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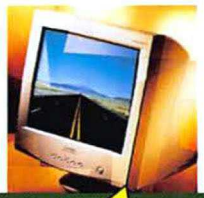

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RAM	32MB EDO DRAM	32MB EDO DRAM	64MB EDO DRAM	128MB EDO DRAM
Hard Drive	4.3GB hard drive (removable)[2]	4.3GB hard drive (removable)[2]	6GB hard drive (removable)[2]	10GB hard drive (removable)[2]
Monitor	12.1" SVGA display	14.1" XGA display	14.1" XGA display	14.1" XGA display
Extra Storage	3.5" floppy drive (dedicated bay)	3.5" floppy drive (dedicated bay)	3.5" floppy drive (dedicated bay)	3.5" floppy drive (dedicated bay)
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The Critics Rave

New! PC Magazine Editors' Choice — Millennia C400 Fra '99

New! PC Computing — Millennia MAX 500 Apr '99

New! PCWORLD — Millennia MAX 500 Apr '99

PCWORLD — Millennia 400 MAX #1 Power Desktop #1 Gaming System Dec '98

PCWORLD — Millennia 450 MAX Best Buy Nov '98 Mar '99

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PC Computing April 1999

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Model Name	Millennia® C400	Millennia 400	*New!* Millennia MAX 500	*New!* Millennia MAX 500	*New!* Millennia MAX 500
Processor	Intel Celeron™ processor 400MHz	Intel Pentium II processor 400MHz	Intel Pentium III processor 500MHz	Intel Pentium III processor 500MHz	Intel Pentium III processor 500MHz
RAM	64MB SDRAM	64MB 100MHz SDRAM	64MB 100MHz SDRAM	128MB 100MHz SDRAM	128MB 100MHz SDRAM
Hard Drive	8.4GB Ultra ATA hard drive[◇]	13GB Ultra ATA hard drive[◇]	13GB Ultra ATA hard drive[◇]	20GB Ultra ATA hard drive[◇]	25GB Ultra ATA hard drive[◇]
Monitor	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx (15.9" display) monitor	17" Micron 700Vx (15.9" display) monitor	17" Micron 700Vx (15.9" display) monitor	15" Micron LCD flat panel display
DVD/CD-ROM	40X CD-ROM drive[◇]	40X CD-ROM drive[◇]	40X CD-ROM drive[◇]	6X max speed DVD-ROM drive	6X max speed DVD-ROM drive
Modem	3Com USRobotics V.90 WinModem**	3Com USRobotics V.90 WinModem**	3Com USRobotics V.90 WinModem**	3Com USRobotics V.90 WinModem**	3Com USRobotics V.90 WinModem**
Graphics	8MB AGP graphics nVidia Riva 128 ZX	8MB Real Starfighter AGP graphics	16MB Diamond Viper 550 TnT AGP graphics	16MB Diamond Viper 550 TnT AGP graphics	16MB Diamond Viper 550 TnT AGP graphics
Training	1-year free[Δ] training @ Micron U online	1-year free[Δ] training @ Micron U online	1-year free[Δ] training @ Micron U online	1-year free[Δ] training @ Micron U online	1-year free[Δ] training @ Micron U online
Factory Direct Price	$1,299 $45/mo. Business. Lease 36 mos.[**]	$1,599 $55/mo. Business. Lease 36 mos.[**]	$1,999 $69/mo. Business. Lease 36 mos.[**]	$2,499 $87/mo. Business. Lease 36 mos.[**]	$3,499 $121/mo. Business. Lease 36 mos.[**]
Order Code:	50150	40150	40152	40154	40156

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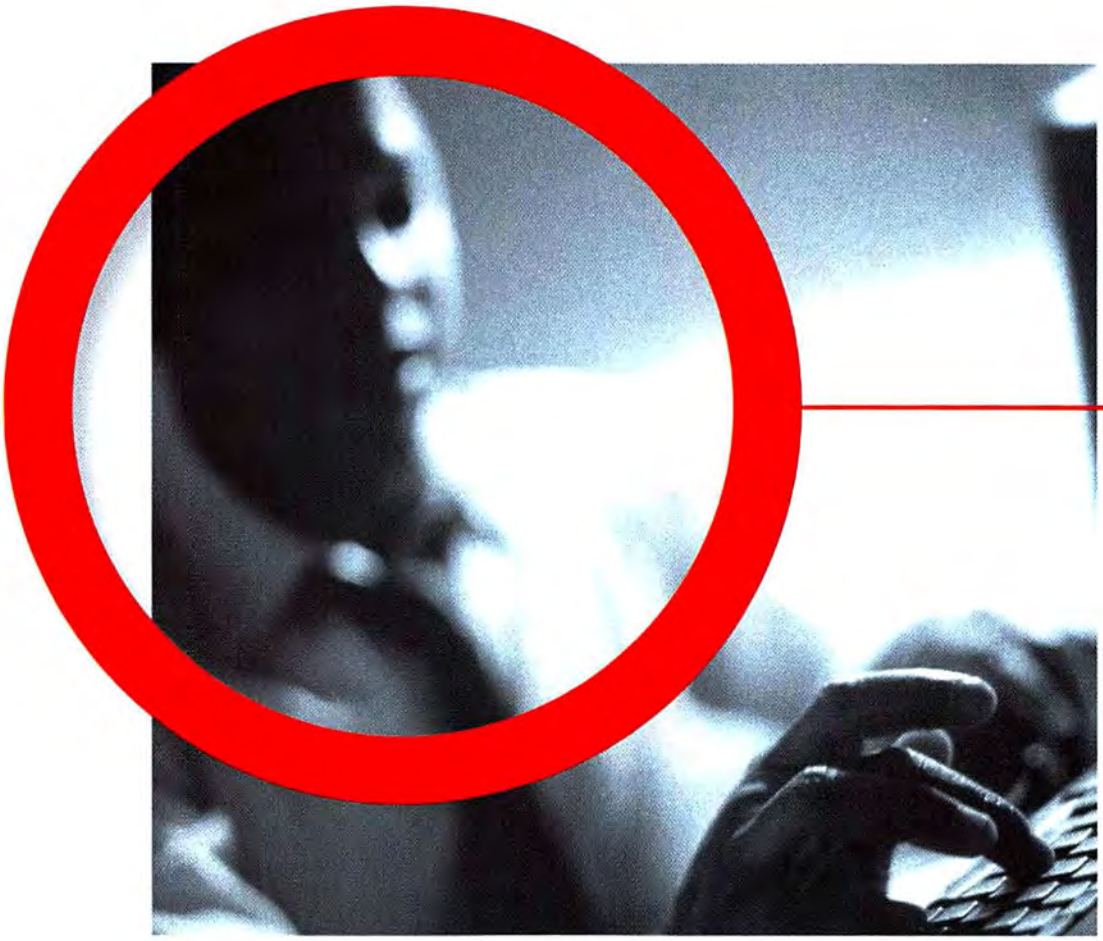

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PC Magazine June '98

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Model Name	ClientPro CP 366	ClientPro CP 400	ClientPro CS 450	ClientPro CS 500
Processor	Intel Celeron™ processor 366MHz	Intel Celeron processor 400MHz	Intel Pentium III processor 450MHz	Intel Pentium III processor 500MHz
RAM	64MB SDRAM	64MB SDRAM	128MB 100 MHz SDRAM	128MB 100 MHz SDRAM
Hard Drive	4.3GB Ultra ATA hard drive*	4.3GB Ultra ATA hard drive*	8.4GB Ultra ATA hard drive*	8.4GB Ultra ATA hard drive*
Monitor	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)	17" Micron 700Vx monitor (15.9" display)
CD-ROM	40X CD-ROM drive*	40X CD-ROM drive*	40X CD-ROM drive*	40X CD-ROM drive*
Cache	128KB internal L2 cache	128KB internal L2 cache	512KB internal L2 cache	512KB internal L2 cache
Graphics	8MB AGP graphics nVidia Riva 128 ZX	8MB AGP graphics nVidia Riva 128 ZX	8MB Real Starfighter AGP graphics	8MB Real Starfighter AGP graphics
Training	1-year free† training @ Micron U online	1-year free† training @ Micron U online	1-year free† training @ Micron U online	1-year free† training @ Micron U online
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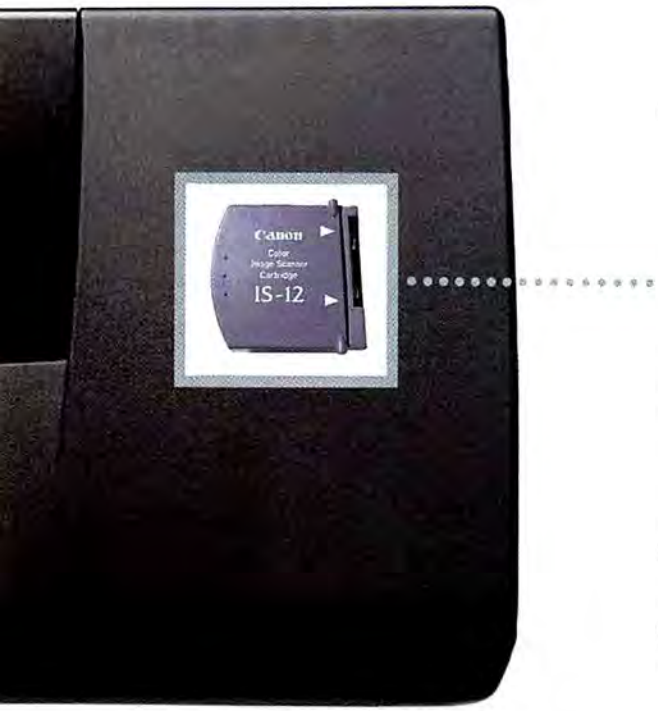

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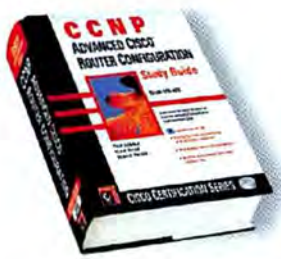

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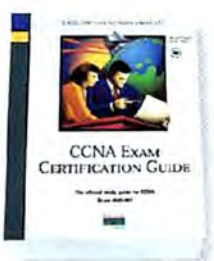

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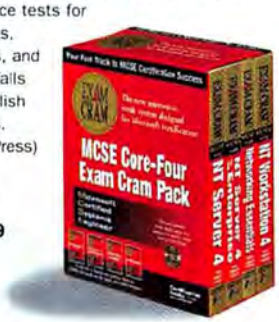

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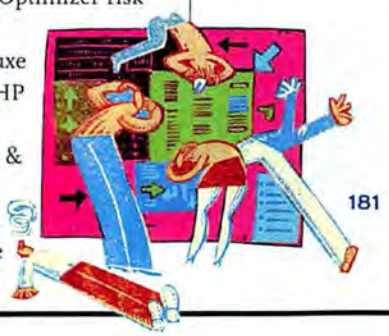

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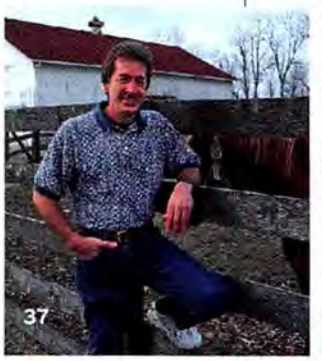

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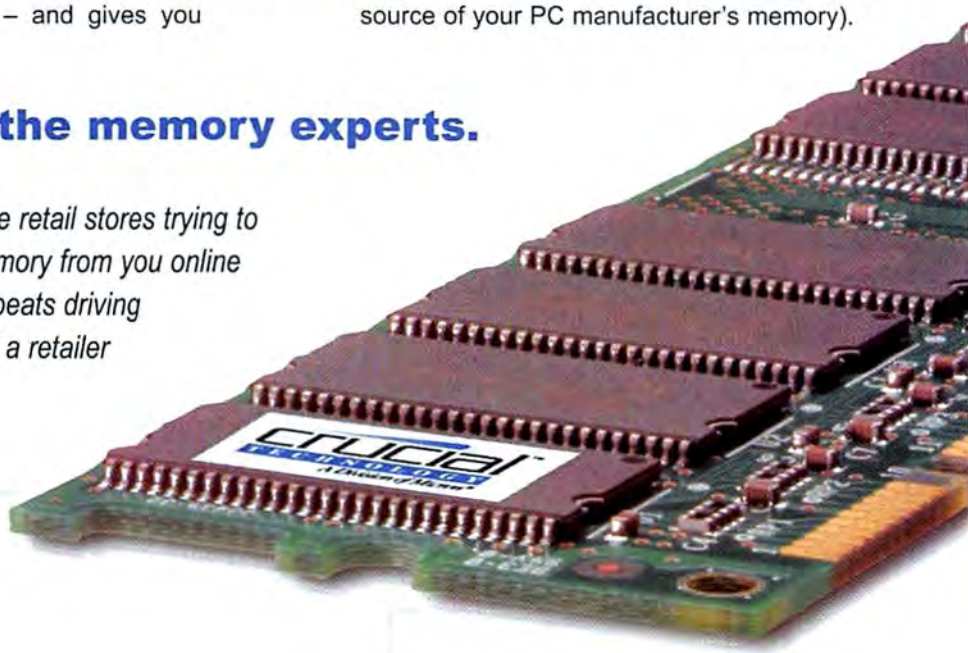

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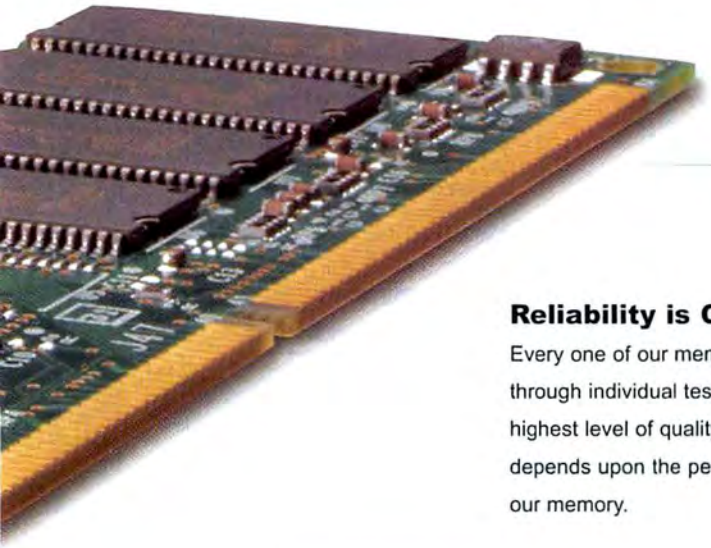

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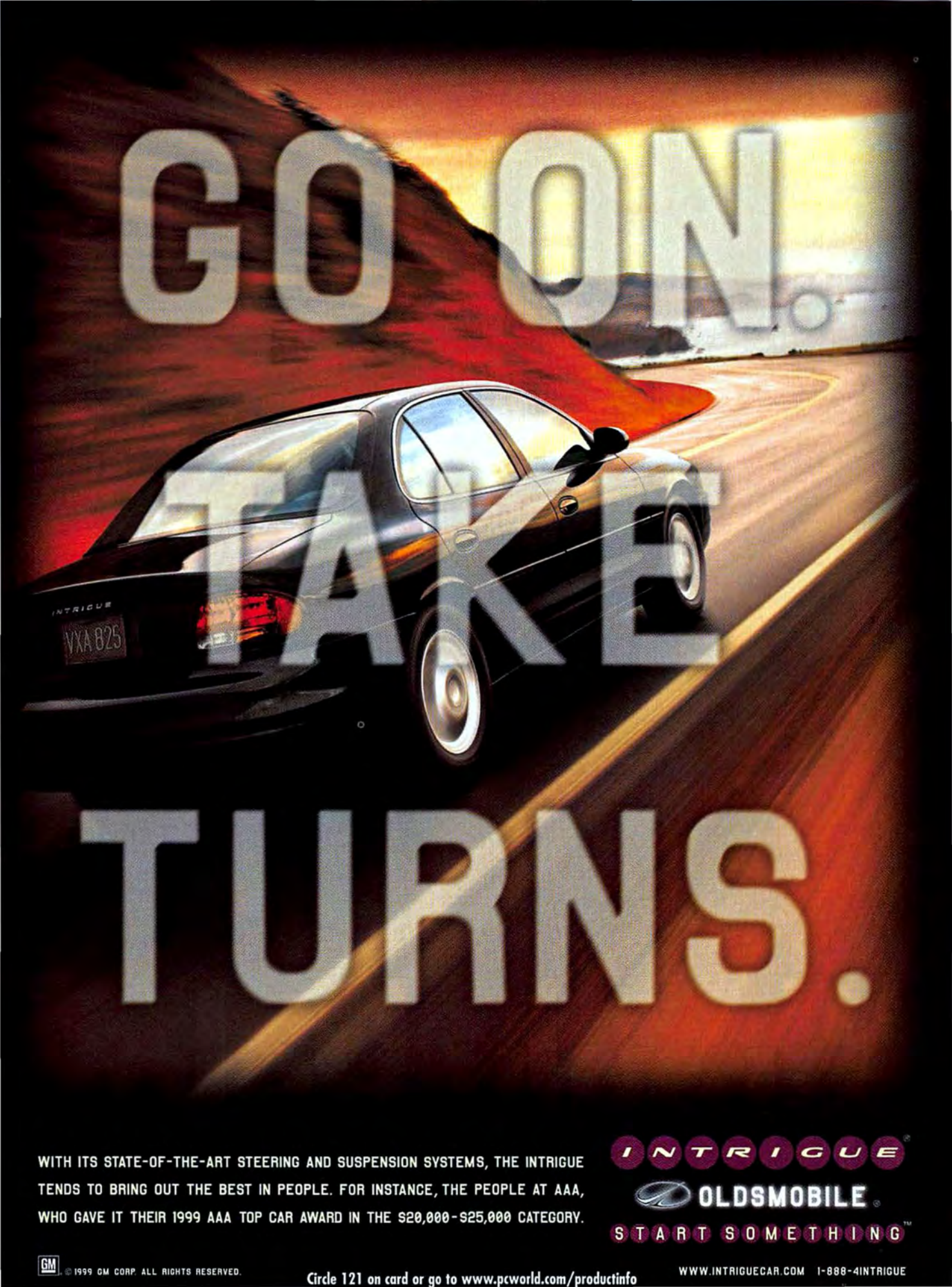

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Do You Have a Right to Privacy?

IS PERSONAL PRIVACY the right of every citizen, or is anonymity a threat to free society? That question, though grossly oversimplified, is the essence of the debate recently reignited by the February launch of the Pentium III with its notorious ID number. But by no means is the Pentium III's ID number the sole technology in question. Consider, for example, these recent developments.

- Free-PC.com announced a deal that got a half million potential users excited and privacy advocates riled. The deal: You supply the company with personal data—your age, income, marital status, and so on. In return, you get a free Compaq Presario with Internet access, e-mail, and a constant display of ads. What's more, Free-PC.com will monitor your whereabouts online.
- Subscribers to TCI's @Home cable Internet access revolted against a new service agreement that, they thought, would give TCI the right to gather and sell information about subscribers. TCI rewrote the contract and clarified the terms.
- Two programmers hacked around the software utility written by Intel that lets buyers of Pentium III systems turn off the chip's ID number. They alleged that even if the PC owner turns off the ID number, the number can be transmitted. Intel denied the allegation.
- Intel also found that a manufacturing error produced a prototype of the Pentium III's ID number in some of its new notebook chips, posing yet another potential privacy threat. The chips affected: 333- and 366-MHz mobile Pentium II chips and 266- and 300-MHz mobile Celeron chips. Intel responded by writing a patch for notebook buyers, and will also work with Microsoft to provide an operating system patch.
- Microsoft acknowledged two separate privacy threats recently uncovered in Windows 98 and Office 97. First, during the registration process for Windows 98, the Registration Wizard sends personal information and a hardware ID number to microsoft.com, even if the user opts not to send that data. Some of the identifying information is also stored in the Windows 98 Registry on the user's hard disk. Second, Office 97 applications—specifically, Word, Excel, and PowerPoint—generate ID numbers based on the serial number of the user's ethernet card; those numbers are then embedded in new documents. In response, Microsoft says it will change the Registration Wizard in the next release of Windows 98; delete information collected in error from its database; create tools that let users delete ID information from Registry files and Office documents; and eliminate the feature that creates ID numbers from Office 2000.

No matter what the **solution,** consumers are **entitled** to informed **choice** and **control**—no questions asked.

FREEDOM OR LICENSE?

ONE ATTEMPT TO thwart such tracking and collection of personal data comes from Zero-Knowledge Systems, a Canadian company that will introduce a controversial new service called Freedom 1.0 this spring. The service is designed to let subscribers browse the Web, send e-mail, and participate in discussions and chat in complete anonymity. Using anonymous remailing and encryption, Freedom offers subscribers one or more pseudonyms, each of which can be used for a different purpose. The service will encrypt all e-mail, manage cookies, and filter spam.

Why the controversy over Freedom? Simply put, critics charge that the anonymity the service provides will attract the unscrupulous—spammers, crooks, and terrorists—and so jeopardize legitimate users.

CHOICE AND CONTROL

IN THE MEANTIME, the debate rages on. Privacy advocates decry identifiers that allow personal data to be misused and behavior to be tracked. Hardware and software vendors and Web sites demand measures that guarantee security and authentication, particularly for e-commerce. Consumers voice varying degrees of tolerance for potential or real threats to privacy.

No matter what the solution, all consumers are entitled to informed choice and control—information about what personal data is being requested and the ability to choose whether and when to release that data. No questions asked.

Cathryn Baskin is editor in chief of PC World. ■

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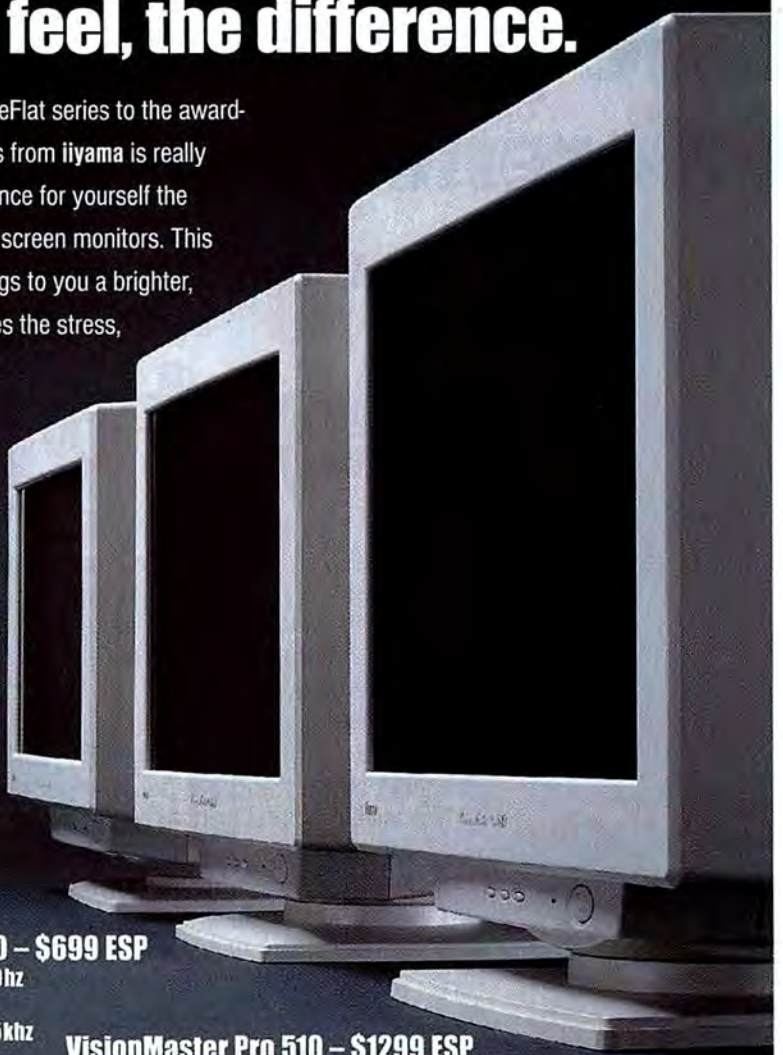

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	VisionMaster 502 (19.5" VIS)	TCO '95	0.22mm/H	110khz	1800 x 1440@75hz	$999
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	Pro Lite 38b (with OSD, USB & Speaker)	TCO '95	0.297mm	62.5khz	1024 x 768@75hz	$1129
15.4"	**Pro Lite 39a** (with OSD, USB & Speaker)	TCO '99	0.2385mm	80khz	1280 x 1024@75hz	$1999
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YOUR TAKE ON: Software costs ◆ Not-so-geeky Linux ◆ Help for the stranded

MICROSOFT'S PRICING

REGARDING Jeffrey Rothfeder's article "Software Prices Still Rising: Blame It on Microsoft" [*Top of the News*, February]: Consumers are willing to pay more for a product if they perceive that it has more value than a competing one. People believe Microsoft Office is worth more to them than Lotus's or Corel's offerings.

Windows 95/98 and Microsoft Office aren't perfect. But if it weren't for Windows 95, I don't believe the computer industry would have grown to anywhere near its current size. The fact that it was Microsoft that achieved market dominance is irrelevant.

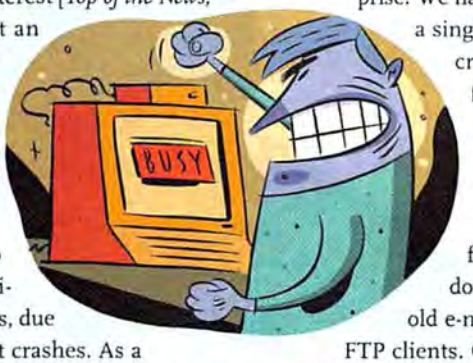
Brian Merrill, Elizabeth, West Virginia

PERHAPS DOS WAS a few bucks cheaper in 1991 than Windows 98 is today, but not many of us would rush to accept that "bargain." And while Claris, Lotus, and Corel sell office suites at a lower price than Microsoft does, expressing surprise at that is like being appalled that a small Chevy costs less than a big BMW.

Alan Reynolds
Hudson Institute, Washington, D.C.

LINUX: THE REAL DEAL

I READ "Upstart Linux: Not Just for Geeks Anymore" with interest [*Top of the News*, March]. I support an organization that uses over 30,000 PCs. Windows support requires five to ten times as much manpower as we needed to support our previous DOS machines, due in part to frequent crashes. As a result I've been searching for alternatives.



As an experiment, we set up Linux on two old Pentium-100 systems (each with a whopping 16MB of RAM). After a week with no crashes, we splurged and added some RAM. One P-100 system was loaded with Red Hat's Linux and the other with Caldera's OpenLinux. Both systems correctly autodetected every component in the boxes, including the hard disk, floppy drive, keyboard, and mouse, as well as the video, network, and sound cards. Surprise! We haven't experienced a single IRQ conflict or crash after close to four weeks of constant use. Next, we installed a variety of heavy-duty applications from different vendors as well as good old e-mail, Acrobat, and FTP clients. Guess what? Still no crashes. Did I mention that I'd never touched a UNIX machine until Linux was installed last month?

With many major apps due for release on Linux before the end of the year, my message to those in the Microsoft Millionaires' Club is short and sweet: Sell your overpriced stock while you still can.

Ward Mundy, Atlanta

REBATE TIPS

I RECENTLY BEGAN working for a fulfillment house, processing rebates. Here's some advice from a data entry operator:

1. Read the directions on the rebate certificate. If you do not send in the required items (such as receipt and UPC code), you will not receive your rebate. The proof-of-purchase requirements are a company's only protection against fraudulent claims.
2. Write legibly! Please print, and if the certificate is small, include a separate paper with your name and address on it.
3. Staple or tape your certificate, receipt, UPC, and other items together so they do not become separated. If possible, attach them all to a blank sheet of paper.
4. A common error is to send the wrong UPC code. If your package has more than one bar code, consider sending all of them.
5. Keep copies of everything sent, and ▶

HOT BUTTON

Uproar Over AT&T WorldNet's ISP Rating

BOY, DID YOU DROP the ball—or your research was outdated—when you rated AT&T as the number one ISP ["Good Providers: The Best National and Regional ISPs," March].

AT&T has pushed aggressively for market share the last six months and at the same time has tried to convert to V.90. This has resulted in busy signals and poor connection speeds. It took me almost 45 minutes to get on and write this e-mail.

Mark Wiars, Boise, Idaho

FOR MORE THAN a year, I've received constant busy signals when trying to log on to my local access number. I have been able to connect to it precisely twice in the last week.

AT&T *has* gone out of its way to field my complaints recently, even calling my home to get a better grasp on the situation. I give its customer service an excellent grade; however, the Net service itself fails miserably.

Raymond C. Rodgers
Mission Viejo, California

YOUR ARTICLE COULD NOT have hit at a worse time to irritate people who actually use AT&T. This is the most off-base article I have ever seen you publish.

Dale Bishop, Lee's Summit, Missouri

AT&T REFUSES to accept you as a customer unless you install its software. I've changed ISPs several times without ever having to follow such a requirement, so I know there's no technical reason for this. When I phoned AT&T to ask why it has this policy, I couldn't get a credible answer.

To uninstall its software, AT&T had to walk me through a tedious manual procedure, but its logo remains on my browser.

Dave deBronkart
Windham, New Hampshire

Editor's response: AT&T WorldNet's network problems are indeed real—and began after our testing for the article. Go to www.pcworld.com/pcwtoday/mar99/ispupdate for the latest. **–Brad Grimes, senior editor**

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Brenda Sessions, Avondale, Arizona

IF YOU'RE STRANDED...

CHRISTINA WOOD'S article ["Stranded! How to Stay Afloat When Your Vendor Sinks," *Top of the News*, March] omitted one possible avenue of relief. When Nimantics, from which I bought my notebook in December 1997, went AWOL, I found the machine strikingly similar in appearance to models marketed by ARM, Chem, EnPower, Hyperdata, Mitac, and others. The machines were clearly all made by the same firm. By contacting several of them, I learned Mitac was the actual manufacturer. Mitac graciously agreed to honor the first year of the warranty, so my machine was not entirely an orphan.

Ira L. Dubitsky, Miami

NET SECURITY TIP

WE ARE ALL starting to buy on the Internet with our credit cards—and with a certain amount of worry about security, stolen numbers, and fraudulent charges. So I telephoned the bank that issues my MasterCard and asked for a second card with a separate number and a $500 limit. This is the card I'll use to buy things on the Internet. If it gets stolen, it will max out at $500 (less what I may have bought). Thieves like to buy big-ticket items, so my second card won't do them much good.

Bill Beer
St. Thomas, U.S. Virgin Islands

CLICK OF DEATH

STEVE BASS'S article on the "Click of Death" problem [*Home Office*, March] is an emotional response to an emotional situation. Bass states that according to Iomega, the problem has been reported in fewer than half of 1 percent of Zip and Jaz products. Iomega's information on it is hardly buried. I went to the firm's Web page and clicked three buttons (Support, FAQ, "What to do if my Zip drive is making repetitive 'clicking' sounds"). Iomega says it will repair or replace affected products free of charge, and Bass indicates Iomega will help users recover their data.

Let's hope this is the only mechanical breakdown Bass experiences. I'd hate for him have to put his car, telephone, television, stereo, and hot-water heater on the shelf next to that Jaz drive.

Greg Savard, via the Internet

PC World *welcomes your letters to the editor.* *See page 12 for contact information.* ■

CORRECTIONS AND CLARIFICATIONS

IN APRIL'S "A Scanner for All Reasons," the features comparison chart should have listed the parts/labor warranty as one year for the Microtek ScanMaker X6 and as 90/30 days for the HP ScanJet 6200C.

In April's *Top 10 Home PCs*, the price of the CyberMax Enthusiast KII-350 should have been $1199. Also, Gateway's G6-500 comes with a 4.8X DVD-ROM drive.

"Upstart Linux: Not Just for Geeks Anymore" (*Top of the News*, March) wrongly implied that the Gnome user interface is a Red Hat product. Gnome is free, open-source software that will be distributed by Red Hat and other companies.

In March's *Top 10 Printers*, we errantly referred to the HP LaserJet 2100 as the HP *DeskJet* 2100.

March's "Good Providers: The Best National and Regional ISPs" should have said our reader survey was conducted in conjunction with World Research of San Jose, California.

February's *New Products* review of NetZip Deluxe 6.3 noted the software's ability to resume a Net download at the point of interruption. This feature works only when the server at the other end supports it.

In February's "Virucide!" feature, we indicated that Symantec provided toll-free phone support for its Norton AntiVirus 5.0. However, the support itself is generally not free. Symantec's *toll-free line* provides two support options that cost either $29 per problem or $2.95 per minute. A third option is a toll line, 541/465-8420, that offers free service for 90 days from the date of the customer's first call.

On page 144 of January's "Snapshots: New Digital Cameras Come Into Focus," we should have said that the Minolta Dimâge EX Zoom 1500 does include an optical viewfinder.

PC World regrets the errors.

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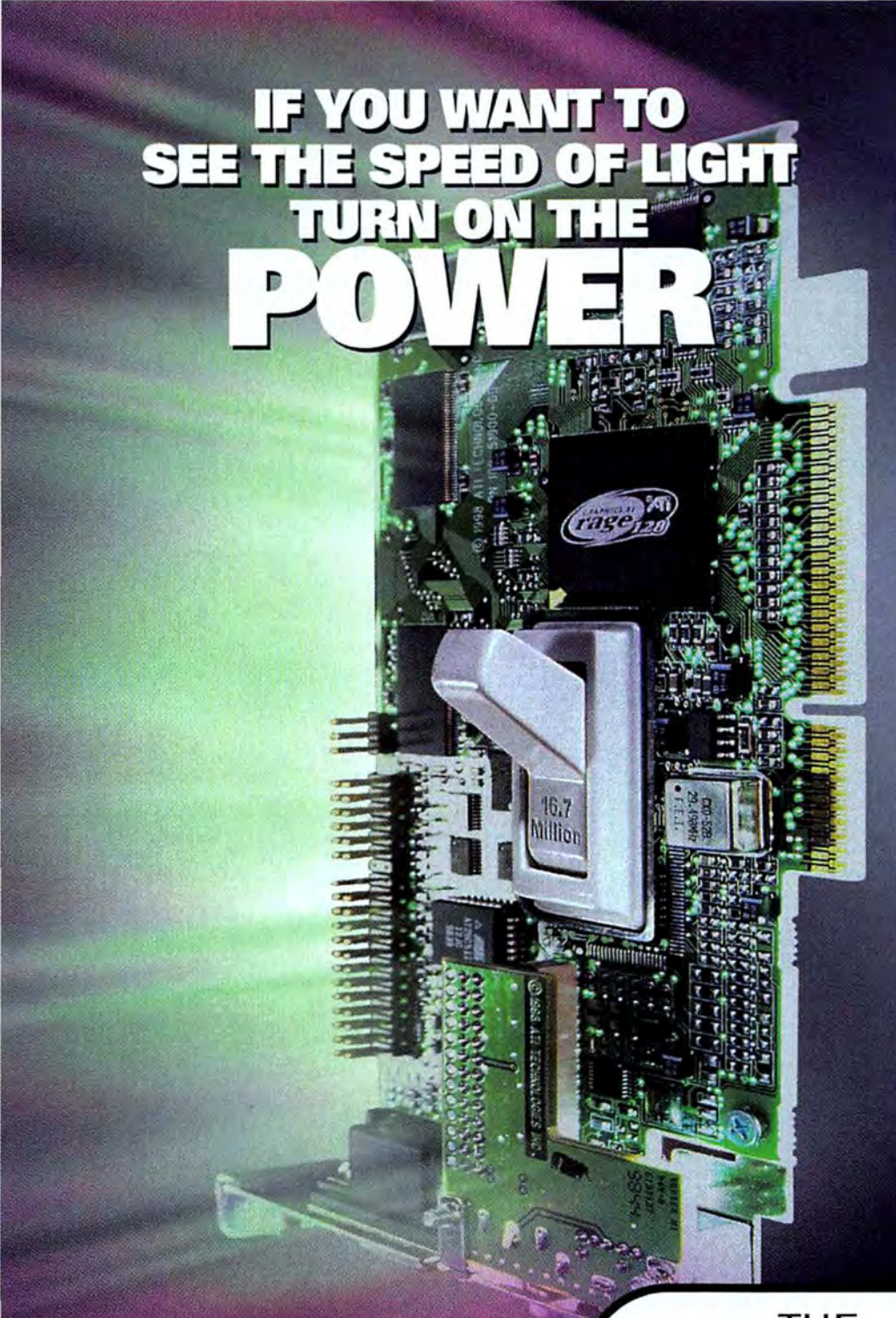

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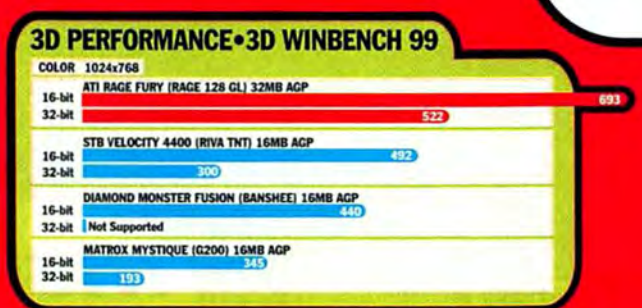

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Don't Get Taken at Web Auctions

Web auctions are booming, but so are complaints from buyers and sellers. Here's how you can protect yourself.

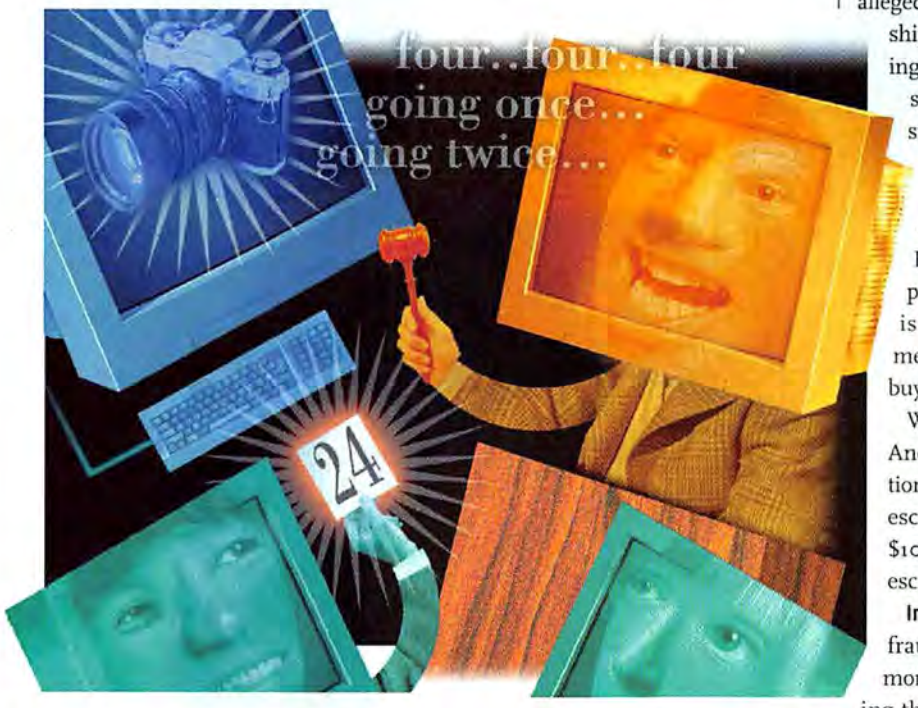

ILLUSTRATION: GORDON STUDER

IN INTERNET YEARS, Web auctions have reached adolescence. Seemingly overnight they've gone from fledgling start-ups used by small communities of regulars to multimillion-dollar enterprises more populous than some small countries.

And with this meteoric success have come the inevitable growing pains. Consumers and auction houses are grappling with the challenge of conducting person-to-person transactions online.

Participating in an online auction involves more than just registering with a site and placing a bid. And starting your own auction brings its own set of challenges. In either case, it's important to understand the risks and then take precautions to minimize them. Here's a look at common pitfalls, plus ways to shop with confidence.

DANGER ZONES

Undelivered products. It's every buyer's nightmare. You win the auction and pay your money, but the goods never arrive. By most accounts, only a small percentage of auction transactions turn out to be fraudulent. Still, you need only be burned once to decide it just isn't worth the risk.

In Pennsylvania, the state attorney general's office filed charges against a man accused of selling Furbies at an EBay auction and failing to deliver the toys to the winning bidders. In another instance, the U.S. postal inspector's office is investigating an Oklahoma man who allegedly cashed in on winning bids but never shipped the sports memorabilia he was selling on EBay. Do these and other cases constitute an epidemic? No. Should consumers be concerned? Absolutely.

One of the most effective methods of protecting yourself is to engage an escrow service to handle the transaction. For a fee paid by both parties (typically 5 percent of the sale price or $5, whichever is higher) the service acts as an intermediary, holding on to the funds until the buyer has a chance to inspect the goods.

When does an escrow service make sense? Andy Rebele, founder and CEO of City Auction, urges consumers to take advantage of escrow services when buying items worth $100 or more. And if a seller won't use an escrow service? "Move on," he advises.

Inaccurate descriptions. Although cases of fraud often make headlines, a more common problem is that of products not matching their descriptions. Take Rani Garner's experience. She purchased a basket of "New Year's goodies" on City Auction last year, but, says Garner, it "was nowhere near what the picture showed." In fact, she adds, the basket contained "a bag of leftover Halloween candy, one broken glass, and one filthy one."

Although it's impossible to avoid all risk (even when, as in Garner's case, the seller includes a picture of the item), attention to the details can improve your odds of getting what you pay for. First, make sure you know whether the item is new or used, what condition it's in, and in the case of electronics or computer equipment, the product's specifications. If the seller's description doesn't answer all your questions, send an e-mail asking for more information.

Shill bidding: Look at auction message boards, and you'll see why shill bidding—using a ▶

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decoy to drive up bids—is a source of concern to auction enthusiasts. Auction houses say that they are constantly on the lookout for shill bidding and urge users to report any suspected abuse. In a recent overhaul of many of its customer service policies, EBay instituted tougher penalties for shill bidders. A first offense warrants 30-day suspension from the service. Repeat offenders are banned permanently. EBay spokesperson Kristin Seuell says that the service "has ways of detecting shill bidders," but for security reasons, she was not able to elaborate.

Consumers can protect themselves by researching the value of an item before bidding. Once the auction is under way, it's easy to get caught up in the excitement. Set a cap on what you're willing to pay, and stick with it. Most sites let bidders indicate a maximum bid, and automatically update the bid by the smallest possible increment until the cap is reached. This may stem an impulse to overbid.

One note: Although buyers assume much of the risk associated with auctions, sellers can also have problems. The most common complaint among sellers is deadbeat bidders—people who win an auction but fail to make payment. Though it's hard to protect yourself from deadbeat bidders, you can specify in your auction's regulations that if the winner fails to pay within a specified period, the auction will be voided. Also, say plainly that no products will be shipped until a check is received and has cleared.

THE FEEDBACK CONUNDRUM

A CENTRAL COMPONENT of person-to-person auction sites is the feedback section, where buyers and sellers can leave their kudos and complaints about fellow auction participants. Based on these comments, buyers and sellers earn negative and positive ratings. It's a great system—when it works.

With the exception of profanity or statements known to be false, comments go unedited. Although this policy encourages dialogue, it can lead to abuse. Buyers and sellers who feel they've been burned can ruin an individual's reputation—sometimes groundlessly. Participants can also falsely boost a rating by using multiple IDs or conspiring with others to post bogus comments.

How do you know which comments to believe and which to ignore? First, read a large enough sampling to understand the overall tone. Then, check to see who wrote the comments. Have the writers actually completed transactions with the person in question? If the comments themselves don't make this clear, then e-mail the writers to find out.

Seemingly great deals can turn into disasters for those who don't do their homework. Take the time to learn the rules of the game.

On EBay, for example, any participant can comment about anyone else, and until recently, it was difficult to know if an overall positive rating was the result of successful transactions or because the person being rated had a lot of friends filing comments. Comments are now separated into two groups—those dealing with a specific transaction and more general ones about a registered user. Again, if you have questions after reading the comments, contact some of the writers as well as the person with whom you're thinking of doing business. If you don't get satisfactory answers, look elsewhere.

BUYER-AND SELLER-BEWARE

ONLINE AUCTIONS can be a great way to buy and sell everything from used computers to collectibles. But seemingly great deals can turn into disasters for those who don't do their homework. Take the time to learn the rules of the game—this knowledge will serve you well as you take a walk on the wild side of e-commerce.

Do you frequent online auctions? How can participants protect themselves from rip-offs and fraud? Send your thoughts to consumerwatch@pcworld.com. Contributing Editor Roberta Furger is the author of Does Jane Compute? Preserving our Daughters' Place in the Cyber Revolution *(Warner Books, 1998).* ■

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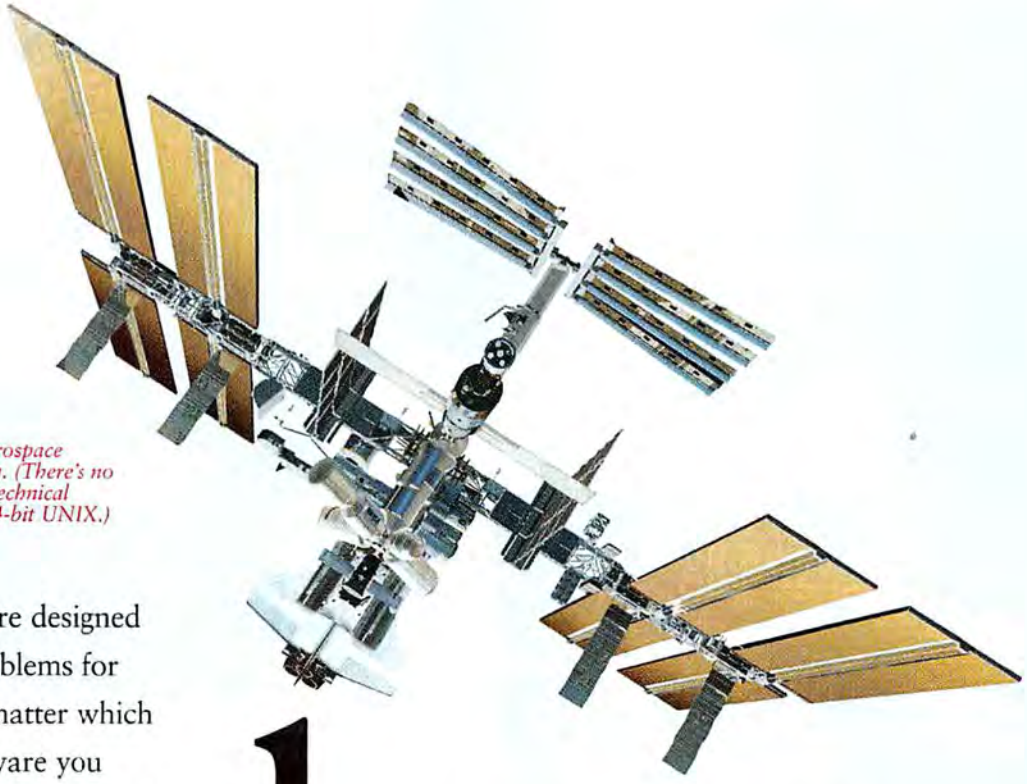

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matrox

Passing the Buck: Vendors vs. Stores

JIM STRACHAN OF Fort Worth, Texas, saved plenty when he bought a PC-and-printer bundle from Computer City. His $1400 got him an IBM Aptiva desktop and an Epson Stylus Color 400 printer. But when the latter broke, Strachan felt neglected by both the store and the printer maker. "No one took responsibility," he laments. "Everyone kept blowing me off."

Two months after his printer died, Strachan got a replacement from the store, but the new unit didn't work. Then CompUSA, which had purchased Computer City in the interim, told him to call Epson, noting that the printer was under an Epson warranty. Epson sent him another unit, but when it failed diagnostic tests, the company told him to call CompUSA. After a dozen calls, Strachan got his fourth printer. He hasn't had the heart to try it yet.

Strachan's tale highlights a thorny problem: When a hardware bundle goes bad, who fixes it? According to Suzanne Shelton of CompUSA, the original manufacturer is responsible—even if the store assembled the bundle. An Epson representative, however, believes the customer can choose whom to call first.

Other national chains such as Circuit City and Best Buy operate as authorized service centers; you can go to them directly or try the manufacturer. Mail-order merchants vary: Micron sends you to the manufacturer of any external part, while Gateway provides hardware support itself for a year.

Even if you purchase an extended warranty from a store—as Strachan did, for $150—the manufacturer remains responsible until the original warranty period expires. When that happens, the extended warranty kicks in, and only then should you contact the store. At that point, the store needs the manufacturer's permission to perform repairs; the shop usually gets the authorization for you, as CompUSA did for Strachan.

ILLUSTRATION: ROBERT NEUBECKER; ICONS: JEFFREY PELO

Heads Up...

ACCORDING TO THE Better Business Bureau in San Jose, California, **Auctionboard.com** has gone out of business. In its place is WebMatch (www.webmatch.com/ab/auction.cfm). Despite our efforts, we were unable to clarify the relationship between the two companies. WebMatch appears active, but phones were disconnected and e-mails bounced back. Bid at your own risk (see *Consumer Watch*, page 27)... In January, plotter and input device maker **CalComp Technology** of Anaheim, California, shut down. Ringdale of Austin, Texas, is offering service and parts to CalComp's Solus 4 customers. Call 800/756-8669 for info... Fee-paying **MSN** members were furious at slow chat rooms as a result of the forum going "public." Will Diefenbach of MSN acknowledges the new policy increased traffic and overloaded servers. "We are monitoring traffic closely and adding servers," he says. If your chat still lags, call 425/635-7019... In January, **Micro Express** customers couldn't reach the PC maker's 24-hour tech support line or got delayed responses. Art Afshar, Micro Express president, admits to the slowdown. "We are watching callback times, and now offer e-mail support after hours and on weekends," Afshar says.

LETTER OF THE MONTH

I BOUGHT A refurbished Canon BJC-4100 printer from WebAuction.com. It prints badly, making pages hard to read. I have contacted Canon ten times about getting it repaired, and repeatedly faxed them my purchase receipt. [Note: Traylor's 30-day WebAuction warranty expired, so he relied on Canon's limited one-year warranty for refurbished models.] Finally, one support representative found that I needed a new printhead and promised to send one. Five months later, I'm still waiting.
—Terry Traylor, Dyersburg, Tennessee

PC World responds: *On Your Side* contacted Canon on Traylor's behalf, since the problem was still covered by the manufacturer's limited warranty. Peter Bergman, Canon's vice president of marketing and customer support, apologized for the delay. The company sent the replacement printhead as well as $120 worth of ink cartridges as a goodwill gesture to Traylor. Unfortunately, the new printhead didn't work. Traylor finally sent the printer to an authorized Canon repair facility. The repair shop fixed the problem in less than a week. ■

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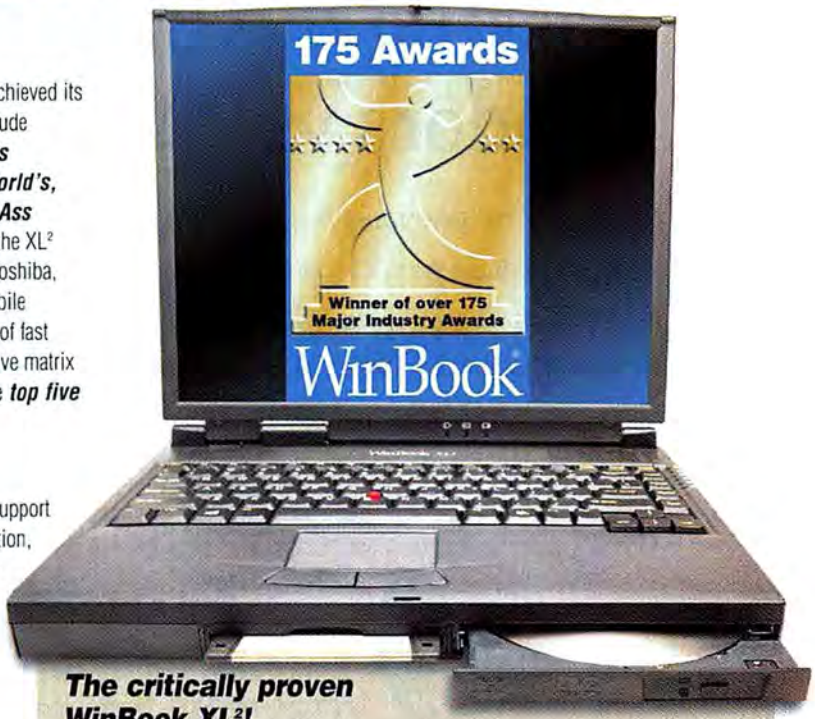

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PHOTOGRAPH: SHAWN SPENCE

DAN TERRY'S HOME COMPUTER was on the fritz and he had no idea why. Whenever he left it unattended for very long, the screen would freeze and he'd have to reboot. His only clue was a cryptic error message: "Mpr.dll file will not start. Please check the file to determine the problem." Terry, of Batesville, Indiana, reinstalled his software and peripherals, reread the manuals, and installed several Windows 95 service patches. But the PC remained crippled.

"I was running out of ideas and things to try," he recalls. Frustrated, he visited a Web search engine and typed in "technical support." With fingers crossed, he sent off his problem to Ask-A-Tech (www.ask-a-tech.org), an unassuming-looking Web site that promises free, e-mail–based technical help. Less than 48 hours later, Ask-A-Tech had pinpointed the source of the hang-ups: The scanning utility that came with Terry's Hewlett-Packard scanner was interfering with a Windows DLL file.

Following Ask-A-Tech's step-by-step advice, Terry disabled the utility—and he hasn't had that problem since. "I was amazed," he says. "All I sent them was the error message and a basic description of my system. I didn't even mention that I had a scanner attached." Terry had discovered a rich resource for technical assistance: Web sites operated not by big companies but by real computer users who provide knowledgeable advice, free of charge.

ONLINE SUPPORT FROM REAL USERS

HEFTY SUPPORT FEES, poorly written manuals, undertrained support staffs, defunct companies—any of these PC-age plagues can drive a support-hungry user online. Many vendors' Web sites provide a wealth of information. But user-run sites are also well worth a try, especially when, like Terry, you can't narrow the source of your headaches down to a particular manufacturer's product. Other real PC users may already have encountered—and solved—the same problems you face. And unlike some vendors, they won't engage in diversionary finger-pointing when PC conflicts arise from clashing hardware or software from multiple companies.

Armed with vendor technical libraries and professional experience as help-desk technicians, Miguel Zlot and two colleagues run the year-old Ask-A-Tech in their spare time. "I've run into brick walls with support many times myself and I became sick of it," Zlot says, explaining his altruistic mission.

Then there is Experts Exchange (www.experts-exchange.com), a free tech support Web site that dubs itself a "knowledge-sharing community." Built around 70 message boards, the site uses a scoring system to discourage idle chitchat and to ensure timely, accurate responses. Over 5000 registered "experts" answer posted questions; when your question gets responses, you grade them for accuracy. Experts who rack up high scores receive recognition on tote boards—and you get good, free support.

Other Web sites operated by computer enthusiasts offer a more free-form approach to ▶

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solving PC problems. Frank Condron's World O' Windows (www.worldowindows.com) provides both elusive hardware drivers and informal support from fellow users. The bustling message boards at Tom Pabst's Tom's Hardware Guide (www.tomshardware.com) are a good source of advice on high-powered hardware topics such as the latest CPUs.

These are just a few of a vast number of Web sites that provide free tech support and general computing advice. To track down others, visit the aforementioned sites, nearly all of which include pages of links to additional resources.

NO GUARANTEES

MOST OF THE help these sites offer is provided by Good Samaritans who have full-time jobs and other interests. That means you shouldn't expect to get answers (correct or otherwise) to your technical questions within a certain period of time.

So what's left? You can always turn to a fee-based support service, such as Intel's AnswerExpress, PC Crisis Line, and PC Techline (see the box above for contact information for these services). Andrew Fratesi, a technically savvy user in South Plainfield, New Jersey, is a committed fan of PC Techline, a 900-number service that charges $2 a minute. The service consistently provides fast solutions to his gnarliest PC problems. "I haven't stumped them yet," he says.

Carla Thornton is a contributing editor for PC World. *If you're having trouble resolving a PC-related hardware or software problem, we'd like to hear about it. See page 12 for contact information.* ■

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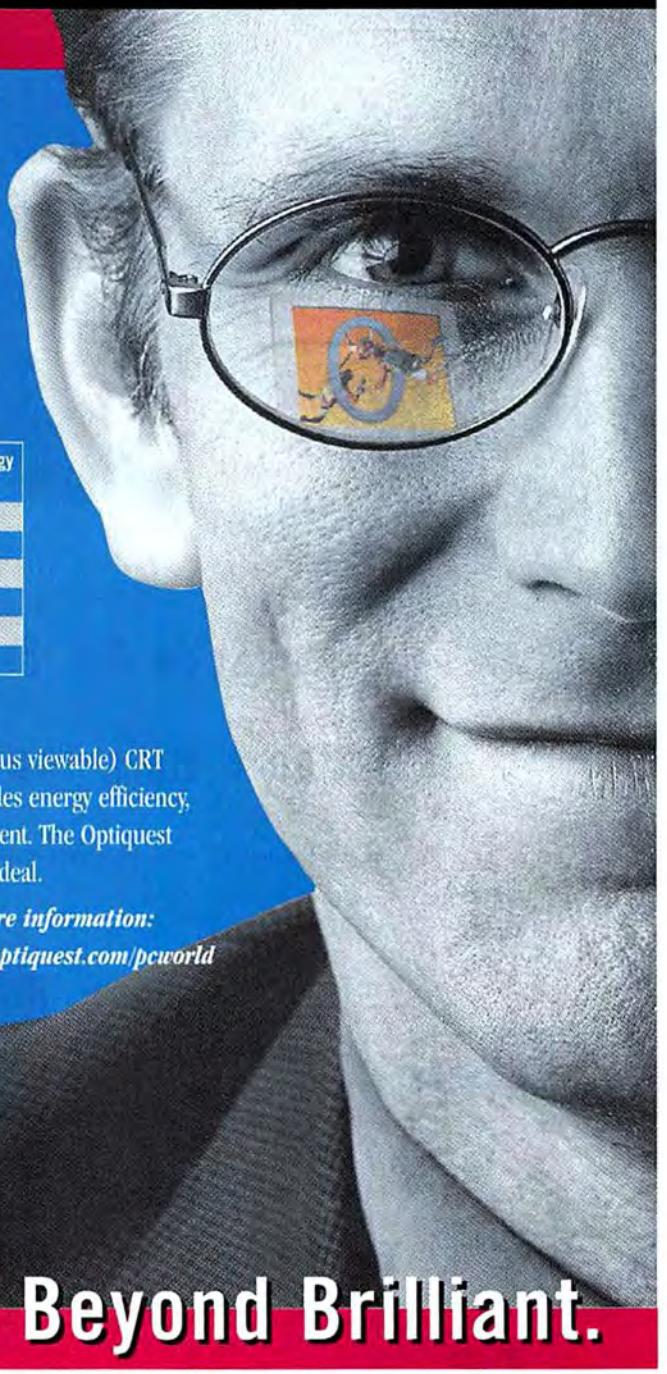

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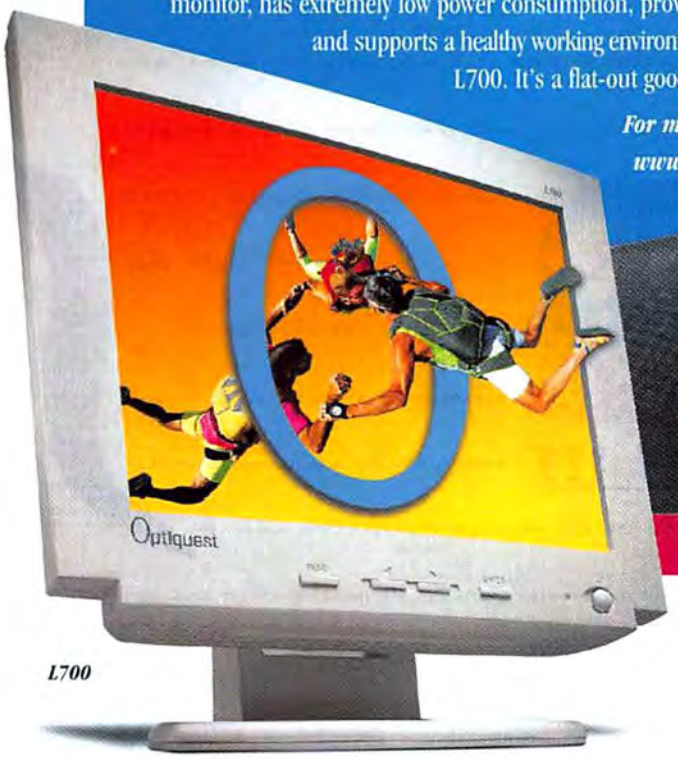

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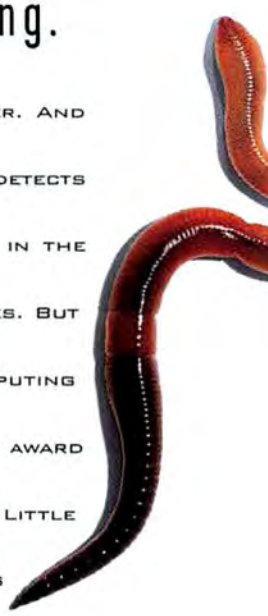

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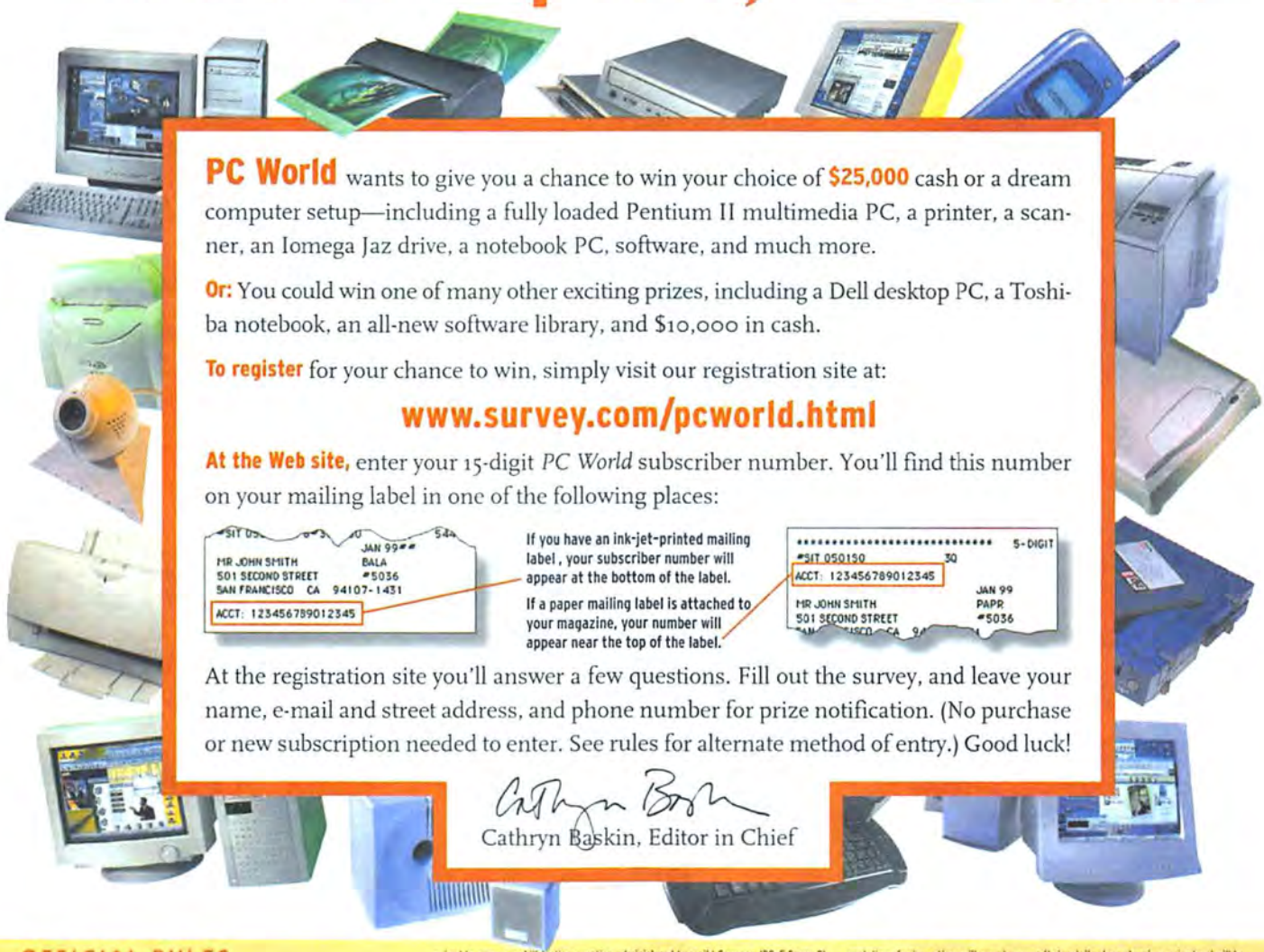

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Cathryn Baskin, Editor in Chief

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My Home Network: Look Ma, No Wires

REMEMBER THE 1940S movie *The Snake Pit*, where Olivia de Havilland dreams she's trapped in a nest of vipers? That's what the floor of my office looks like. My feet are tangled in cabling—hundreds of feet of it, spontaneously breeding at night.

So when I wanted to connect my wife Judy's PC to mine, I put my foot down (carefully): no more wires. Instead of a traditional ethernet LAN, I set up a wireless network. And by gosh, it actually did the job. Sure, it's a bit slower and more expensive than a wired network, but it's also a heck of a lot neater and easier.

Why a home network? Two reasons. First, it cuts costs. For instance, my wife and I can share one printer, and when I back up my system, Judy's gets backed up as well. And here's the biggie: We can share one fast ISDN Internet connection.

Second, networks are now much easier to install and manage. And I'll give credit to (yes, get ready, I'm going to say it) Microsoft. Windows 95, 98, and NT are all network-smart, and configuring a system is no longer a daunting task.

SNAKING DOWN THE HALLWAY

THE BIG PROBLEM with a wired LAN is, of course, the wires. The only way to avoid drilling holes in the walls, schlepping wires through the attic, or running cables down the hall is to go wireless. Sure, it'll cost a few more bucks, but I promise that you'll be networked in under an hour.

I tried Diamond's HomeFree Wireless Desktop Pac, a $200 kit with two networking cards—one ISA and the other PCI. Each card has a transceiver that sends and receives data. The gizmo sticks out behind the computer about an inch and operates at 2.4 GHz, safely beyond the range of devices like cordless phones or wireless keyboards. (Strangely, though, I could no longer listen to Dr. Laura through the transmitter in my teeth.)

Strangely, though, I could no longer listen to Dr. Laura through the transmitter in my teeth.

The amazing part is how easy it was to install the HomeFree network. Windows 98 recognized the card and asked for the CD-ROM so it could install drivers. After two reboots, and one request for my Windows 98 CD-ROM, my computer was ready to go. Then I booted my wife's system and went through the installation process. HomeFree's two network cards found each other, and the LAN was installed. The network recognized the ISDN phone line on my system, and I was all set. I didn't have to tweak—heck, I didn't even *see*—any network gobbledygook.

HomeFree handles up to 16 PCs, and each one can be up to 150 feet away. I had no trouble at 50 feet (and listen, if I had a hot tub out back, I'd have hooked up my notebook and gone the distance).

OH NO, IT'S SLOW

HERE'S THE CATCH: Wireless nets move data more slowly than ethernet LANs. For kicks, I installed Linksys's wired, $60 Network Starter Kit and made some comparisons. On the wired network, a 5MB file took 7 seconds to transfer; a 29MB file took 35 seconds. With HomeFree, the 5MB file took 3 minutes and the 29MB file slogged along for 20 minutes. But I saw no slowdown with Net browsing or e-mail.

The other gotcha is more basic. If my PC is turned off, or it crashes, my wife loses access to the Internet—most likely during the last 2KB of a 20MB download. One solution: Connect an old, working PC to the network as a dedicated communication server (hey, it's better than giving it to your brother-in-law).

You can learn more about building a network at www.linksys.com/support/faqs. To dig deeper, try *Networking Home PCs for Dummies*, a super how-to book.

Next month I'll tell you about my fiasco with speedy cable modem access, and how to share an Internet connection without a LAN. But for now I've gotta go—I feel a snake crawling up my leg.

Contributing Editor Steve Bass is a licensed marriage and family therapist and the president of the Pasadena IBM Users Group. *See page 12 for more information.* ■

HomeFree Wireless Desktop Pac
$200, extra cards $100 each; Diamond Multimedia Systems; 800/468-5846, 408/325-7000; www.diamondmm.com
PRODUCT INFO NO. 693

Linksys Network Starter Kit
$60 street; Linksys; 800/546-5797, 949/261-1288; www.linksys.com.
PRODUCT INFO NO. 694

Networking Home PCs for Dummies
$25; IDG Books Worldwide; www.dummies.com
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Latest browser fixes ◆ Outlook can't archive ◆ **Honey, I blew up the camera**

Last Rites and Fixes for the 4.0 Browsers

ICON: JEFFREY PELO

INTERNET EXPLORER 5 is here, and Communicator 5 is on the horizon. Microsoft and Netscape have been working intensively on these latest versions, which promise to be smaller and more stable than the first 4.0 versions. If you're smart, though, you'll stick with your 4.0 browser until the canaries who use versions 5 have been singing for a couple of months.

No browser (or other complex app) is likely to be bug-free. But after a couple of years of patches and revisions, Communicator and Internet Explorer are pretty close now. Netscape recently posted Communicator 4.51 to its Web site, and Microsoft may already have posted Internet Explorer 4.0 Service Pack 2 by the time you read this. Both correct minor flaws—buttoning up loose ends, smoothing over irritating glitches, and plugging obscure security holes.

Communicator 4.51 is the first update to version 4.5 of Netscape's browser suite. If you're still using Communicator 4.0*x*, note that Netscape says the current version (4.08) will be the last. As we went to press, the company wouldn't supply any details on the fixes contained in version 4.51, other than to say that it solves many of the problems listed on the Communicator 4.5 Release Notes Web page (home.netscape.com/eng/mozilla/4.5/relnotes/windows-4.5.html) as well as four specific security flaws discovered after version 4.5 shipped. The security holes—most of them discovered by Bulgarian sleuth George Guninski—exploit pinholes in Communicator's Javascript scripting language.

Though Netscape assures us that no one has exploited these flaws yet, you should grab the update to reduce your chances of being hacked. To update your current copy of Communicator, choose *Help•Software Updates.*

Grim Fandango 1.01

STILL CAN'T SOLVE that LucasArts Grim Fandango game you got during the holidays? You may have the program's bugs to blame. Several of them induce lockups at critical points in the game, leave players unable to move or open certain doors, or cause important clues to whiz by too quickly to be seen. Yet another bug makes the game crash on speedy systems (Pentium II-400 and faster). For additional details (including game spoilers), point your browser to www.lucasarts.com/support/grim.htm, or download the 2.2MB patch from ftp.lucasarts.com/patches/pc/gfupd101.exe.

IN BRIEF

Kodak Power Supply Recall

BE CAREFUL WITH that AC adapter. If your Kodak DC25, DC40, DC50, or DC120 digital camera came with one of four Elpac AC adapters, you need to contact Kodak about obtaining a replacement. If not fully plugged into the digital camera, the faulty power supplies can make the camera's batteries overheat, leak acid, and even explode. A Web page maintained by Kodak (www.kodak.com/US/en/digital/accessories/ac) points out that such leakages or explosions can cause lacerations or thermal and chemical burns. If you own one of the recalled adapter models—2534, 2457, MI2008, or M42008—you can continue to use it with your digital camera. Just be sure to remove the camera's batteries first. Or better still, register at the same Kodak Web site for a free replacement adapter.

Meanwhile, Microsoft expected to release the Internet Explorer Service Pack 2 in the first quarter of 1999, but the company wasn't sure of the precise date. SP2 will collect the security fixes that appeared after SP1 came out last year (most of them already reported in this space). IE's Guninski counterpart is Spaniard Juan Carlos Cuartango, discoverer of the "Cuartango" and "Son of Cuartango" holes. As we went to press, Cuartango announced that he had found yet another IE 4 security flaw (dare we call it "Return of the Son of Cuartango"?)—one that allows naughty hackers to view the contents of your clipboard. To download Service Pack 2, choose *Help•Product Updates.*

Outlook 98/97 Archive Jive

WHEN YOU ARCHIVE your precious messages in an e-mail program, you expect them to be there later, when you need them. But if you use Microsoft's Outlook 98 or 97 and its Archive or AutoArchive feature, you may want to double-check that they're still around. The company recently acknowledged that both versions of its e-mail/PIM program can lose messages if the computer should crash, reboot, lose power, or otherwise expire while Outlook is moving them to the archive file. As we went to press, Microsoft was about to post a 51MB fix that prevents system failures during the archiving process. Until then, the company suggests you avoid Archive and AutoArchive. For details on the fix and a link to the patch, see officeupdate.microsoft.com/downloaddetails/arch98en.htm.

Scott Spanbauer is a contributing editor for PC World. ■

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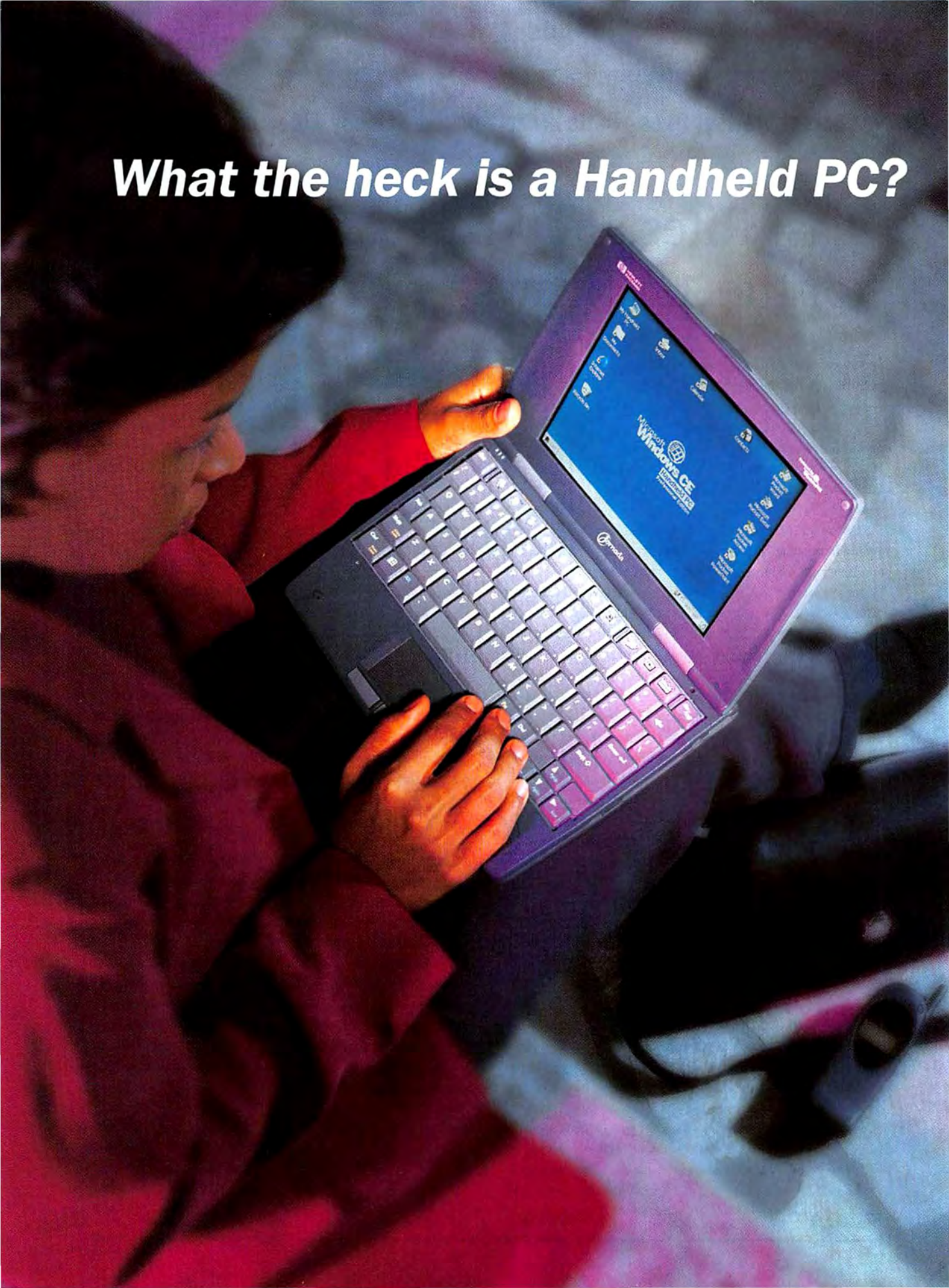

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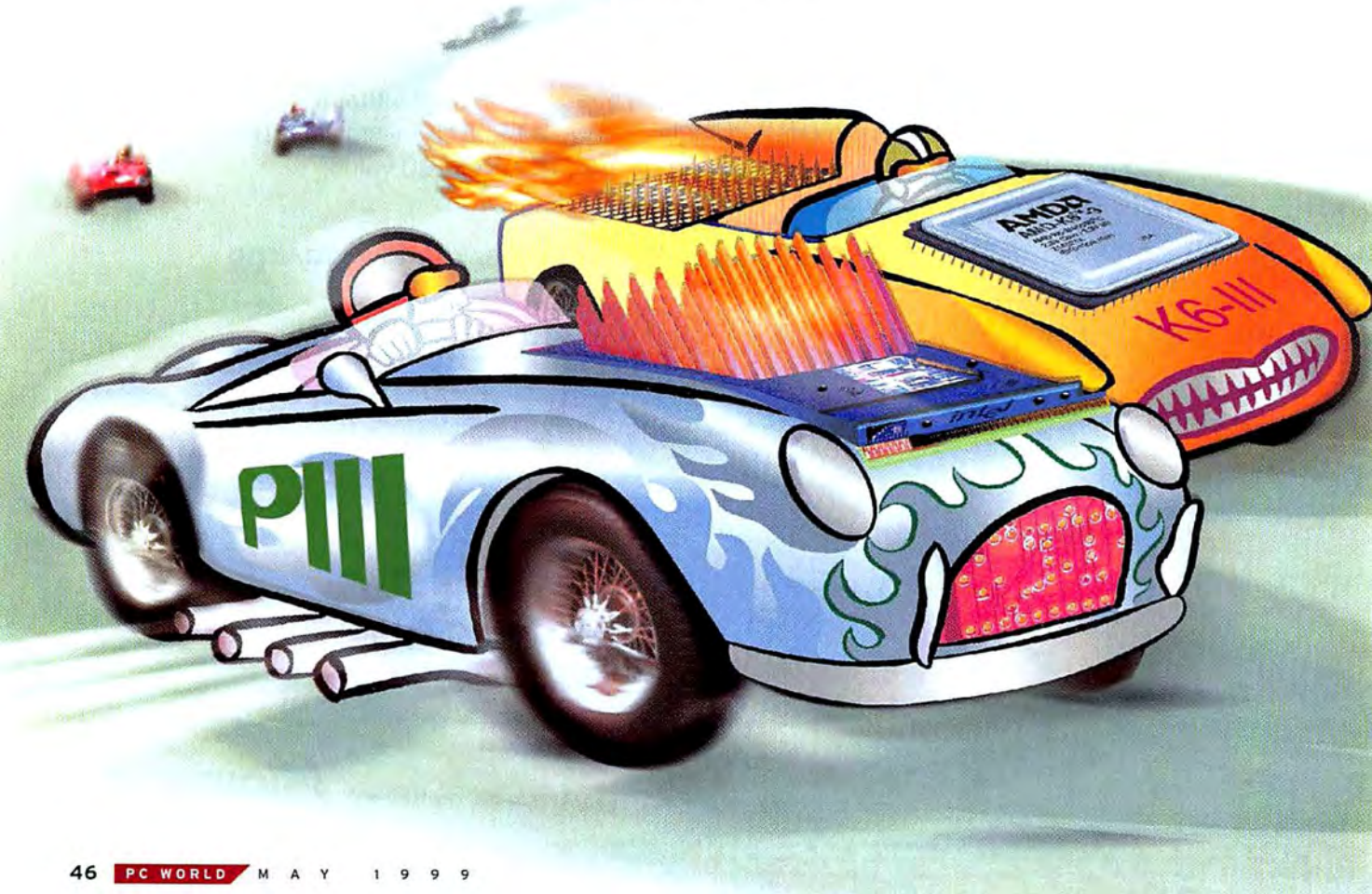
TOP OF THE NEWS

AMD's K6-III Shifts Into Overdrive

Surprise! After years of eating Intel's dust, **AMD catches up to the PIII** in business performance with its wickedly fast new chip.

◆ By Lincoln Spector



QUICK, WHAT pops into your head when you hear the name *AMD*? If you're like most people, you think of low-priced computers that aren't quite as fast as the more expensive Intel-based models. But AMD's new K6-III chip may force you to think again.

In our PC WorldBench tests, which measure PCs' performance on common desktop applications, the fastest K6-III PCs we tested this month—unlike the first K6-III model we tested last month—performed as well as Pentium IIIs that run at higher clock speeds. In other words, the fastest K6-III-400 performed like a Pentium III-450, and the fastest K6-III-450 performed like a Pentium III-500. Nevertheless, you should be able to find K6-III PCs selling for $300 to $600 less than comparable PIII systems.

But where speed matters most—multimedia and 3D graphics—the K6-III was a disappointment. In fact, our K6-III-450s ran as much as 44 percent slower than the average Pentium *II*-450 in our graphics tests.

The lowdown: For business use, the K6-III is within striking distance of the fastest machine you can buy, but it lacks power for serious game playing or complex graphics tasks like multimedia editing.

$1599 ON UP

WE CHECKED OUT five K6-III systems, including two 400-MHz models, the $1599 CyberMax Enthusiast KIII-400 and the $1799 Micro Express MicroFlex K6-3/400. This Micro Express was the only shipping unit we tested; all others were preproduction models.

We tested the CyberMax last month, and it failed to perform like a PIII-450, but we couldn't make generalizations about the chip based on a single PC. This month, we had multiple systems to test and could draw more conclusions.

Compaq Presario 5600s-450

We also evaluated three 450-MHz systems this month. At the high end, the $2480 Compaq Presario 5600s-450 has a large, beautiful flat-panel display. The $1749 CyberMax Enthusiast KIII-450 was identical to the Enthusiast KIII-400 in all ways except clock speed. Finally, we upgraded the 400-MHz Micro Express to 450 MHz ourselves; Micro Express assured us that what we created was analogous to its own 450 machine.

In addition to the K6-III, AMD has released a new chip optimized for notebooks, the K6-2 Mobile. We looked at the first notebook to sport this chip, Toshiba's Satellite 2545-XCDT. If this notebook's performance is any indication, the new mobile chip won't satisfy speed-hungry users.

CACHE-22

THE K6-III OWES its terrific business performance to its cache—or more precisely, its caches. All processors since the Pentium MMX have come with a 64KB level 1 cache built into the chip itself. The Pentium II and III supplement this with a 512KB level 2 cache that sits right next to the chip on the same cartridge and operates at half the chip's speed. The Celeron has a 128KB cache on the chip itself that's a quarter the size of the Pentiums', but it runs at the same speed as the chip.

The K6-III has all these beat. In addition to the 64KB of L1 cache, the chip includes 256KB of L2 cache on the chip, where, like the Celeron's cache, it operates at full speed. The chip also supports a third level of cache on the motherboard, but only if the system manufacturer chooses to put one there.

The smart ones will. Three of the five systems we tested had 1MB L3 caches, and these were the star performers. The 450-MHz Compaq and Micro Express PCs scored over 225 on WorldBench—comparable to the average Pentium III-500 system. (The fastest Pentium III-500 scored a slightly higher 237.) The 400-MHz Micro Express scored 217 on our benchmark tests, only a hair behind the PIII-450s' average of 219. That's great performance, particularly when ▶

Iomega Recalls Jaz Drive Power Units

IOMEGA IS recalling 60,000 power supply units for external Jaz drives following the Consumer Product Safety Commission's finding that the units' plastic housing could separate, exposing users to electrical shock. The units were sold on or after September 1, 1998, with 2GB Jaz drives or remanufactured 1GB Jaz drives, and as replacement or supplemental units. To learn if your power supply is affected, call Iomega at 800/781-3296, or enter the unit's serial number into the utility at www.iomega.com/support/recalls/check.html. Replacement units are free.

Tidbytes

A Better USB: Computer industry heavyweights are building a new version of Universal Serial Bus that is 10 to 20 times faster. The first products aren't expected for at least a year. **Almost-Free PCs:** Microworkz' new Webzter PCs start at $299 and include a year of Internet access from Earthlink Networks. The Webzter Junior offers the barest essentials: a Cyrix M2-300 CPU, 32MB of RAM, a 3.2GB hard drive, and a V.90 modem, but no monitor or CD-ROM or floppy drives. Microworkz Computer; 888/306-2044; www.webzterpc.com.

online GET UP-TO-THE-MINUTE NEWS, including hot game demos, the latest reviews, and productivity shareware, at PC World Online. Point your browser to www.pcworld.com/pcwtoday.

ILLUSTRATIONS: PAMELA HOBBS; PHOTOGRAPHY: KEVIN CANDLAND; ICONS: JEFFREY PELO

you consider that you're paying hundreds of dollars less for it.

On the other hand, the 400- and 450-MHz CyberMax systems came with only 512KB each of L3 cache, which probably contributed to their lower PC WorldBench scores of 202 and 212, respectively. Still, these machines provide plenty of speed for all but the most demanding of users.

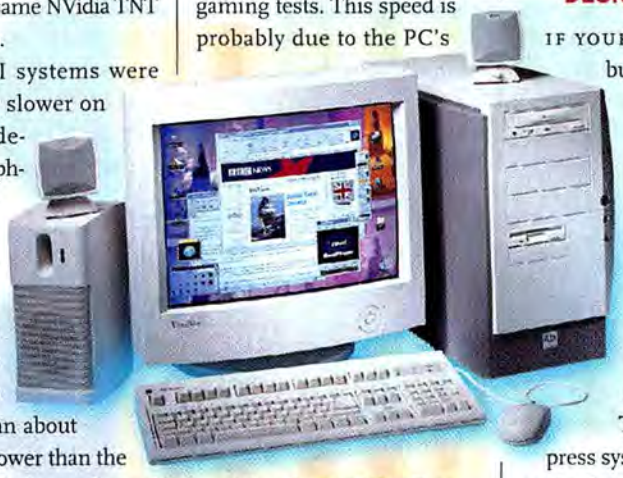
GRAPHIC DISAPPOINTMENT

THE K6-III MAY be a killer at standard business applications, but when you run the latest 3D shoot-'em-up, you could be the victim. In *PC World*'s graphics benchmarks, the K6-III-450 PCs that had been running like Pentium III-500s couldn't keep up with the average PII-450.

On the PowerPoint test, our least taxing graphics test, the K6-III systems came within striking distance of the Pentium IIIs. The CyberMax K6-III-450, the slowest K6-III-450 in our business application tests, finished this test in 156 seconds, only 9 seconds behind the average Pentium III-500 with the same NVidia TNT graphics chip.

The K6-III systems were significantly slower on our more demanding graphics tests. For example, in the Redline Racer game test, Compaq's pricey Presario 5600s-450 ran about 44 percent slower than the average similarly configured PII-450 PC we've tested. On the same test, the 450-MHz CyberMax Enthusiast fared only slightly better, trailing the PII-450s by about 30 percent. On the Director test, results were similarly unimpressive: The top-performing Compaq lagged behind the Pentium II-450s by about 11 percent.

The 400-MHz Micro Express ran as fast as or faster than the quickest K6-III-450 systems on many of our 3D gaming tests. This speed is probably due to the PC's Diamond Multimedia Monster Fusion graphics subsystem. But the Monster Fusion has some drawbacks that prevent us from recommending this Micro Express as a gaming system. Among the board's shortcomings is the inability to render 3D images in 32-bit color, so some games won't look as lifelike as they might.



Micro Express MicroFlex K6-3/400

DESKTOP DERBY

IF YOUR MAIN concern is business, K6-III systems can offer a phenomenal deal, depending on the vendor. They may cost hundreds of dollars less than similarly outfitted PIIIs that run at pretty close to the same speed.

The two Micro Express systems were the fastest in their respective clock-speed and price classes. Their spacious hard drives and large displays are impressive, considering that the systems cost only $1799 (for the K6-3/400) and $2049 (for the K6-3/450). But these are basic machines, without the software bundles or high-quality speakers some

PHOTOGRAPH: KEVIN CANDLAND; BACKGROUND: PAMELA HOBBS

3DNow Software Is Heavy on Games, Light on Business

LIKE ITS PREDECESSOR, the K6-2, the K6-III comes equipped with the 3DNow instruction set. 3DNow speeds up complex 3D imaging and improves audio compression as well. To benefit from 3DNow, you need both a processor and an application that support it.

As of early March, AMD claimed that 100 programs use 3DNow. This is great news if you use your computer for entertainment, since most of these programs are games. But of the 100 programs, only 5 are business applications, such as IBM's ViaVoice 98 and Viewpoint Data Labs' LiveArt 98 illustration program. (Even programs not designed for 3DNow may benefit if they make use of Microsoft's popular DirectX version 6.*x* graphics application programming interface, which supports the K6-2's and K6-III's 3DNow instructions.)

And yes, 3DNow definitely improves a program's performance. We ran the Compaq and Micro Express K6-IIIs through a suite of tests and games with options to support 3DNow turned off and then on. We saw improvements of 6 to 13 percent in games' frame rates. But the real difference was in a beta version of the 3DMark 99 Max gamer's benchmark, where the Compaq's score jumped from 1692 to 3190.

AMD's 3DNOW IMPROVES games that support it, such as Inner Workings' Plane Crazy.

But 3DNow faces competition from Intel's 3D instructions, the Streaming SIMD Extensions, or SSE, which are supported in the Pentium III (see our story on PIII-enhanced software, page 51). A Pentium III-450-equipped Micron Millennia ran our Plane Crazy and Motocross Madness games tests 25 percent faster than any K6-III system we put up against it.

The Pentium III got at least some of that boost on Motocross Madness from SSE. Motocross Madness can make use of DirectX 6.1, which supports both 3DNow and SSE. For the moment, 3DNow has the advantage in program support—it has, after all, been out longer than SSE. But with Intel's greater market share, don't expect that lead to last.

Nevertheless, 3DNow won't become obsolete anytime soon. Major games and multimedia applications will probably support both standards for the foreseeable future.

of the other systems provide. Micro Express charges $2124 for a comparably equipped Pentium III-450—$325 more than for the K6-III-400, which should run business applications at approximately the same speed.

Compaq's Presario 5600s-450 offers lots of goodies, including a Zip drive and an excellent flat, 15-inch LCD screen. As a result, the Presario costs a whopping $2480. That's still about $600 less than Compaq charges for a similarly configured PIII-500.

The CyberMax Enthusiast KIII-400 costs $1599, and the 450 will run you $1749. Both systems offer something the others don't: a 4.8X DVD-ROM drive. What's more, the CyberMax systems come with good-sounding speakers and a nice selection of software, including WordPerfect Office Suite and several Compton's reference titles. The vendor charges $250 to $300 more for identically configured Pentium III systems.

LEAVE IT AT HOME

AMD'S OTHER NEW chip, the K6-2 mobile, doesn't match the K6-III's success with business apps. With its top speed of 333 MHz and 3DNow capabilities, this K6-to-go should offer an inexpensive way to take multimedia on the road.

Judging from the one notebook we tested, the chip might just as well have stayed at home. With a PC WorldBench score of only 131, Toshiba's $1899 Satellite 2545XCDT performed more like a Pentium II-233 notebook than like anything with "333" in its name. Why the sluggish performance? One possibility is the lack of an integrated ▶

Clock for Clock, K6-III Desktops Win...

	SYSTEM	CPU	RAM (MB)	L2/L3 cache (KB)	PC WorldBench 98 score
DESKTOPS	Compaq Presario 5600s-450	K6-III-450	128	256/1024	226
	CyberMax Enthusiast KIII-450	K6-III-450	128	256/512	212
	Micro Express MicroFlex K6-3/450	K6-III-450	128	256/1024	231
	CyberMax Enthusiast KIII-400	K6-III-400	128	256/512	202
	Micro Express MicroFlex K6-3/400	K6-III-400	128	256/1024	217
	Average of 14 desktops	Pentium III-500	128	512/none	232
	Average of 3 desktops	Pentium III-450	128	512/none	219
	Average of 42 desktops	Pentium II-450	128	512/none	214
	Dell Dimension V433c	Celeron-433	64	128/none	196
	Average of 2 desktops	Celeron-400	64	128/none	191
NOTEBOOKS	Toshiba Satellite 2545XCDT	K6-2-333	64	512/none	131
	Average of 5 notebooks	Pentium II-366	64	256/none	185
	Average of 14 notebooks	Pentium II-300	64	512/none	157
	Average of 3 notebooks	Pentium II-233	32	512/none	130

TEST PC WORLD CENTER **HOW WE TEST** All systems are tested with PC WorldBench 98, *PC World*'s application-based benchmark. A higher PC WorldBench 98 score is better. For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing). Data based on testing conducted by the PC World Test Center. All rights reserved.

...but PIII PCs Serve Up More Razzle-Dazzle

SYSTEM[1]	CPU	Graphics RAM (MB)	Presentation test (seconds)	Playback tests (frames per second)		
Compaq Presario 5600s-450	K6-III-450	16	150	82	35	31
CyberMax Enthusiast KIII-450	K6-III-450	16	156	n/a	44	49
CyberMax Enthusiast KIII-400	K6-III-400	16	157	65	43	45
Average of four systems	PIII-500	16	147[2]	94	76	53
Average of six systems	PII-450	16	155[3]	92	63	54

TEST PC WORLD CENTER **HOW WE TEST** In Microsoft PowerPoint 97, we time a script that builds a 50-slide presentation; lower times are better. For the Macromedia Director 6 test, we play back a looping AVI clip using Microsoft Active Movie in the background while running an animation created using Director 6 in the foreground. For Criterion Redline Racer and Rage Incoming playback tests, we execute self-running demos. For all playback tests, higher frame rates are better. Tested applications do not make use of AMD's 3DNow technology. PIII, PII, and K6-III systems tested with 128MB of RAM. Data based on testing conducted by the PC World test Center. All rights reserved. [1]All systems tested with NVidia TNT graphics adapter. The Micro Express systems are not included here because they use a different graphics subsystem. [2]Average of two systems. [3]Average of four systems.

Intel Fights Back With Budget Celeron-433

INTEL IS RAISING the bar on its low-end processor with the release of the Celeron-433. The 433 isn't a particularly good deal in itself, but as always with new Intel chips, it will force down prices on systems based on Intel's older and just-barely-slower chips.

The only Celeron-433 system we've tested so far, the **Dell Dimension V433c**, was underwhelming. The $1491 system scored a disappointing 196 on PC WorldBench 98, only about 3 percent more than the average Celeron-400. Make no mistake about it—there's nothing wrong with a score of 196, it's just not much of an improvement.

Future Celeron-433 PCs may well be more impressive, but probably not by much—an 8 percent boost in clock speed will only go so far. The Celeron-433 won't be the smartest chip for your money until the Celeron-466 comes out in late April and drives the price down. Intel has other Celerons on the way. This summer, expect to see a Celeron chip code-named Whitney with graphics built into the chip set. It could lower prices further.

L2 cache, the speed booster that's built into mobile Pentium IIs and Celerons.

Toshiba didn't quibble with our test results, acknowledging that in this case it had traded speed for features—the notebook includes a 14.1-inch screen. The company's Satellite 4030CDT, which costs $100 more, has a much faster processor—a Celeron-300—but its screen measures only 13 inches. Another plus: In *PC World*'s tests of battery life, the 2545XCDT lasted an impressive 3.5 hours.

As always, it's hard to evaluate a CPU based on a single computer, and at press time, Compaq had announced a notebook based on a new 380-MHz K6-2 chip. But if the Satellite 2545XCDT we tested is any indication of what the new chip can do, don't hold your breath.

WOULD YOU BET ON AMD?

AMD-equipped PCs have traditionally been sold primarily to consumers, while businesses keep their distance. As analyst Nathan Brookwood of the research firm Insight 64 points out, "People who spend their own money on a computer are more likely to go with AMD. People who spend other people's money will be more cautious."

It's possible that the K6-III will change that. With its relatively low price and its excellent performance on standard business applications, its appeal may spread from home to small businesses, and then to bigger companies, especially if AMD can keep the K6-III significantly cheaper than Intel's PIII processor. Already, every major vendor except Dell and Micron is either selling or planning to sell at least one AMD model.

AMD could gather still more momentum when it introduces its K7 chip, which is expected to appear sometime during the second half of the year. With completely new architecture, 0.25-micron technology, a 128KB L1 cache, and additional improvements, the K7 chip could pose a real challenge to Intel.

DESKTOP AND NOTEBOOK PCs — FEATURES COMPARISON

K6-III PCs Aren't Cheap, but They're Loaded With Goodies

AMD K6-III-450 DESKTOP	List price	Display size (inches)	Hard drive (GB)	CD/DVD-ROM drive speed	Graphics adapter/ RAM (MB)	Additional features	Product info number
Compaq Presario 5600s-450 800/345-1518 www.compaq.com	$2480	15[1]	14.4	6X DVD-ROM	Diamond Viper 550/16	LCD monitor, V.90 digital modem with DSL support, speakers, Zip drive, home networking support	738
CyberMax Enthusiast KIII-450 888/438-2929 www.cybermax.com	$1749	19	13	4.8X DVD-ROM	STB Velocity 4400/16	V.90 modem, speakers with subwoofer, Corel WordPerfect Suite 8	739
Micro Express MicroFlex K6-3/450 800/989-9900 www.microexpress.net	$2049	19	18	32X	Diamond Monster Fusion AGP/16	V.90 modem, speakers with subwoofer	740
AMD K6-III-400 DESKTOP							
CyberMax Enthusiast KIII-400 888/438-2929 www.cybermax.com	$1599	19	13	4.8X DVD-ROM	STB Velocity 4400/16	V.90 modem, speakers with subwoofer, Corel WordPerfect Suite 8	741
Micro Express MicroFlex K6-3/400 800/989-9900 www.microexpress.net	$1799	19	18	32X	Diamond Monster Fusion AGP/16	V.90 modem, speakers with subwoofer	742
CELERON-433 DESKTOP							
Dell Dimension V433c 800/388-8542 www.dell.com	$1491	15	6.4	2X CD-RW	integrated ATI 3D Rage Pro Turbo AGP/8	network card, speakers, Microsoft Office Small Business Edition Plus Encarta	–
AMD K6-2-333 NOTEBOOK							
Toshiba Satellite 2545XCDT 800/867-4422 www.toshiba.com	$1899	14.1	4.3	24X	S3 Virge MX3D/2	active-matrix screen, V.90 modem, 3.5-hour battery life	743

[1] LCD monitor provides as much viewable space as a 17-inch CRT monitor.

How the Newest Chips From AMD and Intel Stack Up

CPU	Level 2 cache	Level 3 cache	Estimated system price	The scoop
Pentium III-500	512KB, off chip	none	$2000-$3000	Intel's fastest desktop chip. Basically a Pentium II with the new SIMD instruction set for 3D imaging, plus a few desktop enhancements.
Pentium III-450	512KB, off chip	none	$1750-$2800	Cheaper, slightly slower Pentium III uses the same SIMD instructions as the PIII-500.
K6-III-450	256KB, on chip	optional, on motherboard	$1700-$2600	Performs as fast as a Pentium III-500 on business applications, but slower on complex graphics. Uses 3DNow instruction set for 3D imaging.
K6-III-400	256KB, on chip	optional, on motherboard	$1500-$2400	Matches the speed of a Pentium III-450 on business applications.
Celeron-433	128KB, on chip	none	$1400-$1600	New entry in Intel's line of low-cost CPUs is a touch speedier than the Celeron-400.

This rosy picture has a few thorns. AMD has a history of manufacturing delays with new chips. Last year, for instance, a production line problem kept the then-new K6-2 from coming out as soon as expected. If such a delay happens with the K6-III, you may have trouble getting one of the new chips no matter how desperately you want it, and AMD could become the victim of its own success.

AMD could face additional problems if Intel decides to slash its prices. Clearly, the industry's largest chip manufacturer is better equipped to fight a protracted price war.

WHAT TO BUY NOW

IF YOU WANT a blindingly fast machine to run your business applications, you can't do better than a K6-III-450 system. For less than the cost of a Pentium III-450 PC, you'll get the performance of a Pentium III-500. Of course, if all you're running are business applications, you probably don't really need that much power to begin with, and a Celeron-400 or -433 will do just fine.

And if you're addicted to computer gaming, or otherwise need fast and wonderful 3D graphics, you may want to shell out the big bucks for a Pentium III system.

First PIII Applications Offer More Promise Than Performance for Business Users

ANALYSIS

WHAT GOOD IS a new chip if there are no applications to go with it? Not much, of course. Intel is spending $300 million to assure potential buyers that apps written to work with its new Pentium III are to die for. But a look at the first batch of PIII-ready apps reveals that most of them are to yawn at.

The Pentium III not only boasts the fastest PC clock speeds yet, but it also supports 70 new instructions (so-called Streaming SIMD Extensions, or SSE) that accelerate image rendering, 3D geometry, and other multimedia tasks. Software written to use these new instructions should show a noticeable performance boost.

Intel says that roughly 200 applications and Web sites will be optimized for the Pentium III by this summer. Of those, 64 were available as we went to press. Most of them fall into one of four categories: Internet plug-ins (and Web sites that use them), voice recognition, image editing, and games. Bread-and-butter applications like word processors, spreadsheets, and e-mail won't get any boost.

THE WILD WILD WEB

INTEL HAS pegged its hopes for the Pentium III on the Web. In practical terms, that means some new Internet plug-ins have been rewritten to take advantage of SSE instructions. Web sites will then have to enhance their media clips and 3D demos to take advantage of those enhanced plug-ins.

Shells Interactive's Spike plug-in is a case in point. Once you have downloaded and installed it, Spike plays back interactive 3D animations that download quickly because they're highly compressible. The Sharper Image's Web site (www.sharperimage.com) uses Spike to display interactive 3D models of yuppie gewgaws. Autobytel's car-shopping site (www.autobytel.com) uses the Metacreations SSE-enhanced MetaStream plug-in to let you virtually test-drive the car of your dreams.

SPIKE, AN SSE-ENHANCED plug-in, can make online shopping a hands-on experience.

RealNetworks has jumped on the Pentium III bandwagon, too. A new version of ▶

its RealPlayer G2 plug-in uses SSE to smooth jerky video playback. However, according to a RealNetworks source, the Pentium III–enabled player will improve playback efficiency by only 2 to 5 percent compared to a Pentium II. The boost in speed may be more noticeable with content specifically encoded for the new player. We discerned little difference between the Pentium III–enhanced and standard versions of the player when playing clips from CNN.com. In fact, playback on a Pentium III-450 seemed identical to that on a Pentium MMX-166.

VOICE OF REASON

IF 3D WEB SITES don't exactly light your fire, Intel is hoping that better, faster voice recognition will do the job. A half dozen companies, including Dragon, IBM, and Lernout & Hauspie, have announced that forthcoming versions of their voice recognition applications will exploit SSE and another Pentium III innovation, which is called *cache prefetch*, in order to make voice recognition increasingly attractive to the mass market.

Most of these applications are still in beta versions. The major exception: Dragon is shipping an SSE-enhanced version of Point & Speak. Comparing the new version (on a Pentium III-450) with a non-enhanced version (running on a Pentium II-450), we found training times to be dramatically faster: With the enhanced version, training took us just 3 minutes; with the unenhanced version, that task took up to 25 minutes.

Questions remain, however, about whether those improvements are attributable specifically to use of the SSE instructions. In the process of reprogramming a voice recognition application for the Pentium III, vendors may find that it speeds up on other CPUs as well. For example, IBM, while optimizing its ViaVoice recognition engine for the Pentium III, achieved significant performance increases on non-SSE CPUs as well, according to Eddie Epstein, the company's manager of speech recognition development. Still, Epstein predicts that the next version of ViaVoice will reap "modest" performance gains from the Pentium III.

If 3D Web sites don't light your fire, Intel's hoping that better, faster voice recognition will.

Digital artists will also benefit right away from the Pentium III. By late March, Adobe planned to post to its Web site a free Photoshop 5.0 update that adds support for SSE. *PC World* tested a prerelease version and found that when applying complex image filters to very large images, the update accelerated processing by approximately 20 percent. Adobe planned to release SSE-enabled versions of PhotoDeluxe at the same time.

Video-encoding applications will also get a speed boost. Microsoft PowerPoint 2000, for example, will allow you to add video clips to presentations and then encode the whole thing as an MPEG-4 file for streaming playback, tapping the Pentium III for a performance boost in the process. The chip doesn't help during playback, though, according to Microsoft Office product manager John Duncan.

IT managers may also like the Pentium III. A slew of upcoming security and asset-management utilities will use the chip's controversial ID number to keep track of software licenses and hardware. Web sites may use the number to validate user IDs.

IT'S ALL A GAME

GAMES ARE where the Pentium III really gets to strut its stuff, by accelerating the geometry calculations used to build and animate complex characters and objects. Measured in raw frame rates, the performance gains are dramatic, allowing developers to make characters, lighting, and action more realistic. But as IBM discovered with ViaVoice, Activision found that rewriting its Heavy Gear II shooter to take advantage of the new instructions also yielded better performance on Pentium II systems that didn't support SSE, according to Ryan Moos, the game's associate producer.

But based on the currently available software, business buyers will probably want to wait on the the Pentium III. The next version of the chip, due out later this year and code-named Coppermine, will sport higher clock, memory bus, and AGP speeds, as well as a full-speed integrated cache. In the meantime, those SSE instructions, as well as the programs that use them, will not be enough to entice most mainstream users.

—Scott Spanbauer ▶

Applications Optimized for the Pentium III

As PIII-enhanced apps creep to market this year, many business users will likely be underwhelmed by the selection. Here are some highlights.

		Availability
Business	Adobe PhotoDeluxe 1.1, PhotoShop 5.0	now
	Dragon Point & Speak	now
	IBM ViaVoice	fall
	Lernout & Hauspie Voice Express	May
	Microsoft PowerPoint 2000	now
Web	Metacreations MetaStream Streaming 3D Viewer	now
	Oz.com Fluid 3D plug-in for RealPlayer G2	May
	RealNetworks RealPlayer G2	now
	Shells Interactive Spike	now
Games	Activision Heavy Gear II	May
	Activision Battlezone II	fall
	Interplay Descent 3D	now
	Id Software Quake III Arena	fall
	Rage Dispatched	now

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ThinkPad® 770	price	power	media	show
	$3,799 to $5,099*	mobile Pentium® II processor 266 to 366 mhz 8.1gb or 14.1gb hard drive 64 or 128mb memory	13.7" or 14.1" TFT display 1280 x 1024 resolution† hot-swappable dvd drive option: SmartCard security	ThinkPad 770. Turn it way up. Maximum power, from raw performance to full multimedia capabilities to Windows NT® Workstation support. www.ibm.com/thinkpad or call 800 426 7255, ext. 5035.

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*Estimated reseller price for models 770/72U-8AU. Actual prices may vary. †Available only on model 770/8AU. mhz denotes microprocessor internal clock speed only; other factors may also affect application performance. gb=1 billion bytes for HDD capacity. PCs referred to in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. Intel Inside and Pentium are registered trademarks of Intel Corporation. © 1999 IBM Corp. All rights reserved.

Who Made Your Notebook? Don't Believe the Label

CONSUMER ALERT

TAKE A LOOK at the picture below. Notice anything odd? The two notebooks—Quantex's T-1410 and Dell's Inspiron 3500—are essentially identical. Same case, same keyboard, same screen, same ports, drives, and bays, even the same motherboard. The reason: They're both designed and built by the same company, Compal Electronics of Taiwan. And these aren't the only duplicate notes on the market. The Dell Inspiron 7000, Sceptre SoundX 6500, and ARM Armnote TS3012, for example, are practically triplets.

What's going on here? It's the notebook industry's not-so-dirty little secret. Many of the biggest vendors in the U.S. market—including Compaq, Dell, and Hewlett-Packard—don't actually design their own portables. Instead, these vendors, along with many smaller companies, buy notebooks from so-called Original Design Manufacturers—known in the industry as ODMs—and then, in many cases, do little more than slap their own nameplate on the case.

This practice doesn't necessarily hurt consumers. Thanks to economies of scale, ODMs can design and build notebooks less expensively than individual vendors can—and that translates into smaller price tags. But these digital doppelgängers raise a significant question for notebook buyers: If someone else designs and builds a notebook, what does the nameplate really mean?

> If **someone else** designed and built your notebook, what does **the nameplate** really mean?

PORTABLES FOR DUMMIES

UNTIL RECENTLY, most vendors designed their notebooks in-house. To turn those designs into products, they had two options: Build the notebooks themselves or hire another company to do it. In industry-speak, that outside company is called an Original Equipment Manufacturer.

Most notebook OEMs are based in Taiwan. Last year, Taiwanese manufacturers built some 6 million notebooks, or roughly 40 percent of the world supply. Compal is one of Taiwan's bigger notebook OEMs, but it's not the biggest. That honor goes to a company called Quanta Computer, which claims to be the world's third-largest notebook maker, behind Toshiba and IBM. Quanta's list of customers has featured such names as Apple, Dell, and Gateway. Other major notebook OEMs include Acer, Inventec, and Arima.

In the past, each vendor's notebooks were unique, no matter who actually assembled them, because each vendor handled its own design. "Four, five years ago, we did everything in-house," says Marc Jourlait, the director of worldwide market development for HP's Mobile Computer group. "It was all custom design, and the prices were custom prices."

But as profit margins have shrunk, vendors have found themselves under increasing pressure to cut costs. To do so, they are turning more and more to outsourcing the design, as well as the manufacturing, of their notebooks. And conveniently enough, the same folks who build notebooks can also design them. When that happens, the OEM switches hats and becomes an ODM. An ODM can sell a given design to as many clients as it ▶

PHOTOGRAPHS: KEVIN CANDLAND

Separated at Birth?

FROM THE KEYBOARD, touchpad, and curvy speaker enclosures up front to the ports in back and the motherboard inside, the **Quantex T-1410** (left) and **Dell Inspiron 3500** (right) appear to be identical. The similarity is no coincidence: Both notebooks are designed and manufactured by the same company, Compal Electronics of Taiwan. Compal supplies the same bare-bones notebook to both vendors. Dell and Quantex then customize the machine for individual orders, installing the specific processors, RAM, hard drives, and (sometimes) screens that their customers want. The major differentiator between cloned notebooks? Service and reliability.

*Estimated reseller price for models 560/9OU-BIU. Actual prices may vary. †Actual weight/thinness may vary due to vendor components, manufacturing process and options. Includes battery (and travel cover on ThinkPad 600 models) and excludes external diskette, cd/dvd drives, if applicable. mhz denotes microprocessor internal clock speed only; other factors may also affect application performance. gb=1 billion bytes for HDD capacity. PCs referred to in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. Intel Inside and Pentium are registered trademarks of Intel Corporation. © 1999 IBM Corp. All rights reserved.

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wants—which is why those two notebooks in the picture look so much alike.

NOTEBOOKS 'R' US

FOR SOME VENDORS, particularly smaller ones like ARM, working with an ODM is like going down to Notebooks 'R' Us and buying a couple thousand laptops off the shelf. For others, particularly larger vendors such as Dell, Hewlett-Packard, and Quantex, the process is collaborative.

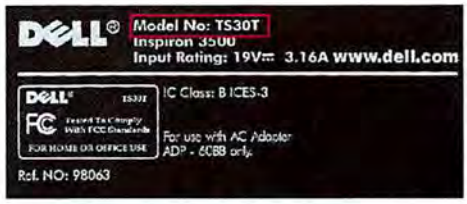
"We're involved in every stage of the design, from concept, defining the feature set, and prototyping," says Quantex product manager Herman Chan. "We have a really strong relationship with Compal, so they're hand-carrying prototypes on planes back and forth between us and Taiwan until we're satisfied."

The rather basic design that emerges from this process—the layout of the motherboard, the basic chip sets (including graphics), what kind of ports will be included, the case, keyboard, and touchpad—still has to be filled in by individual notebook vendors. When the laptops arrive from the ODM, those vendors add the CPU, RAM, hard drive, and, sometimes, the screen.

WHO MADE IT?

SO HOW DO YOU tell whether a given notebook is ODM'd and whether it has a twin elsewhere on the store shelves?

For starters, see "Notebook Name Game: A Guide to Who Builds What," below. If two vendors use the same company for both design and manufacturing, their notebooks may indeed be clones. But the only way to tell for certain is to get your hands on them. Beyond the obvious visual cues, check the sticker on the bottom. If the manufacturer's model number is the same on both machines—as in the two photos at right—then you've got a pair of clones.



CHECK THE LABEL: Look on the bottoms of the Quantex T-1410 (above) and the Dell Inspiron 3500 (below), and you'll find the same model number.

Furthermore, those clones will likely be selling for roughly the same price. For example, at press time, a Sceptre SoundX 6500 and an ARM Armnote TS3012—each with a Pentium II-333, an 8.1GB hard drive, and 64MB of RAM—cost an identical $3299. The only major difference is the Armnote's 15.1-inch active-matrix LCD, compared to the Sceptre's 14.1-inch screen. A similarly configured Dell Inspiron 7000 (15.1-inch screen, but no modem) costs $3099.

RELIABILITY & SERVICE

IF THESE ODM'D clones have the same design and similar price tags, how can you pick one over another?

ODM'd notebooks have a reputation for favoring reliability over cutting-edge features. And users seem to agree: In *PC World*'s latest Reliability and Service survey (see "PC Reliability & Service: The Best Are a Phone Call Away," page 155), Dell and Hewlett-Packard—both of which sell ODM'd portables—were rated first and second, respectively, for notebook reliability. (Because of their relatively small market shares, Quantex, Sceptre, and ARM didn't make the survey.)

That's not to say a given notebook clone will offer the same reliability no matter whose name is on the case. All vendors do quality testing after the finished products arrive from overseas—but some may do more than others.

"We go way beyond what they do at the factory," says HP's Jourlait. "We'll shake and bake them, drop them, freeze them, bombard them with coffee and Coke."

Different vendors also offer different levels of service. For example, the Sceptre SoundX 6500 and ARM ArmNote TS3012 missed our March *Top 10 Notebooks* because of their skimpy support policies (Sceptre limits free phone support to weekdays, and ARM does not guarantee a turnaround time on repairs). By contrast, a practically identical version of the Dell Inspiron 7000 has made the Top Ten, thanks in part to 24-hour support and a promise that most repairs will be turned around in a day.

That nameplate, it turns out, really does make a difference.

—*Dan Miller* ▶

Notebook Name Game: A Guide to Who Builds What

FEW NOTEBOOK VENDORS actually make their own notebooks. But some outsource the design work, too. Here's who designs and manufactures notebooks for the top ten U.S. notebook vendors.[1]

VENDOR	Product line	Design	Manufacture
1. Compaq	Armada	Compaq	Inventec
	Presario	Arima	Arima
	Prosignia	Compaq	Inventec
2. Dell	Inspiron	Compal	Compal
	Latitude	Quanta	Quanta
3. Gateway	Solo 2500, 3100, 9100	Gateway	Sanyo
	Solo 5150	Gateway	Quanta
4. IBM	ThinkPad I series	IBM	IBM
	others	IBM	Acer
5. Hewlett-Packard	all	Compal	Compal
6. Packard Bell/NEC	all	NEC	FIC
7. Apple	all	Apple	Quanta
8. Acer	all	Acer	Acer
9. Toshiba	all	Toshiba	Toshiba
10. Micron	GoBook, Transport XKE/XPE	Sanyo	Sanyo
	Transport Trek/Trek2	GVC	GVC

[1] The top ten vendors according to an International Data Corporation report.

*Estimated reseller price to end users for IBM PC 300GL model 6287-41U; monitor shown is IBM G-54 with 15" screen and 13.7" viewable image, starting at $239; certain features described below are available for an additional charge. Actual prices may vary. MHz denotes microprocessor internal clock speed only; other factors may also affect application performance. PCs in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. Wake on LAN is a product of IBM/Intel Advanced Manageability Alliance and is a trademark of IBM Corporation. Intel, the Intel inside logo and Pentium are registered trademarks of Intel Corporation. © 1999 IBM Corporation. All rights reserved.

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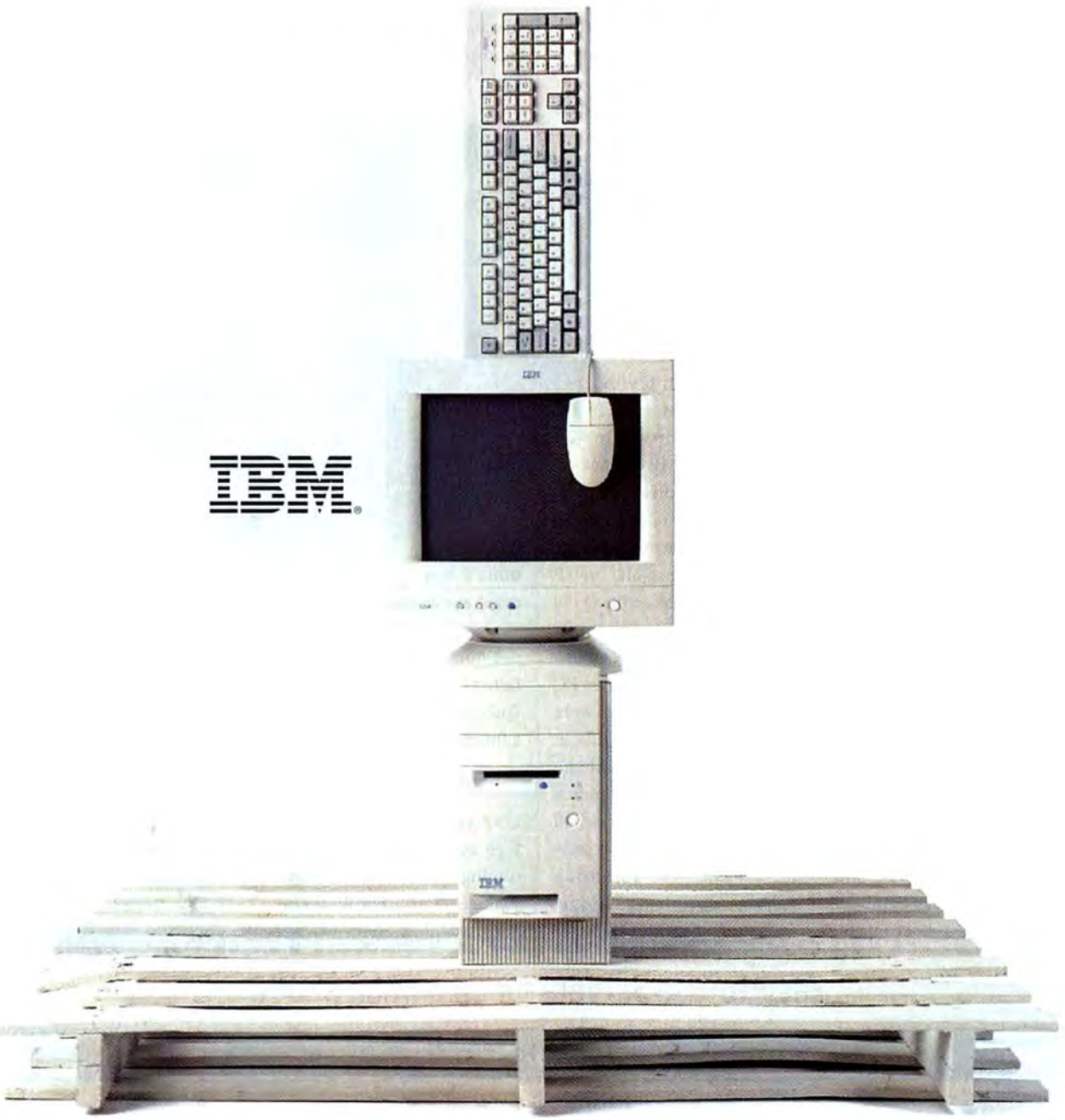

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Plug-and-Play Servers Take the Pain Out of Small-Business Networks

FIRST LOOK

IT'S A COMMON problem: Your business is growing, with more employees using more PCs, and they all need to share files and printers, send e-mail, and connect to the Net.

Used to be that you'd buy an expensive server (essentially a PC on steroids), install a complex network operating system like Novell Netware or Windows NT, and even hire an IS staffer to keep it all running. But so-called thin servers—also known as network appliances—offer server functionality for up to 100 users at a lower price, with less hassle.

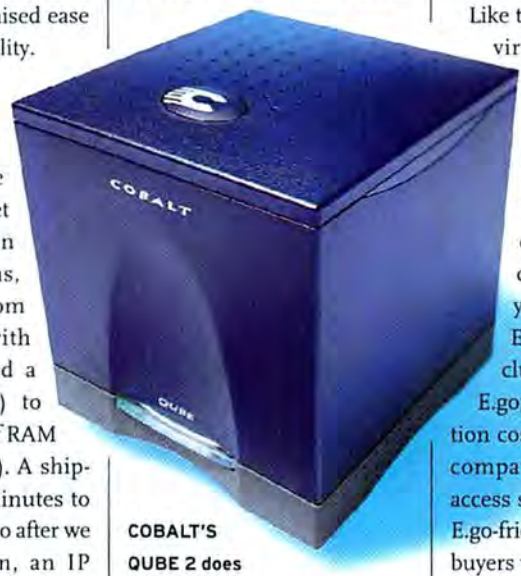
Thin servers are usually designed to handle specific network chores, such as sharing a workgroup printer, providing Internet access, or hosting a Web site. And though most are based on some flavor of UNIX, you manage them through user-friendly, browser-based interfaces.

We looked at four new thin servers: Cobalt's Qube 2, Encanto's E.go, Compaq's new Prosignia NeoServer, and Intel's InBusiness Print Station. (We'd hoped to see Whistle Communications' latest InterJet, too, but it wasn't available in time.) All four delivered their promised ease of use and functionality.

ON THE WEB

COBALT'S QUBE 2 is built for e-mail, file sharing, and intranet services. It comes in three configurations, ranging in price from $999 (for a unit with 16MB of RAM and a 3.2GB hard drive) to $1499 (with 32MB of RAM and a 10.2GB drive). A shipping unit took 15 minutes to set up. A minute or so after we turned the unit on, an IP address appeared on the Qube 2's built-in LCD; we simply plugged that IP address into a Web browser on another PC on the network, and we were ready to configure the Qube 2.

Cobalt preinstalls all the necessary software: the industry-standard SendMail e-mail server, the Apache Web server, a basic Web-authoring package, document management tools, and support for discussion groups. Add a third-party network router (the Qube 2 comes with two ethernet ports) and an ISDN (or faster) Net connection, and the Qube 2 is ready to function as a full-fledged Web server.



COBALT'S QUBE 2 does e-mail and Web hosting.

SUPER E.GO?

LIKE THE QUBE 2, Encanto's E.go 200 handles e-mail and routing. But its main role is to make setting up a Web site fast and easy. The $1295 box comes with a 56-kbps modem; for $200 more you can opt for an ISDN connection: In either guise, the E.go packs all the software you need to create Web pages and even do e-commerce; an extra $200 lets you handle secure credit-card transactions.

Like the Qube 2, the E.go is virtually plug-and-play: You power it up, wait until the lights are glowing, and then use a special version of Netscape Communicator (included) to access it from any PC on your network. For now, Encanto acts as the exclusive ISP for users of E.go; an unlimited connection costs $70 a month. The company plans to arrange access services through other E.go-friendly ISPs this year, so buyers will have more choice.

In our prerelease unit, Encanto's automatic setup and registration system (done via a secure phone line) wasn't working, so we couldn't accurately judge setup time. But even unfinished, the E.go appears to offer an easy, low-cost way to establish a Web presence. Our only question: Can you really host a Web site over a 56-kbps modem? ▶

SERVERS FEATURES COMPARISON

Easy-to-Use Servers for Less Than $2000

PRODUCT	List price	Backup	Dial-in remote access	E-commerce	E-mail	File storage	Intranet	Print server	Shared Internet access	Web server	Product info number
Cobalt Qube 2 888/702-6225 www.cobaltnet.com	$999-$1499	●	○	○	●	●	●	○	●[1]	●[1]	734
Compaq Prosignia NeoServer 800/888-0259 www.compaq.com	$1399-$1699	●	●[2]	○	●[2]	●	○	○	●[2]	○	735
Encanto E.go 200 888/362-2686 www.encanto.com	$1295-$1695	○	●	●	●	●	○	○	●	●	736
Intel InBusiness Print Station 800/538-3373 www.intel.com	$170	○	○	○	○	○	○	●	○	○	737

● Yes ○ No

[1] With external router (not included). [2] Internet Plus model only.

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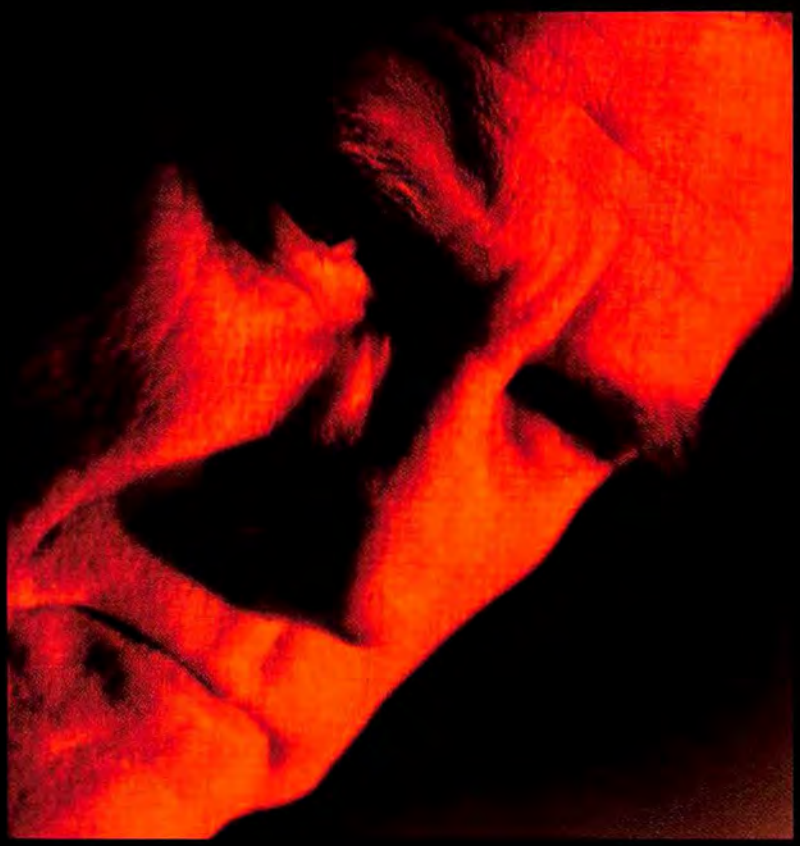

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NOT-SO-THIN SERVER

OF THE FOUR thin servers that we looked at, Compaq's ProSignia NeoServer is functionally the most traditional, sharing files, peripherals, and Internet access; providing network backup and remote access; and dishing out e-mail.

The basic unit, priced at $1399, includes a Celeron-366 processor and an 8.4GB hard drive (which may not be sufficient for larger networks, even when supplemented by an optional 6.3GB drive). The Internet Plus model ($1699) adds a 56-kbps modem for Internet access, remote dial-in, and e-mail.

It took us about 15 minutes to set up the basic model (we tested a shipping unit). After connecting the cables, we went to another PC and installed a special version of Netscape Communicator. The difference between this and other thin servers is that only a designated administrator can control backup and setup of remote access. Other users simply see that a new drive is available on the network.

> Each of these four boxes gets the job done with a minimum investment of time and trouble.

EASY PRINTING

INTEL'S INBUSINESS Print Station ($170) is the latest addition to the company's InBusiness line of specialized small-business network appliances (the InBusiness Internet Station offers Net connectivity, and the InBusiness Email Station provides internal and external e-mail services).

Many smaller businesses share a printer simply by hooking it up to a PC on the network, but large print jobs can bring that host computer to its knees. Print servers enable you to connect a printer to any available network connection, without tying up a valuable PC.

Once we hooked up AC power, plugged in the network cable, and connected the printer, we had our Print Station (a shipping unit) working in about 10 minutes. After we hooked up the hardware, we had to run the installation program on each computer on the network. In some cases, we had to enter an IP address for the printer, but a simple wizard-based interface handles even that chore. Using the Print Station, we found that print jobs started almost instantaneously.

There are cheaper ways to get the same functionality these thin servers offer: A sub-$1000 PC and free copies of Linux, SendMail, and Apache will do the job just as well. And the 56-kbps modems that come with the E.go and the NeoServer aren't the answer for high-traffic Web sites. But if you need to connect a bunch of users on your network to each other, to the Net at large, or to specific peripherals, without getting a degree in network administration, these four boxes will do the job with a minimum investment of time and trouble.

—Stan Miastkowski

FTC Lets Intel Off the Hook—for Now

ILLUSTRATION: PAMELA HOBBS

ANALYSIS

ROUND ONE OF Intel vs. the feds is over, and most analysts call it a draw. By reaching a settlement just before trial, Intel escaped an airing of its dirty laundry, and the Federal Trade Commission, whose case seemed weak, avoided a loss. But PC buyers may have taken it on the chin.

"Consumers would have benefited if the case had been tried, because it would have established a precedent," says Linley Gwennap, editor of *MicroProcessor Report*.

The FTC alleged that Intel, which controls 80 percent of the CPU market, unfairly withheld technical details from customers that refused to divulge information they considered proprietary. Those customers—Digital, Compaq, and the workstation maker Intergraph—need advance knowledge of Intel's CPUs to develop future products.

But when those companies refused to give Intel the information it wanted, the chip maker shut off the flow of information. Intel spokesperson Chuck Mulloy says the company was simply defending itself after the patent disputes led to litigation. "Does it make sense to give a trade secret to someone who is taking you to court?" he asks.

The settlement, expected to be made final in May, says Intel can't withhold technical data or samples from customers that assert intellectual property rights. But those customers must agree not to seek an injunction against the use or sale of Intel chips. That's valuable to Intel, since Digital, Compaq, and Intergraph had sought injunctions in their disputes. Intel did not have to admit to being a monopolist.

WHAT'S IN A NAME?

THE MONOPOLY issue is not just a matter of name-calling. Although being a monopoly isn't illegal, companies so branded face tougher antitrust rules and difficult legal battles with competitors.

For now, there will be no sneak peeks at Andy Grove's e-mail, nor any searching cross-examinations of Intel's business practices. However, the government is continuing to investigate the $25 billion chipmaking giant. Among the practices reportedly under scrutiny are Intel's control of industry standards and the way it funnels marketing dollars to computer makers that agree to participate in its "Intel Inside" campaign. ▶

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FIRST LOOK

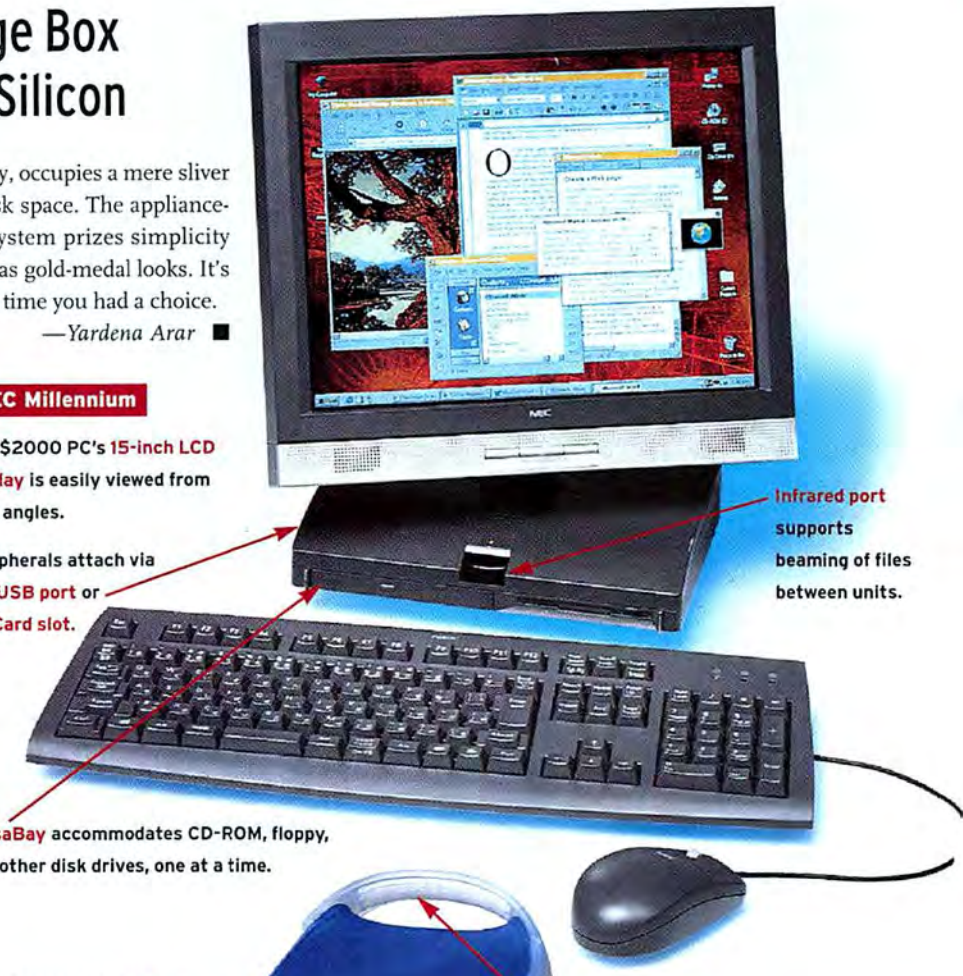
HIGHER, FASTER, stronger... sleeker? Like Olympic athletes, today's PCs constantly set performance records. But outwardly, most resemble the beige boxes of 1995. What's worse, they still have some of the same design flaws, like huge desktop footprints and inaccessible innards.

That's finally changing. Intel recently staged a PC fashion show that included a desktop PC shaped like a koi fish and another resembling a bonsai tree. Those designs aren't ready for mass-production, but a few vendors are serving up some style.

Users also deserve PCs engineered for real people. Apple's Power Macintosh G3 is an early example: The aqua-colored case pops open without a screwdriver, and the motherboard sits inside the door.

But PC makers won't let Apple hog the spotlight for long. NEC's Millennium, due by July, occupies a mere sliver of desk space. The appliance-like system prizes simplicity and has gold-medal looks. It's about time you had a choice.

—*Yardena Arar* ■



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- Corel® WordPerfect® Suite 8 Software

$999 or as low as **$28**/mo. for 48 months[4]

ESSENTIAL 400c
- Intel Celeron Processor 400MHz with 128K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB AGP Graphics
- 8.4GB Ultra ATA Hard Drive
- SoundBlaster AudioPCI 64D
- Altec Lansing GCS-100 Speakers
- 56K[3] Internet/Fax Modem
- MS® Windows 98
- Corel WordPerfect Suite 8 Software
- **1-Year gateway.net℠ Internet Access[1]**

$1299 or as low as **$37**/mo. for 48 months[4]

ESSENTIAL 433c
- Intel Celeron Processor 433MHz with 128K Cache
- 128MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB AGP Graphics
- 13GB Ultra ATA Hard Drive
- SoundBlaster AudioPCI 64D
- Altec Lansing GCS-100 Speakers
- 56K[3] Internet/Fax Modem
- MS Windows 98
- Corel WordPerfect Suite 8 Software
- **1-Year gateway.net Internet Access[1]**

$1499 or as low as **$42**/mo. for 48 months[4]

All Gateway™ Essential PCs include: 13X min/32X max CD-ROM, 3.5" Diskette Drive, Micro-Tower Case, MultiFunction Keyboard, Mouse, HelpSpot™ Troubleshooting & Self-Repair Software, Year 2000 Compliance[5], 1 Year Parts & Labor/1 Year On-Site Support.[6]

Choose any Gateway Essential or Performance PC, and you can customize it with one of the following solution packages:

Family Entertainment Package - $149
- kidBoard™ Sketchboard™ Drawing Tablet
- Hasbro Interactive™ Classic Games (Sorry!®, Pictionary®, Scrabble®, Boggle®, Ultimate Yahtzee®)

KidBuilder Start-Up Package - $199
- KidBuilder Preschool-Kindergarten Software (includes 7 titles)
- kidBoard Keyboard
- kidBoard Sketchboard Drawing Tablet

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www.gateway.com
VISIT GATEWAY COUNTRY®

Gateway™ Performance Line:
for home users who want to crank it up.

PERFORMANCE 450

- **Intel® Pentium® III Processor 450MHz with 512K Cache**
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 16MB 3Dfx™ Voodoo Banshee™ AGP Graphics Accelerator
- 13.5GB **Ultra ATA 66 7200 RPM** Hard Drive
- 4.8X DVD-ROM Drive & MPEG2 Decoder
- 3.5" Diskette Drive
- SoundBlaster® AudioPCI™ 64D
- Boston Acoustics® BA635™ 3-Piece Speaker System
- U.S. Robotics® 56K[3] Voice Winmodem®
- 8-Bay Mid-Tower Case
- MultiFunction Keyboard & Mouse
- Microsoft® Windows® 98 & MS® Works Suite 99
- HelpSpot™ Troubleshooting & Self-Repair Software
- Year 2000 Compliant[5]
- 3-Year Parts & Labor, 1-Year On-Site Support[6]
- **1-Year gateway.net℠ Internet Access[1]**

$1999 or as low as **$56**/mo. for 48 months[4]

Ad Code # 11070

PERFORMANCE 500

- **Intel Pentium III Processor 500MHz with 512K Cache**
- 128MB SDRAM
- VX900 .26 Screen Pitch 19" Monitor (18" viewable)
- 16MB NVIDIA™ RIVA TNT™ AGP Graphics
- 13.5GB **Ultra ATA 66 7200 RPM** Hard Drive
- 4.8X DVD-ROM Drive & MPEG2 Decoder
- 3.5" Diskette Drive
- SoundBlaster AudioPCI 64D
- Boston Acoustics BA635 3-Piece Speaker System
- U.S. Robotics 56K[3] Voice Winmodem
- 8-Bay Mid-Tower Case
- MultiFunction Keyboard & Mouse
- Microsoft Windows 98 & MS Works Suite 99
- HelpSpot Troubleshooting & Self-Repair Software
- Year 2000 Compliant[5]
- 3-Year Parts & Labor, 1-Year On-Site Support[6]
- **1-Year gateway.net Internet Access[1]**

$2499 or as low as **$70**/mo. for 48 months[4]

PERFORMANCE 550XL

- **Intel® Pentium® III Xeon™ 550MHz with 512K Cache**
- 128MB SDRAM
- VX900 .26 Screen Pitch 19" Monitor (18" viewable)
- 16MB NVIDIA RIVA TNT AGP Graphics
- TV/FM Tuner Card
- 18GB **Ultra ATA 66 7200 RPM** Hard Drive
- 4.8X DVD-ROM Drive & MPEG2 Decoder
- Philips® CD-RW (CD-Rewritable) Drive
- 3.5" Diskette Drive
- SoundBlaster AudioPCI 64D
- Boston Acoustics Digital MediaTheater™ Dolby® Digital 3-Piece Speaker System
- U.S. Robotics 56K[3] Voice Winmodem
- 10-Bay Tower Case with 300-Watt Power Supply
- MultiFunction Keyboard & Mouse
- Microsoft Windows 98
- MS Office 97, Small Business Edition plus Bookshelf® 98 & FREE Office 2000 Upgrade Offer[7]
- HelpSpot Troubleshooting & Self-Repair Software
- Year 2000 Compliant[5]
- 3-Year Parts & Labor, 1-Year On-Site Support[6]
- **1-Year gateway.net Internet Access[1]**

$3999 or as low as **$112**/mo. for 48 months[4]

Choose any Gateway Essential or Performance PC, and you can customize it with one of the following solution packages:

Complete Gamers Package - $149 *(Content suitable for ages 17 and older)*
- Extreme Gaming Software (Hexen II™, Heavy Gear™, Quake II™, Battlezone™)
- Extreme Gaming II Software (Unreal™, Forsaken™, The House of The Dead™, Turok® Dinosaur Hunter)
- Microsoft SideWinder® Precision Pro Joystick

Electronic Photo Album Package - $369
- Philips CD-RW (CD-Rewritable) Drive
- Visioneer® PaperPort® OneTouch™ 7600 USB Scanner
- CD Stomper™ CD Labeling System

Toll Free from Canada 800-846-3609 Toll Free from Puerto Rico 800-846-3613 Toll Free from Mexico 95-888-888-0074

1. No monthly fee for first year. Rural access $3.95 per hour. Local access $1.50 per hour over 150 hours. 12 months runs from date of delivery. Must register within 30 days of delivery. 2. Gateway purchases will qualify for the Your:)Ware program by: 1) financing through a Gateway authorized lender; 2) purchasing an additional software or solution bundle; or 3) purchasing support package upgrades. Call us for details. 3. Maximum data transfer rate dependent upon variables including particular modems with which you are communicating, telephone lines, communications software and communications protocols. 4. Prices and configurations subject to change without notice or obligation. Prices exclude shipping and handling and taxes. 5. All Gateway Celeron™, Pentium, Pentium Pro, and Pentium II processor-based systems are qualified to carry the "NSTL Hardware Tested Year 2000 Compliant" logo because they have successfully completed the NSTL YMARK2000 test. These systems have also passed the Microsoft Millennium Year 2000 test suite. Gateway cannot be responsible for third party software that improperly sets, resets, or calculates dates. These issues are not related to the hardware and operating system, and cannot be corrected by Gateway. 6. Call 1-800-GATEWAY or write to Gateway Terms & Conditions, P.O. Box 1951, North Sioux City, SD 57049-1951 for a free copy of our limited warranties and on-site service agreements. If Gateway determines on-site service is necessary, it will be provided for product in the continental United States, Alaska, Hawaii, Puerto Rico and Canada (excluding mice, keyboards, monitors and portables). You may be asked to take your PC to a Gateway location for warranty service. See agreements for specific terms and limitations. 7. Free Office 2000 upgrade certificate offer available for a limited time only. Certificate must be redeemed by 10/15/99.

Gateway™ Business Computers:

ALR-Series® Servers

Highly reliable, highly upgradable, highly affordable cutting-edge servers. Gateway ALR-Series servers are custom-built for your company.

ALR® 7200

Ideal for both companies and power-hungry workgroups, the ALR 7200 Series offers big server features at a small price.

- Intel® Pentium® II Processor 350MHz with 512K Cache (Dual Pentium II and Pentium III capable)
- 64MB PC 100 ECC SDRAM (expandable to 1GB)
- 4GB Ultra 2 SCSI Hard Drive (expandable to 27GB)
- Integrated Intel 10/100 Ethernet
- InforManager™ Server Management Software

Starting at **$1897** or **$65**/month for 36 mos. business lease[1]

ALR 8200

Our ALR 8200 Series improves mid-range server performance with extraordinary expansion capabilities and dual-processing power support.

- Intel Pentium II Processor 350MHz with 512K Cache (Dual Pentium II and Pentium III capable)
- 128MB PC 100 ECC SDRAM (expandable to 1GB)
- 9GB Ultra 2 SCSI Hard Drive (expandable to 162GB)
- Integrated Intel 10/100 Ethernet
- InforManager Server Management Software

Starting at **$3699** or **$126**/month for 36 mos. business lease[1]

ALR 9200

Up to four Pentium® II Xeon™ processors deliver incredible data throughput at a low cost per transaction on this high-end enterprise server.

- Intel Pentium II Xeon processor 450MHz with 512K Cache (Quad Pentium II Xeon and Pentium III capable)
- 256MB ECC 100 ECC EDO DRAM (expandable to 4GB)
- 9GB Ultra 2 SCSI Hard Drive (expandable to 54GB)
- Integrated Intel 10/100 Ethernet
- Gateway Server Management Software

Starting at **$7999** or **$244**/month for 36 mos. business lease[1]

E-Series Managed Desktops

Our commitment to stable platforms is all about consistency with reliable, easy-to-manage business desktops.

E-1200

Designed for the IT manager focused on manageability and serviceability, the Intel® Celeron™ processor-based E-1200s deliver solid performance at a minimum cost.

- Intel® Celeron™ Processor 366MHz with 128K Full-Speed Cache
- 32MB SDRAM (expandable to 256MB)
- 4.3GB SMART II Ultra ATA Hard Drive (expandable to 13GB)
- Integrated Intel 10/100 Ethernet with Wake-up On LAN
- EV500 15" Color Monitor (13.9" viewable)
- Intel LANDesk® Client Manager v.3.31

Starting at **$999** or **$34**/month for 36 mos. business lease[1]

E-3200

Maximum performance, enhanced serviceability and industry-standard manageability are yours with the full-featured E-3200.

- Intel Pentium II Processor 350MHz with 512K ECC Cache (supports up to Pentium III Processor 500MHz)
- 32MB 100MHz SDRAM (expandable to 384MB)
- 8.4GB SMART II Ultra ATA Hard Drive (expandable to 22GB)
- Integrated 3COM® 10/100 Ethernet with Wake-up On LAN
- EV700 17" Color Monitor (15.9" viewable)
- Intel LANDesk Client Manager v.3.31

Starting at **$1399** or **$48**/month for 36 mos. business lease[1]

E-4200

The E-4200 delivers next-generation Intel Pentium III processor technology and a 100MHz front-side bus at an unbelievable value.

- Intel Pentium II processor 350MHz with 512K ECC Cache (supports up to Pentium III processor 500MHz)
- 32MB 100MHz SDRAM (expandable to 384MB)
- 13GB SMART II Ultra ATA Hard Drive (expandable to 22GB)
- 3COM® 10/100 Ethernet with Wake-up On LAN
- Microsoft® Windows® NT® 4.0
- VX900 19" Color Monitor (18" viewable)
- Intel LANDesk Client Manager v.3.31

Starting at **$1749** or **$60**/month for 36 mos. business lease[1]

E-Series Technical Workstations

These powerful workstations are designed for everything from software development to digital content creation, to computer-aided design.

E-5200

Configured and priced for budget-conscious technical users, E-5200 workstations are perfect for 2-D drafting and entry-level 3-D design.

- Intel Pentium II Processor 350MHz with 512K ECC Cache (supports up to Pentium III Processor 500MHz)
- 64MB ECC SDRAM (expandable to 1GB)
- 4.3GB SMART II Ultra ATA Hard Drive (expandable to 22GB IDE)
- 3COM 10/100 Ethernet with Wake-up On LAN (expandable to 1GB)
- VX900 19" Color Monitor (18" viewable)
- MS® Windows NT 4.0

Starting at **$1999** or **$68**/month for 36 mos. business lease[1]

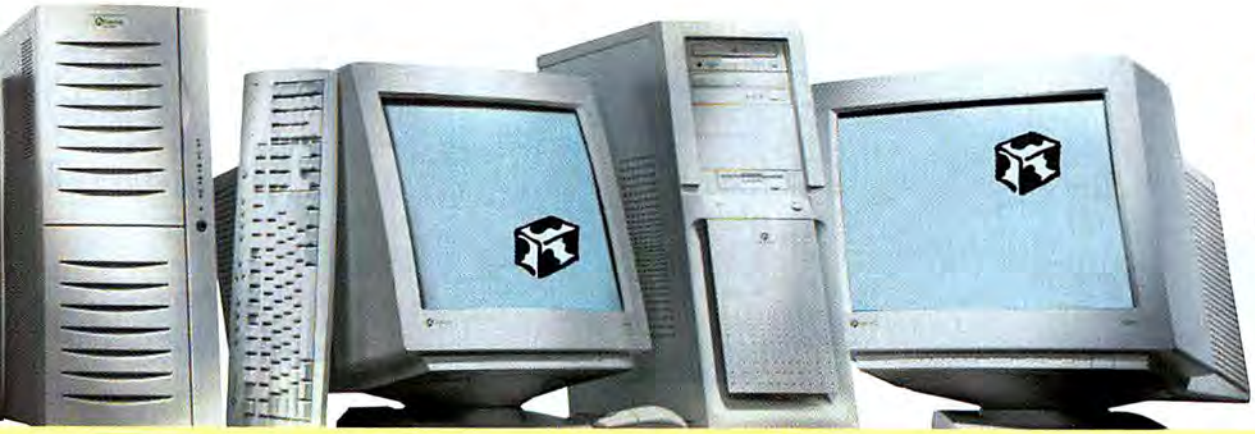
E-5250

The E-5250 is ideal for power-hungry applications like complex 3-D design, digital content creation and high-end animation.

- Intel Pentium II Xeon™ Processor 450MHz with 512K ECC Cache (supports up to Pentium III Xeon 500MHz)
- 128MB ECC SDRAM (expandable to 2GB)
- 4.5GB 10K RPM SCSI Hard Drive (expandable to 22GB IDE)
- 3COM 10/100 Ethernet with Wake-up On LAN
- VX1100 21" Color Monitor (19.7" viewable)
- MS Windows NT 4.0

Starting at **$4799** or **$163**/month for 36 mos. business lease[1]

For the latest pricing and to custom-build your own system, call or visit the Web.



intel inside
pentium® III

for businesses that want to get the job done.

Solo® Portable PCs

No matter what your company's portable needs are, power, exceptional portability or excellent value, we'll custom-build Solo portables just for your business needs.

SOLO 2500

Designed for stability and manageability, the affordable Solo 2500 is the ideal tool for an entire fleet. This scalable system integrates the CD-ROM and floppy into the chassis, maximizing portability and convenience.

- 12.1" SVGA TFT Color Display
- Intel Celeron Processor 300MHz (supports up to Pentium II Processor 366MHz)
- 32MB SDRAM (expandable to 288MB)
- 4GB Ultra ATA Hard Drive (expandable to 10GB)
- MS Windows 95, Windows 98 or Windows NT 4.0
- MS Office 97 (optional)

Starting at **$1649** or **$57**/month
for 36 mos. business lease[1]

SOLO 3100

True mobility is yours with the Solo 3100's revolutionary combination of mainstream features in a 5.2-pound package. This sleek 1.2-inch system is one of the lightest integrated DVD portables in the world.

- 12.1" TFT Color Display
- Intel Pentium II Processor 300MHz (supports up to Pentium II Processor 366 MHz)
- 32MB SDRAM (expandable to 160MB)
- 4GB Ultra ATA Hard Drive (expandable to 6.4GB)
- MS Windows 95, Windows 98 or Windows NT 4.0
- MS Office 97 (optional)

Starting at **$2349** or **$80**/month
for 36 mos. business lease[1]

SOLO 5150

At just 6.7 pounds fully loaded and only 1.6-inches thin, the sleek 5150 is a mobile presenter's dream machine with maximum portability.

- 14.1" XGA TFT Color Display
- Intel Pentium II Processor 333MHz
- 64MB SDRAM (expandable to 288MB)
- 4GB Ultra ATA Hard Drive (expandable to 10GB)
- MS Windows 95, Windows 98 or Windows NT 4.0
- MS Office 97(optional)

Starting at **$2199** or **$75**/month
for 36 mos. business lease[1]

GP-Series Small Business Desktops

A big solution for small businesses. We custom-build our powerful GP-Series small business desktops network-ready with cutting-edge technology, just for your firm.

GP6-366c

Designed for the budget-conscious small business user, the GP6-366 delivers solid performance complete with office productivity software.

- Intel Celeron Processor 366MHz with 128K Cache (supports up to Pentium II Processor 400MHz)
- 64MB SDRAM (expandable to 384MB)
- 6.4GB Ultra ATA Hard Drive (expandable to 22GB)
- 10/100 Twisted Pair Ethernet
- EV700 17" Color Monitor (15.9" viewable)
- MS Office 97, Small Business Edition plus Bookshelf® 98
- MS Windows 95 or MS Windows 98

Starting at **$1399** or **$48**/month
for 36 mos. business lease[1]

GP7-450

For maximum performance, the GP7-450 offers cutting-edge technology that will help increase your office's productivity.

- Intel Pentium III Processor 450MHz with 512K Cache (supports up to Pentium III Processor 500MHz)
- 128MB SDRAM (expandable to 384MB)
- 9GB Ultra ATA Hard Drive (expandable to 22GB)
- 10/100 Twisted Pair Ethernet
- VX900 19" Color Monitor (18" viewable)
- MS Office 97, Small Business Edition plus Bookshelf 98
- MS Windows 98

Starting at **$2299** or **$79**/month
for 36 mos. business lease[1]

Ad Code #11070
GSA Schedule #GS-35F-4565G

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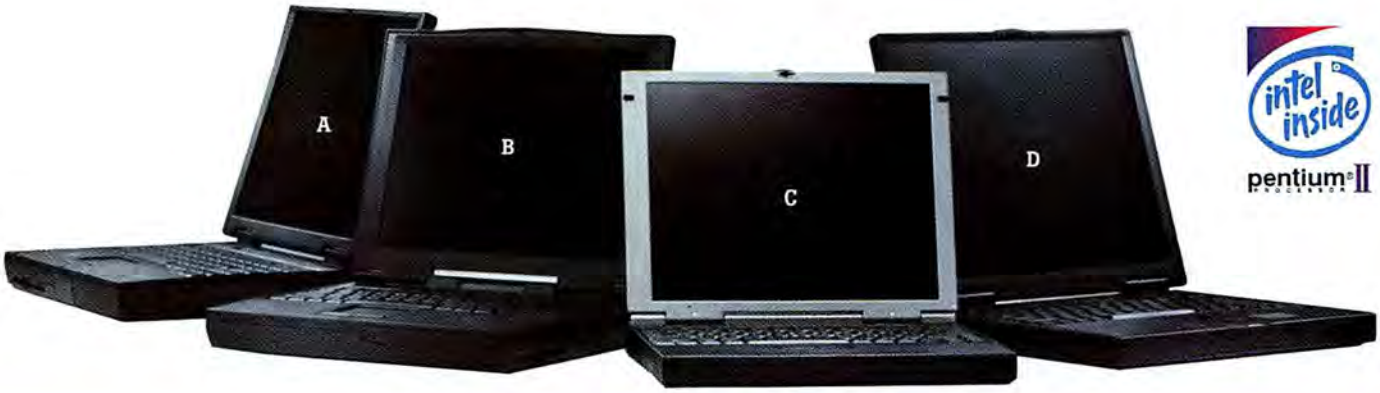
1. Leasing provided by independent leasing companies to qualified commercial customers. Lease payments based on a 36-month term. Lease terms subject to change without notice or obligation.



intel inside
pentium® II

Gateway™ Portables:
for people who want selection, but they want it to go.

With our Your:)Ware℠ purchasing program, you make low monthly payments and after two years, you can trade in toward a new one.[2]

A SOLO® 2500SE

A solid entry-level portable with all the necessary stuff built in.

- 12.1" SVGA TFT Color Display
- Intel® Celeron™ Processor 300MHz
- 32MB SDRAM (expandable to 288MB)
- 2MB Graphics Accelerator with 64K Colors
- Integrated 8X min/20X max CD-ROM Drive & 3.5" Disk Drive
- 4GB Ultra ATA Hard Drive
- NiMH Battery & AC Pack
- NTSC/PAL Video Output
- V.90 56K[3] Modem
- Casual Case
- EZ Pad® Pointing Device
- Starting Weight: 7.1 lbs.[8]
- Microsoft® Works Suite 99
- **1-Year gateway.net℠ Internet Access[1]**

As low as **$50**/mo. for 48 months or **$1799[4]**
(Base price starting at $1799)

B SOLO 9100LS

The desktop PC in condensed form. It sacrifices nothing for portability.

- 14.1" XGA TFT Color Display
- Intel® Pentium® II Processor 333MHz
- 64MB SDRAM (expandable to 384MB)
- 4MB SGRAM 3-D Graphics Accelerator
- Removable Combo DVD-II Drive & 120MB SuperDisk™ Drive
- 6GB Ultra ATA Hard Drive
- Lithium Ion Battery & AC Pack
- NTSC/PAL Video Input & Output
- V.90 56K[3] Modem
- Deluxe Leather Case & EZ Pad Pointing Device
- Starting Weight: 8.6 lbs.[8]
- MS® Office 97, Small Business Edition plus Bookshelf® 98 & FREE Office 2000 Upgrade Offer[7]
- **1-Year gateway.net Internet Access[1]**

As low as **$95**/mo. for 48 months or **$3399[4]**
(Base price starting at $3099)

C SOLO 3100 Special

Powerful yet ultralightweight and sleek.

- 12.1" SVGA TFT Color Display
- Intel Celeron Processor 300MHz
- 32MB SDRAM (expandable to 160MB)
- 2.5MB 256-Bit Graphics Accelerator
- Integrated 8X min/20X max CD-ROM Drive & External 3.5" Diskette Drive
- Integrated V.90 Modem
- 4GB Ultra ATA Hard Drive
- Lithium Ion Battery & AC Pack
- Leather Portfolio Carrying Case
- EZ Point® Pointing Stick, Full-Size Keyboard
- Starting Weight: 5 lbs.[8]
- Corel® WordPerfect® Suite 8 Software

As low as **$56**/mo. for 48 months or **$1999[4]**

D SOLO 5150SE

Perfect for presentations: lightweight with a nice big screen.

- 14.1" XGA TFT Color Display
- Intel Pentium II Processor 300MHz (Performance Enhanced)
- 32MB SDRAM (expandable to 288MB)
- 2.5MB 256-Bit Graphics Accelerator
- Modular 8X min/20X max CD-ROM Drive & 3.5" Disk Drive
- 4GB Ultra ATA Hard Drive
- Lithium Ion Battery with Battery Gauge & AC Pack
- NTSC/PAL Video Output
- V.90 56K[3] Modem
- Casual Case & EZ Pad Pointing Device
- Starting Weight: 6.75 lbs.[8]
- Microsoft Works Suite 99
- **1-Year gateway.net Internet Access[1]**

As low as **$69**/mo. for 48 months or **$2449[4]**
(Base price starting at $2449)

All Solo® Portable PCs include: USB Port, CardBus, Zoomed Video Support, EZ S.M.A.R.T.™ Hard Drive Monitoring Protection Service, Integrated 16-Bit Sound & Stereo Speakers, Microsoft® Windows® 98, LapLink® V.7.5 for Windows 98, McAfee® VirusScan, Year 2000 Compliance,[5] 1-Year Parts & Labor Support.[6]

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Ad Code # 11070

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In a developing story, IDG.net and CNN.com have been linked in a technology information coup.

This just in: CNN.com, the world's leading news site, now features technology news and information from the Web's fastest growing global technology information network — IDG.net.

CNN Interactive has discovered what readers of IDG publications have known for over 30 years: no other company can match the breadth and quality of technology information offered by IDG.

PC World Online — along with fellow IDG.net sites *Computerworld Online, InfoWorld.com, JavaWorld, Network World Fusion* and *TheStandard.com* — is proud to be part of the Web's most trusted network of computing publications. With 240 sites in 55 countries, IDG.net reaches more readers, in more markets, than any other Web network — and, it's growing every day.

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More publications, more product reviews, more technology news — more of the quality information you need to make technology decisions for any computing environment, from the home office to the global enterprise.

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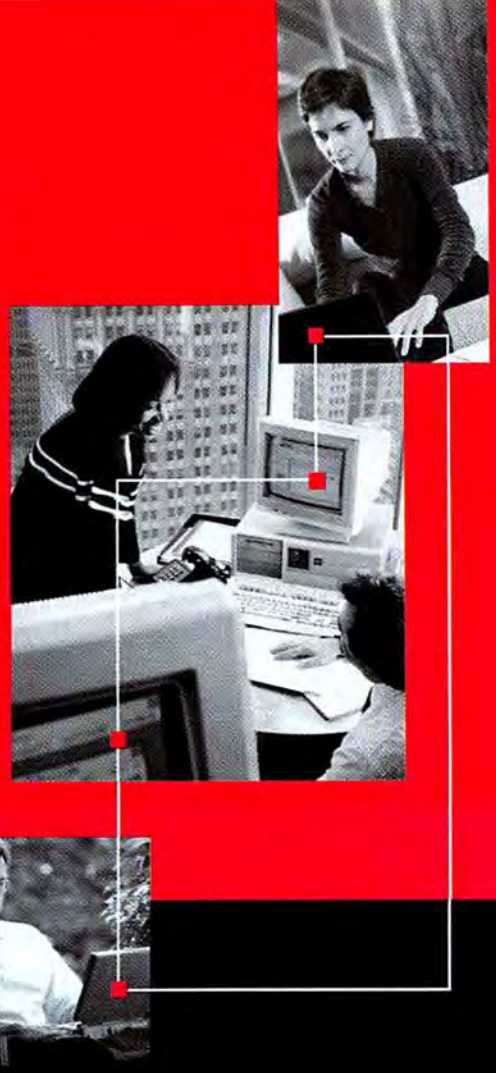
Shari's at home.
Working on the Johnson report.

Scott and Lisa are in the office.
Working on the Johnson report.

Ron's in Miami Beach.
Wishing he wasn't working on the Johnson report.



Your all-in-one small business weapon:

- **Document Management**
  Store, retrieve & share files from any Web connection
- **Group Calendar**
  Coordinate team schedules
- **Group Contact Manager**
  Look up information on key contacts
- **Bulletin Boards**
  Customize by project and department
- **Company Chat Rooms**
  Cut travel and phone costs
- **Web-based e-mail**
  Send/receive messages with no ad clutter
- **Business Center**
  Get discounts on business services

Working together seamlessly is a must for small businesses. And there's no better collaboration and communication tool than the new, more powerful HotOffice 2.0. No matter where team members are, everyone can securely access vital information, day or night, from any Web connection. You can customize HotOffice, and be up and running in minutes. Even better, because HotOffice is a Web-based intranet service, there's no hardware or software to buy. No technical hassles. Just one low monthly subscription. So check out what HotOffice can do for your business with a 30-day free trial.
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GET WITH THE FLOW!

In business, today more than ever, knowledge is power. Success starts by selecting the right mix of products that enable the flow of knowledge-laden documents throughout the company.

Marijean Lauzier, CEO, The Weber Group

When Larry Weber started The Weber Group public relations agency in 1987, the only document management tools he and his other co-worker needed were Post-It notes, different colored pens and pencils, and a date stamp. That was sufficient for a two-person office, but today the Cambridge, Mass.-based agency has 250 employees, $28 million in revenue, and is considered to be one of the fastest-growing technology agencies in the world. One reason for The Weber Group's success is its ability to keep pace with this growth by using breakthrough technology in areas such as document management.

THE DOCUMENT MANAGEMENT SERIES

PHOTOGRAPH BY GEORGE SIMIAN

The Weber Group

Weber's first foray into automated document management occurred in 1991, when the company had 46 employees and $4 million in revenue. The Weber Group was working with Lotus Development Corp. on the Notes product launch, and became a beta test site for Lotus Notes. "We had to switch to PCs, since at that time we were a Macintosh-based shop," says Weber CFO Bill Davies. "But as a company we've always been committed to using the best technology and taking risks."

In the following two years the agency extended its use of Notes to remote offices in Palo Alto and London, and became one of the very first beta sites for the Macintosh version of Notes. "We were really pushing the envelope," says Laura Antonucci, vice president of client development.

> "As a company we've always been committed to using the best technology and taking risks."
>
> **—Bill Davies, CFO, The Weber Group**

The Notes database capabilities were also expanded. "Most places were primarily using Notes for e-mail, but we found there were many benefits to using it for internal functions," Davies explains. "We started using it for key human resource and administrative activities, such as booking conference rooms, circulating resumes of prospective hires, and submitting check requests." The Weber Group even hired an outside consultant to develop a centralized, standardized, time-tracking Notes system to track employees' billable and non-billable hours. The program was so successful the consultant made it an off-the-shelf packaged time-tracking application.

Davies says a big advantage of the Notes system was "the sharing of more accurate information, faster. For instance, if a client called and wanted to know how many hours had been billed to his account that month, I could pull up real-time data on my computer screen and give him up-to-date information."

In 1996 The Weber Group, with 156 employees and more than $14 million in revenue, turned its document management focus on public relations tools. The company put profiles of media and analysts onto databases where Weber employees could access them. The Weber Group also collaborated with Dow Jones as early adopters of their news retrieval service.

eROOM WITH A VIEW

Most recently, The Weber Group collaborated with Cambridge, Mass.-based Instinctive Technology Inc. to develop WeberWorks, an operating system using a variety of Internet, intranet, and extranet tools. Scott MacIver, vice president of interactive communications at Weber, explains they chose Instinctive Technology because "they offered a collaboration solution, high security, and version control." He also liked the fact that their "technology follows the Windows metaphor."

When building the Web-based WeberWorks system, MacIver says they had to keep in mind that the "document" is no longer a piece of paper. "Now documents are shared in different formats, depending on the user's needs," he explains.

Introduced in 1998, WeberWorks allows employees to access items such as company newsletters, listings, and biographies of new employees, or go to Weber's "Best Practices Registry" to view company guidelines on specific public relations activities. Employees can also share and revise documents in a special "eRoom" and pull together news clippings in an electronic file. For instance, if an employee is putting together a status report for a client, he or she can go to WeberWorks to cull project updates from various databases, attach certain documents like press releases, and put everything in a Word document for electronic or paper distribution.

Clients using WeberWorks can view biographies of their account staff, look up media lists, or revise/review pending documents. "It's all about collaboration between account teams and the clients," says Antonucci. "WeberWorks really lets you act as an extension of the client's marketing team."

Sometimes, however, inappropriate sharing of information can be detrimental, as when a client sees a draft of a press release that has not yet been approved internally at The Weber Group. To prevent this, an access control feature allows the system administrator to specify which view of each document each user sees.

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"When you automate the core functions of the public relations craft, then you have more time to become creative."

—Marijean Lauzier, CEO, The Weber Group

In another example, an account executive's view of a media list might have much more detail than the client's version. One reason for this is to avoid overloading the client with too much information. "Clients primarily want actionable information," Weber President and CEO Marijean Lauzier explains, "so that's what we give them."

Future plans for WeberWorks include broadening the client applications and using more systems capabilities, such as instant messaging.

But, no matter how good a document management system is, it won't be effective if employees aren't willing to use it. Fortunately, The Weber Group had several things on its side to encourage company "buy in."

Lauzier points out that a big factor in encouraging employee participation was Weber leadership's obvious deep commitment to this technology. "If we are to remain leaders in this industry we need to be able to embrace change," she says. "Larry Weber wants the agency to mirror technology and learn by doing. That's why our use of technology was a differentiater in 1990, and it's an even bigger differentiater today."

When it comes to the mechanics of the system, Davies says one important plus was the fact that the people designing the system understand public relations. MacIver used to be a public relations practitioner, and his colleague has been working at Weber for many years. As a result, the document management system was designed with the specific needs of public relations professionals in mind.

Yet perhaps the biggest motivator for employees to use the system is because it makes their jobs easier and more enjoyable. Lauzier explains, "When you automate the core functions of the public relations craft, then you have more time to become creative." She adds, "Our job is all about relationship management — with editors, analysts, and clients. Now we can work smarter, faster, and be more responsive to these people."

"The system empowers employees," says Antonucci. "If an employee wants to look up a document, they can do it on the computer desktop. He or she doesn't have to chase people down or exchange e-mail to find it."

DIVIDENDS OF THE SYSTEM

In addition to helping employees work smarter, the Weber document management system has benefited the company in several other ways. The return on investment for the system "is through the roof," says Davies. For instance, "you can get the benefit of a big organization in the smaller offices." Smaller offices can tap into the same databases being used by the home office, and since everything is standardized there is no learning curve involved in going from one office to another.

Lauzier adds that in this age of mergers and acquisitions, the document management system ensures quality and consistency.

Finally, the document management system helps solidify Weber's partnerships with its clients. For instance, four years ago Weber employed an advanced use of Notes to access client SAP's Germany-based Notes database network. "We had to replicate their Notes database at night, since it completely tied up the server," Davies said. However, he adds, doing this allowed Weber to operate as an extension of SAP's global team.

There's little doubt The Weber Group will continue to grow its document management system in the future, since, as Lauzier points out, using cutting-edge technology has always been a key factor in the company's philosophy and success. "When Larry started this agency, his spark was to use technology in a way that would transform client service and the public relations craft," she says. "He wanted to define what would become the next great agency." As founder of one of the top five largest technology public relations firms in the world, it looks like he's succeeded.

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When a Document's Not a Document

What does the future hold for document management? Much depends on how you define "document." Years ago the term "document management" primarily referred to the management of text documents, such as legal briefs and business forms. Now, however, the documents might be a photograph, logo, or video clip. This transition from text-based to visually-based documents is perhaps one of the biggest changes facing document management today.

"Document management is currently moving toward more visually-based solutions, which might be animation, graphics, or charts — anything that falls into this new world called 'rich media,'" says Scott MacIver, vice president of interactive communications at The Weber Group, a public relations agency based in Cambridge, Mass. "We're entering a new age of visual communication, and people are going to rely more on visual cues such as photographs when obtaining information."

The major reason for this change, says Weber Chairman and founder Larry Weber, is the World Wide Web. "The Web is very visual," he explains. "As a result there's been a definite shift from text to image."

VISUALS DRIVE THE STORY

"Visuals make for more interesting storytelling," MacIver points out. "For instance, we used to publish press releases on the Web in a text-based format, like an HTML file. Then we started questioning if that was the most effective way to use the Web. Now we try to have visuals — like a 60 second video clip — drive the story."

The transition from static to dynamic documents is another change that will have an impact on document management, MacIver says. "A static document might contain all the information you might need in a Word format," he explains. "However, with a dynamic document you might go to your Internet browser, tell it what information you are looking for, and then receive a document that has all the elements you need at that particular time."

An example of a recent event which used both dynamic and visual documents is a media briefing held by the Recording Industry Association of America (RIAA) in December 1998. In addition to a traditional press conference, where media gather in a room with the company's spokespeople and receive printed press materials, RIAA and The Weber Group, in partnership with Irvine, Calif.-based Electronic Media Communications, held a Webcast — an interactive press conference, integrating telephony with the Internet.

Media were invited to the Webcast via email and telephone, and at the appointed time were instructed to log on to a specific Web site. The reporters saw live video of the press conference, and were able to call in questions to the spokespeople and access press materials on the Web site. Many of these press documents were videos, not text. For instance, if a reporter clicked on "industry quotes" he or she would see a video of an industry source talking about the press conference's subject matter. Over 2,500 reporters, industry experts, special interest groups, and customers logged onto the Webcast, and more than 100 reporters used the dial-in press call.

The bottom line of this trend toward visual and dynamic documents, MacIver says, is "the ability to share the type of information we need to share faster." In many ways, sharing information is what document management is all about.

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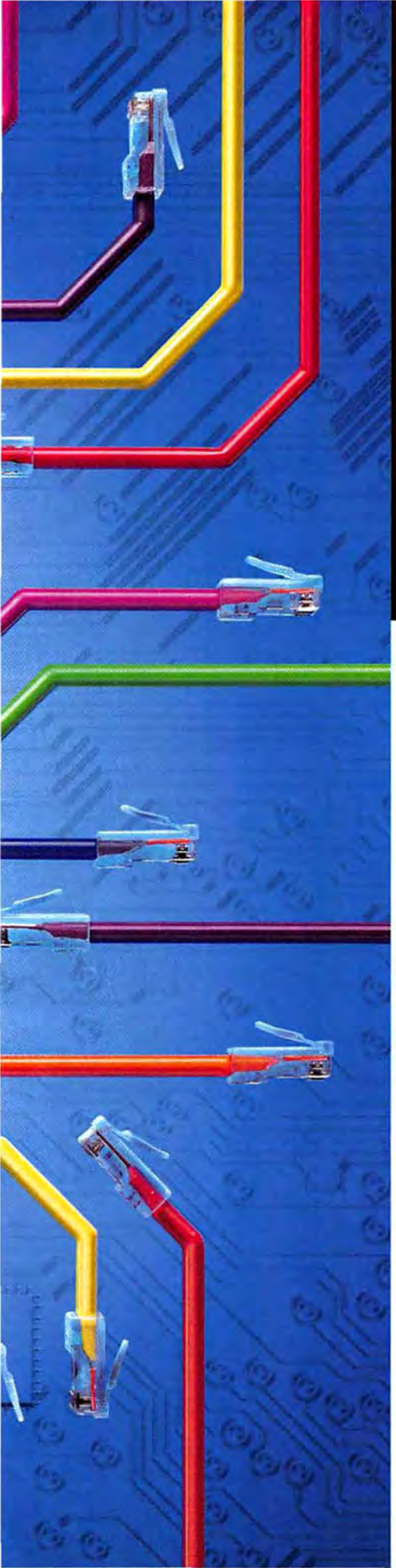

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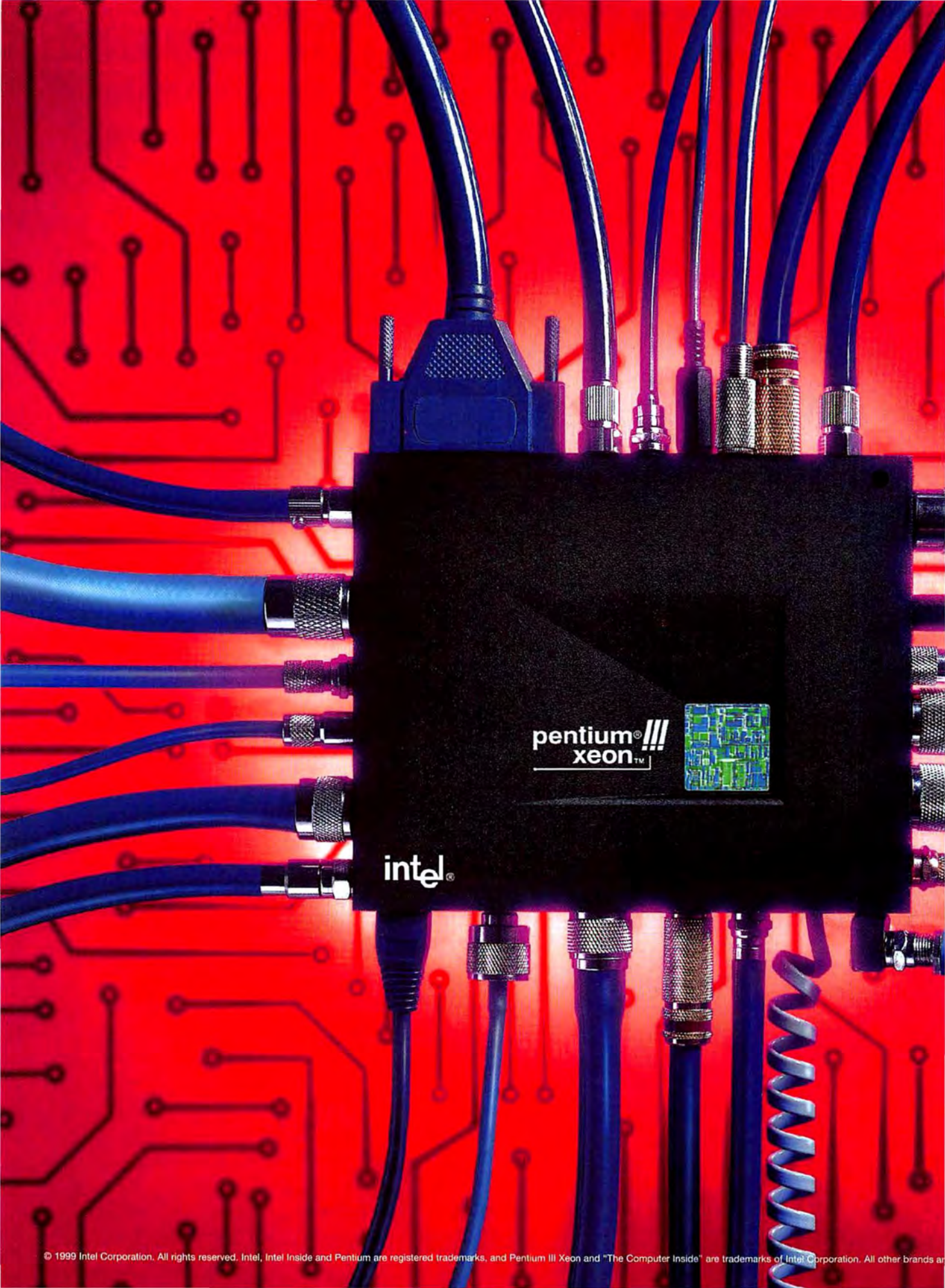

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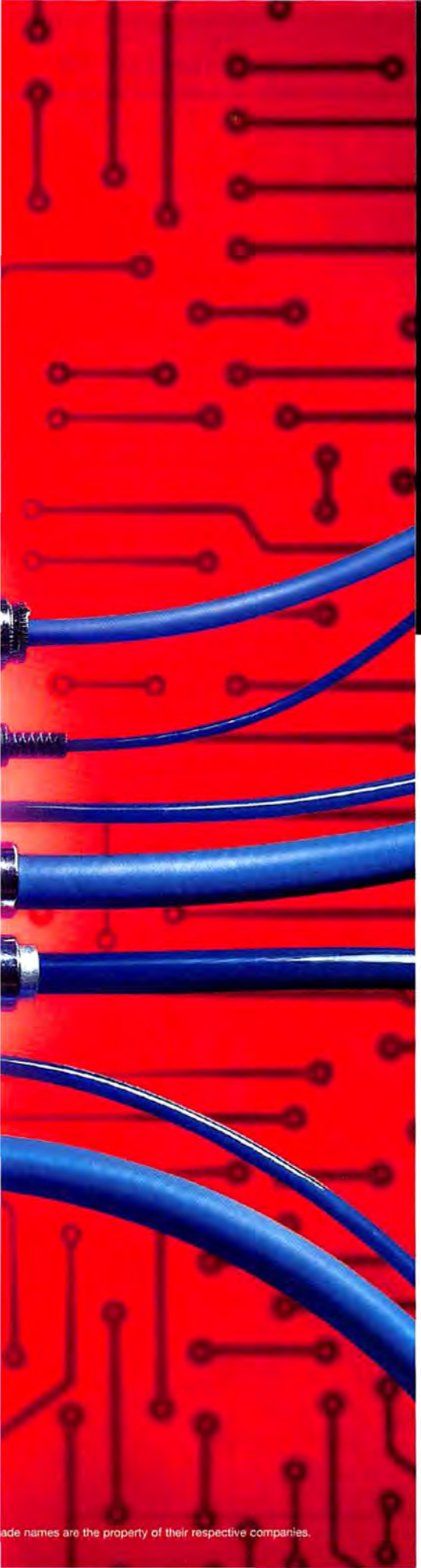

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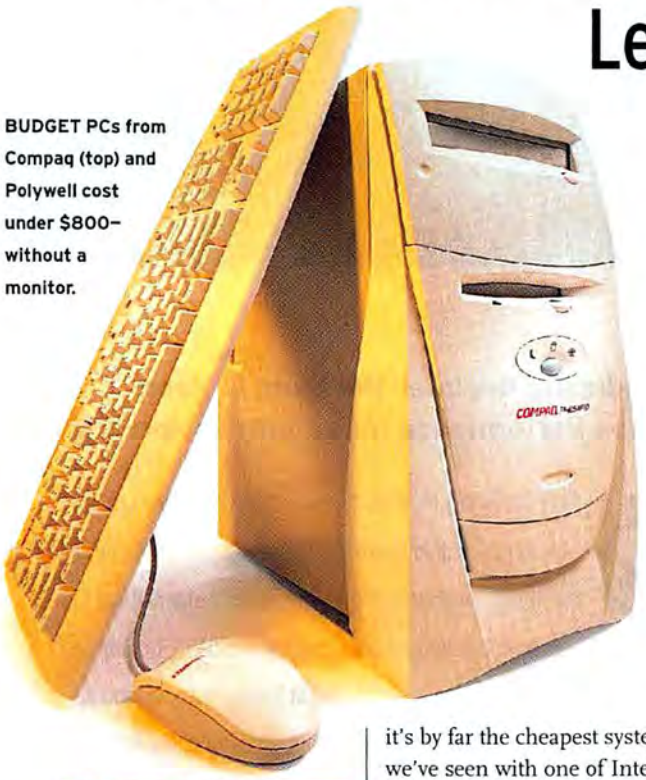

BUDGET PCs from Compaq (top) and Polywell cost under $800—without a monitor.

PHOTOGRAPHS: MARC SIMON

DESKTOP PCs

WHEN $799 PCs debuted about a year ago, they represented the bottom of the barrel in both hardware specs and performance. But now that new bare-bones systems go for $500 or less, $799 buys a surprisingly robust budget PC. While two $799 newcomers—Polywell's **Poly P400Se** and Compaq's **Presario 5184**—cut some corners (neither comes with a monitor or a spiffy graphics subsystem), both are good deals.

The Poly P400Se caught our eye with its Celeron-400 CPU; it's by far the cheapest systen we've seen with one of Intel' newest budget processors Until now, "Intel Inside" on sub-$800 PC meant the sys tem had a Celeron-333 or Ce eron-366 CPU. The only othe Celeron-400 PCs we've test ed—Gateway's G6-400c (*Ne Products*, March, www.pcworlc com/mar99/celeron400) an Dell's Dimension V400c (se *Top 10 Home PCs*, page 242)— both cost more than $110 without a monitor.

Our shipping Poly had plentiful 64MB of RAM, bu otherwise its 4.3GB hard disk V.90 56-kbps modem, an 16X–40X CD-ROM drive ar in line with specs of other PCs in its price range. Of course the pricier Gateway and Dell Celeron-400s have larger hard disks, DVD-ROM drives, add-in sound and graphics (Polywell integrates these on the motherboard), and home-oriented productivity and finance software (Polywell bundles Lotus SmartSuite 97).

Performance-wise, the Poly sits squarely between other systems in its price class and more expensive Celeron-400s. Its PC WorldBench 98 score of 175 is about 9 percent higher than that of the similarly priced K6-2-350–based CyberMax Enthusiast KII-350, and about 8 percent below the average scores of the Gateway and Dell Celeron-400s. Most people won't notice any difference running general business apps. But the Poly's graphics subsystem shares 8MB of main RAM, and historically such PCs run 3D games sluggishly compared to systems with a dedicated 3D graphics board.

The preproduction Compaq Presario 5184 that we saw is the first machine we've tested with an AMD K6-2-380 CPU and a 95-MHz system bus. Its 8.3GB hard disk is generous for a budget PC, and the home-oriented software bundle includes Encarta, Quicken, Microsoft Works, and Word. You also get a 14X–32X CD-ROM drive and a V.90 modem; as

84 Polywell Poly P400Se, Compaq Presario 5184 budget PCs
85 Virtual Ink Mimio
86 Adobe PageMaker 6.5 Plus, Adobe Acrobat 4.0
88 Compaq Aero 2100, HP Jornada 420, 3Com Palm IIIx and Palm V personal digital assistants
90 Sony PCV L600 LCD PC, ProdEx Technologies AddressGrabber
92 Calendar Creator Deluxe 6.0, Kai's Photo Soap 2, Etalon 3D PhotoClay
93 Kidasa Milestones Simplicity 2.0, Palisade RiskOptimizer
96 ScanSoft PaperPort Deluxe 6.0, HP ScanJet 3200C, Philips Hopper SV10
98 Microsoft Expedia Streets & Trips 2000, MicroSolutions Backpack CD-Rewriter

Poly P400Se

PRO: Aggressively priced Celeron-400 system with 64MB of RAM.

CON: No productivity software, relatively small hard disk, integrated AGP graphics is not optimal for playing 3D games.

VALUE: Adequate performance at an outstanding price.

Street price: $799

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PRODUCT INFO NO. 729

Presario 5184

PRO: Large hard disk, decent entry-level software bundle.

CON: K6-2-380 computer performs like a slow K6-2-350 machine; will probably not be able to handle some 3D games well.

VALUE: Low price for an adequate performer from a top-tier vendor.

Street price: $799

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with the Poly, AGP graphics and PCI sound subsystems are integrated on the motherboard. For $279 more, Compaq will add a 15-inch monitor and JBL speakers. But K6-2-350 systems still give you more: The $1099 CyberMax Enthusiast KII-350, for example, comes with a 4.8X DVD-ROM drive, a 19-inch monitor, and separate sound and AGP graphics cards. And while Compaq's reliability rating for home PCs is comparable to CyberMax's, Compaq's service is inferior, according to our latest survey (see "PC Reliability and Service: The Best Are a Phone Call Away," page 155).

You'd expect a K6-2-380 system to perform somewhere between K6-2-350 and K6-2-400 PCs, but the Presario 5184's PC WorldBench 98 score of 155 is actually 3 percent lower than that of the slowest K6-2-350 we've tested. The Presario 5184 will likely disappoint gamers more than the Poly because its graphics subsystem doesn't support Open GL client drivers, which will hinder performance on certain 3D games like Quake.

For bargain hunters who prefer dealing with a top-tier vendor, the Presario 5184 may be worthwhile. But for the speediest PC $799 can buy, check out the Poly P400Se.

—Yardena Arar

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Mimio: Electronic Whiteboard Substitute

ELECTRONIC NOTE-TAKING

IF YOU ATTEND a lot of brainstorming sessions, you've probably wished for an electronic whiteboard to capture all those precious ideas. But the large ones are pricey, and even compact units, such as MicroTouch's sub-$500 Ibid 100, are heavy and unwieldy.

Virtual Ink's $499 **Mimio** isn't cheaper than smaller competitive offerings, but it solves the portability problem by retrofitting conventional whiteboards to record scribbles and sketches electronically on a PC. It consists of a folding 28-inch bar (14 by 7 by 2 inches when closed) that weighs under 2 pounds; four color-coded dry-erase marker sheaths; and a pressure-sensitive eraser. The bar holds position-sensing optics and connects by cables to the serial (or Universal Serial Bus) and mouse ports of a PC. The marker sheaths are wired for ultrasonic and infrared transmission. When you write, Mimio detects and records your pen strokes as images you can save for printing or perusal. You use the eraser to make corrections or to wipe out blocks of text.

MARKER MAGIC: Mimio saves traditional whiteboard scribbles electronically.

Setup of an early preproduction unit was remarkably straightforward. The teal-colored bar attached by suction cups to the left side of my 3-by-4-foot office whiteboard. The mechanical kinks I ran into—suction cups giving way unexpectedly, and pens sometimes needing a lot of pressure to activate—should be fixed in the shipping version.

Virtual Ink says that Mimio supports boards as large as 4 by 8 feet and can be used with videoconferencing software, including Microsoft's NetMeeting, to share whiteboard notes remotely.

Mimio would be even more useful if it could convert handwriting to editable text. But if you can't justify the expense of a large electronic whiteboard, or even a smaller one that isn't comfortably portable, Mimio should fit the bill.

—Anita Epler ▶

Mimio

PRO: Lightweight, easy-to-use kit for saving whiteboard notes.

CON: Cannot convert handwriting to editable text.

VALUE: No more expensive and a lot more portable than integrated electronic whiteboards.

Street price: $499

Virtual Ink

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PageMaker Targets Publishing Novices

DESKTOP PUBLISHING

UNTIL RECENTLY, small-business and home-office users who lacked professional graphics expertise were limited to inexpensive, simple programs like Microsoft's $99 Publisher 2000. Now, Adobe is reaching out to novices who want to create eye-catching documents for commercial print runs.

PageMaker 6.5 Plus

PRO: Easy-to-use templates and huge clip art library, excellent publishing tools.

CON: No wizards, no printed catalog of clip art or template files.

VALUE: Expensive, but worthwhile for desktop-publishing novices who want to use commercial printing services.

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PICK A PICTURE: PageMaker 6.5 Plus's new Picture Palette makes adding high-quality canned art a simple point-and-click operation.

While not a major upgrade, **PageMaker 6.5 Plus** substantially enhances the excellent publishing tools in PageMaker 6.5. A new Template Palette contains about 300 layouts. A new Picture Palette affords access to a good-size library (4700 illustrations, 300 stock photos) of high-quality clip art.

In my tests using a preproduction copy, both Palette features were so easy to use that I didn't miss the wizards that other packages supply. However, a printed list of the templates and clip art to supplement Picture Palette's keyword search feature would have been nice.

Other goodies include a handy Microsoft Office–style toolbar, a Publisher 98 (but not 2000) file converter, and a limited edition of Adobe Photoshop 5.0.

PageMaker vets will probably find the $99 upgrade worthwhile, if only for the clip art library. But those who've shied away from PageMaker because of its high-end reputation—and $499 price tag—may also want to take a look. Publisher 2000 is cheaper and easier to use, but PageMaker's color tools and widespread service bureau support make it a better investment if you'd like to use a commercial printing service for better-quality projects or large print runs.

—Richard Jantz

Acrobat 4.0 Performs With the Net

ELECTRONIC PUBLISHING

ADOBE ACROBAT, the premier tool for publishing paper documents electronically, swings back into action with its first major upgrade in two years. **Acrobat 4.0** thoughtfully emphasizes Web tools and workgroup collaboration.

New Web capture and annotation features make it easy to create PDF (Acrobat's ubiquitous Portable Document Format) files from Web pages or all or part of an entire Web site. Annotation tools let workgroup users document discussions about Web site changes.

Acrobat 4.0's digital signature system controls access to PDF documents. Each time a digital signature is added, the original PDF file is also preserved—useful for approving and tracing online documents.

Gone is the cumbersome PDF file creation routine in Acrobat's Distiller program, which required selecting all sorts of settings. Now you can create a PDF file in seconds by dragging any supported file (Microsoft Office, FrameMaker, WordPerfect, HTML, ASCII text documents, and several graphic formats) onto the Acrobat desktop icon. You can still use Distiller buttons to change default settings—for example, to optimize files for screen display or printing. Acrobat 4.0 also lets you create notes without embedding them in documents, a major nuisance in 3.0. And you can now attach a file anywhere in a document—for instance, an Excel file to support a chart.

Niggling little flaws persist. In my preproduction copy, compression on larger files doesn't seem much improved, and (my pet peeve) Acrobat still cannot select text properly from formatted columns. Also, you can't view some Acrobat 4.0 PDF files without a (free) Acrobat 4.0 reader. But overall, Acrobat 4.0 merits a standing ovation.

—Luis Camus ▶

Acrobat 4.0

PRO: Dynamite new Web, security, collaboration, and annotation tools.

CON: Compression of large files not much improved.

VALUE: A must-have for anybody who needs to exchange very large document files.

Price: $249

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New Palms Outshine Color Win CE Palmtops

P D A s

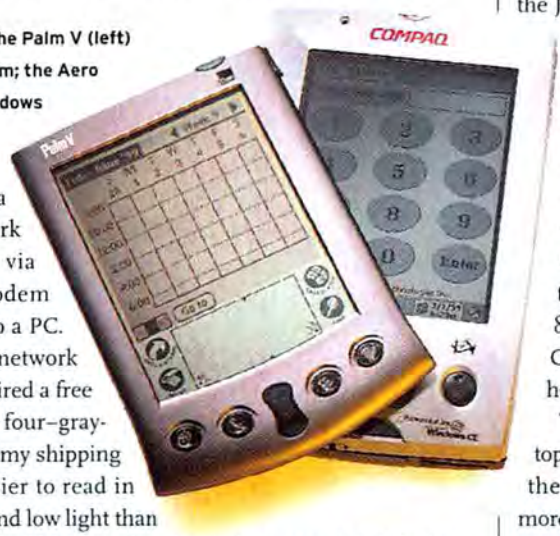
THOUGH PALM PILOTS and Palm III devices account for three out of every four personal digital assistants sold, 3Com isn't resting on its laurels. Two next-generation Palms—one that pumps up memory and expandability, another with a superslim design—arrive just in time to challenge the first color Windows CE palmtops.

The 5.5-ounce, $369 **Palm IIIx** resembles the Palm III on the outside but is considerably buffed up inside. 3Com doubled the RAM to 4MB, which the company says you'll need to use a growing collection of enterprise applications and Web-based databases.

ROOM TO GROW

THE RAM, WHICH on older Palms is located on a small card in the back, is now integrated onto the main logic board, clearing space for an expansion slot to accommodate add-ons like flash memory and pager cards. But as on the Palm III, the back is attached with small screws, making access for upgrades a bit inconvenient.

The IIIx, which runs on AAA batteries, lets you synchronize data over a network as well as via direct or modem connection to a PC. (Previously, network syncing required a free add-on.) The four-gray-scale LCD of my shipping unit was easier to read in both bright and low light than the Palm III's. This was also true of 3Com's other newcomer, the $449 **Palm V**.



PDAs PLUS: The Palm V (left) is sleek and slim; the Aero 2100 does Windows CE in color.

The Palm V comes with just 2MB of RAM but performs much like the IIIx. However, its curved, anodized aluminum case (about half as thick as those of previous Palms) and recessed buttons scream designer chic. Weighing only 4 ounces, my shipping unit came with a removable leather cover that cleverly attaches to either side of the unit through twin stylus dispensers, to suit both lefties and righties.

The Palm V uses a built-in lithium ion battery that you recharge by returning the unit to its syncing cradle. Unfortunately, the cradle's AC adapter power cord attaches to its serial port plug, adding yet another cable to the back of your PC.

COLOR IT COMPLEX

COMPAQ'S $449 **Aero 2100** and Hewlett-Packard's $519 **Jornada 420** are the first Windows CE palmtops to have active-matrix color screens. The display on my shipping Jornada was nicer than the preproduction Aero's, thanks in part to a proprietary app that optimizes the Jornada's backlight for various lighting conditions. But while color is a boon for games and images, it adds little to most business programs on a 2.4-by-3.2-inch screen.

Both units weigh much more than the Palm IIIx, with the Jornada a bit lighter than the 10.9-ounce Aero. Power-hungry screens quickly drain the units' lithium ion batteries; both run about 10 hours on a charge (versus a month of regular use for the Palm V). Base units of the Aero and Jornada have 8MB of RAM (Windows CE is a notorious memory hog, so you'll need all of it).

These new Win CE palmtops are better designed than their predecessors, with more ergonomic button placement and easier access to the CompactFlash slot. But the OS itself remains a drawback. There's still no uniform way to close apps, and no intuitive way to switch between them.

The Jornada's screen and weight give it the edge over the Aero. But for pocket-size personal companions, Palm devices are still the way to go. Check out the expandable Palm IIIx for corporate apps or the Palm V for a stylish look (if you're willing to give up the convenience of off-the-shelf AAA batteries). Either way, you're guaranteed the operational simplicity so lacking in Windows CE palmtops.

—Michael S. Lasky ▶

PHOTOGRAPH: MARC SIMON

Aero 2100

PRO: More ergonomically designed than previous Win CE palmtops.
CON: Hard-to-read color screen; expensive; clunky Windows CE operating system.
VALUE: Not much.
Street price: $449
Compaq Computer
800/345-1518
www.compaq.com
PRODUCT INFO NO. 714

Jornada 420

PRO: Sharp, 256-color screen with software-controlled backlight.
CON: Windows CE operating system still too slow and complex.
VALUE: Pricey color screen does not add to productivity.
Street price: $519
Hewlett-Packard
800/443-1254
www.hp.com/jornada
PRODUCT INFO NO. 715

Palm IIIx

PRO: Easy-to-read screen, comes with increased memory and expandability for corporate users.
CON: Upgrades require dismantling the unit.
VALUE: Pocket workhorse combines simplicity and power.
Street price: $369

Palm V

PRO: Case is lightweight, ultraslim, and beautifully designed; built-in lithium ion batteries are easy to recharge.
CON: Power supply for desktop syncing/recharging cradle is poorly designed.
VALUE: Worthwhile if stylish design is a major consideration.
Street price: $449
3Com
800/881-7256
www.palm.com
PRODUCT INFO NO. 716

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Sony's Thin Slim Line: I Want My PCV

DESKTOP PC

IF YOU SEEK space savings and style in a powerhouse PC, consider Sony's good-looking **PCV L600**. At $2999, this top-shelf model in the new VAIO Slimtop LCD Computer line isn't cheap, but you'd pay at least as much for other, less handsome PCs with an LCD.

Style is the line's major selling point: The keyboard, LCD panel, and CPU case are cast in cool shades of lavender, and the computer itself measures just 11 by 13.2 by 3.6 inches. But the design is also functional, featuring six keyboard buttons for launching selected apps; Microsoft Outlook users can program a button to check for mail and turn on a red light in the LCD's bezel whenever messages are waiting.

DESKTOP DELUXE: Sony's PCV L600 packs a power-user wallop into an attractive, space-saving package—but costs nearly $3000.

The respectable configuration of my preproduction unit—Pentium III-500 CPU, 128MB of RAM, 10.8GB hard disk, and 10X–24X CD-ROM drive—included a couple of unusual expansion slots. One accommodates the bundled Memory Stick, a 4MB storage device that Sony digital cameras use to store images. A Type II PC Card slot, more prevalent on notebooks, supports connectivity devices such as ethernet cards.

The 14.1-inch active-matrix LCD panel renders vivid, crisp colors. The text quality suffices for most mainstream uses, but small type looks jagged—not unusual with LCD panels. The integrated speakers create tinny sound (Sony says it will fix this in shipping units). A home-oriented software bundle includes Microsoft Works 4.5 and the 99 versions of Quicken, Money, and Encarta.

The PCV L600 offers a high-end desktop configuration in an attractive wrapper—and a price to match. It's a worthy contender for executive suites or corporate environments where a high-tech, high-style image matters.

—Mick Lockey

PCV L600

PRO: Stylish and compact design, power-user configuration.

CON: Pricey.

VALUE: A great blend of style and substance—but oh, my aching wallet.

Street price: $2999

Sony Electronics

888/315-7669

www.sony.com/pc

PRODUCT INFO NO. 717

Transfer Contact Information Painlessly

UTILITY

THANKS TO THE Internet, we're inundated with contact information—in e-mail, on Web pages, and in electronic documents. But getting all those names, addresses, and phone numbers into your desktop apps can be a pain. ProdEx Technologies' **AddressGrabber** eliminates the data-entry hassle, letting you transfer contact info from almost any source into 30 popular address books, personal information managers, and even shipping service software—all with a couple of mouse clicks.

When you install AddressGrabber, it automatically detects your contact management apps and puts them on a floating toolbar. The utility works with ACT 4.0, Excel, GoldMine, Lotus Organizer, Maximizer, Outlook, Outlook Express, Word, and WordPerfect. It doesn't support certain MAPI-based address books, such as Windows 95's Internet Mail and News client, but ProdEx says it will support more apps through software downloads on its Web site.

With AddressGrabber installed, you just highlight an address and click the source and destination program in the toolbar. The utility figures out what information goes into which field (name, address, e-mail, and so on), lets you edit the entry, and then transfers it, field by field.

Using a shipping version with Netscape's address book, I was impressed by the program's accuracy in transferring data to the proper fields. If the destination app isn't running, the program either launches it or prompts you to (either way, you have to click the transfer button again).

The basic $29 version transfers addresses from electronic documents only. The $49 Deluxe Edition allows transfers between multiple PIMs, and the $89 Business Edition adds QuickBooks, and FedEx and UPS support. My one complaint: AddressGrabber does not offer an address book of its own. *—Glenn McDonald* ▶

AddressGrabber

PRO: Easy transfer of contact information from electronic text into desktop applications.

CON: Lacks a built-in address book.

VALUE: Convenient time-saver if you maintain large contact lists.

Street price: basic $29, Deluxe Edition $49, Business Edition $89

ProdEx Technologies

408/872-3100

www.prodexusa.com/ag

PRODUCT INFO NO. 718

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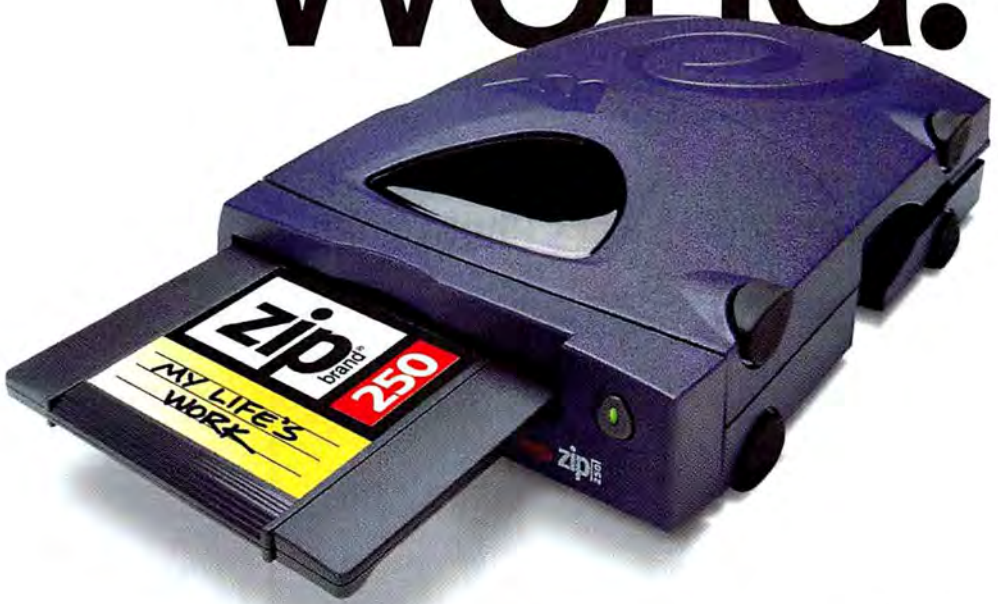

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Calendar Creator 6.0 Prints Your Schedule

CALENDAR

HOW DO YOU keep track of your schedule? Calendar Creator, which started out as a program for making personalized calendars, has acquired some upscale personal information manager features recently. But it will never be mistaken for a serious business scheduling tool such as Lotus Organizer or Microsoft Outlook—and in upgrading, it has sacrificed some of the simplicity that made it so popular.

Brøderbund's **Calendar Creator Deluxe 6.0** doesn't add much to version 5.0 beyond a beefed-up collection of clip art, photos, and fine art, plus an Art Gallery browser to help you sort through them. You can still link calendars within a collection (even on a network) so that coworkers can check for conflicts, but you can't invite people to meetings. Its address book lets you link events with contact info; however, it lacks advanced features such as the ability to create letters or e-mail within the program.

I ran into a glitch installing a shipping copy on my three-year-old Pentium-133 system. A quick download took care of the problem.

Ironically, the program's greatest weakness may be its growing customizability. While the manual provides plenty of help, novices can no longer master the app in minutes; those who liked the simplicity of previous versions may find the latest options bewildering. Also, some of the new art is more suitable for a home or small office than for corporate settings. But if you want a good old-fashioned calendar with a personal touch, this $50 package will fit the bill—and your wall. *—Yardena Arar*

Calendar Creator Deluxe 6.0

PRO: Highly customizable, includes plenty of art for printed calendars.

CON: Limited contact management functions, customization not completely intuitive.

VALUE: Best for home or small-office users who prefer printable calendars to conventional PIMs.

Street price: $50

Brøderbund

617/761-3000

www.broderbund.com

PRODUCT INFO NO. 719

QUICK TAKES

Give 2D Images a 3D Look

THE APPROPRIATELY named 3D PhotoClay from Etalon transforms "flat" 2D images into 3D objects you can rotate. The lackluster interface in my shipping copy was easy to use, but PhotoClay doesn't offer as many tools for distortion and manipulation as MetaCreations' $50 Kai's Super-Goo. PhotoClay performs sluggishly at best on older PCs; Etalon recommends a Pentium II-based PC with an 8MB AGP graphics card. PhotoClay images can be saved in several popular formats, including AVI or VRML for use on Web sites. 3D PhotoClay has a limited bag of tricks, but it's an inexpensive tool for doing some pretty cool things. Etalon; 408/257-8625; www.etaloncorp.com

PRODUCT INFO NO. 727

—Grace Aquino

Internet-Easy Imagery With Kai's Photo Soap 2

GRAPHICS

IN A UNIVERSE of look-alike photo-retouching applications, Kai's Photo Soap stood out for its unusual interface. MetaCreations' **Kai's Photo Soap 2** is just as pretty and adds some nifty effects, including access to an online chat room where users share tips. But getting used to the program still takes time, and my shipping copy took up a hefty 155MB of disk space.

Kai's Photo Soap 2 is divided into "rooms"—Organize, Clean, Compose, Album, and Print—filled with shiny sliding buttons (which made fine adjustments difficult), pulsating icons, and hidden drawers for specific tasks like cropping or rotating images. Unfortunately, it's easy to forget which room contains which tools.

HOW'D YOU DO THAT? Kai's Photo Soap 2 comes with access to an online chat room where you can seek advice from fellow users.

Then again, Kai's Photo Soap 2 helped me create a Web slide show in seconds—no HTML required. You can create a virtual picture book, or a rotatable cube-shaped photo display. You don't manipulate the original images, so you will never make irreparable mistakes. You can remove layered effects with a five-level undo command or a pink eraser.

In all, Kai's Photo Soap 2 can make your pictures sparkle—and help you share them online—with moderate effort.

—John Goddard

Kai's Photo Soap 2

PRO: Lets you quickly create a slide show for Web sites and e-mail; helpful online chat room can be reached from within application.

CON: Initially confusing interface, massive disk space requirement.

VALUE: Impressive graphics tools and Web features for novices and imaging hobbyists.

List price: $50

MetaCreations

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www.metacreations.com

PRODUCT INFO NO. 720

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System Order Code: pcw05m03

QP6/450 M-2x $1499

Business lease:$54/Mo., 36 Mos. ***$0 Money Down***

System Order Code: pcw05m06

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System Order Code: pcw05m10

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QP6/450 Best Buy(w/Pentium III processor 450MHz)..$1799
System Order Code: pcw05m09

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  Revolutionary Flat-Faced CRT Technology (18" viewable, .25dp)
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- ■ Internal 100MB Zip Drive w/one cartridge
- ■ *New* US Robotics 56K V.90 WinModem* w/Telephony
- ■ 6x High-Capacity DVD-ROM Drive
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- ■ Altec-Lansing ACS-45.1 PowerCube Speakers w/subwoofer
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System Order Code: pcw05s07

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- ▲ 256K Performance Enhanced on-die cache technology
- ■ 14.1" XGA Active Matrix Display
- ▲ 128MB SDRAM / 6GB Ultra-ATA Hard Drive
- ■ 56K V.90 Fax/Modem
- ■ Removable Combo Ultra-Fast DVD-ROM Drive & 3.5" Floppy Drive
- ▲ *New* ATI Rage Lt Pro 3D AGP Video w/8MB
- ■ ESS 3D Wavetable Surround Sound and Speakers
- ■ Long-Lasting 12-cell Smart Lithium Ion Battery
- ■ USB and Fast IR Ports / Integrated Personal Touchpad
- ■ MS Windows 98
- ■ Corel WordPerfect Office Suite 8
- ■ Quantex Carrying Case
- ■ 3-Year Limited Warranty on CPU and Main Memory
- ■ 1-Year Parts and Labor Warranty on all other Components
- ■ *Upgrade to 10GB Ultra ATA HD, add $299*

Quantex I-1410 w/Pentium II processor 333MHz...$2499
System Order Code: pcw05i04

T-SERIES "MOBILE WARRIOR" NOTEBOOKS

Quantex T-1330 $1899

Business lease: $68/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw05t00

- ▲ Pentium® II processor 300MHz
- ▲ 256K Performance Enhanced on-die cache
- ▲ New Ultra-Thin Design (12.44"x9.84"x1.37")
- ■ 13.3" XGA Active Matrix Display
- ■ 32MB SDRAM / 4GB Ultra-ATA HD
- ■ 56K V.90 Fax/Modem
- ■ 24x Modular CD-ROM Drive / 3.5" Modular Floppy Drive
- ▲ NeoMagic NM65 128-bit AGP Video
- ■ Integrated 16-bit Stereo Sound and Speakers
- ■ Smart Lithium Ion Battery
- ■ USB and Fast IR Ports / Integrated Personal Touchpad
- ■ MS Windows 98 / Corel WordPerfect Office Suite 8
- ■ Quantex Carrying Case - *Upgrade to Deluxe Carrying Case for $89*
- ■ 3-year limited warranty on CPU and Main Memory
- ■ 1-Year parts and labor warranty on all other components
- ■ *Upgrade to MS Office 97 SBE v2.0 (FREE upgrade to Office 2000), add $99*

Quantex T-1330 w/Pentium II processor 333MHz.....$1999
System Order Code: pcw05t01

Quantex T-1400 $2199

Business lease: $79/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw05t04

- ▲ *New* Pentium® II processor 333MHz
- ▲ 256K Performance Enhanced On-die cache
- ▲ New Ultra-Thin Design (12.44"x9.84"x1.43")
- ■ 14.1" XGA Active Matrix Display
- ■ 64MB SDRAM / 6GB Ultra-ATA HD
- ■ 56K V.90 Fax/Modem
- ■ 24x Modular CD-ROM Drive / 3.5" Modular Floppy Drive
- ▲ NeoMagic NM65 128-bit AGP Video
- ■ Integrated 16-bit Stereo Sound and Speakers
- ■ Smart Lithium Ion Battery
- ■ USB and Fast IR Ports / Integrated Personal Touchpad
- ■ MS Windows 98 / Corel WordPerfect Office Suite 8
- ■ Quantex Carrying Case - *Upgrade to Deluxe Carrying Case for $89*
- ■ 3-year limited warranty on CPU and Main Memory
- ■ 1-Year parts and labor warranty on all other components
- ■ *Upgrade to MS Office 97 SBE v2.0 (FREE upgrade to Office 2000), add $99*

Quantex T-1400 w/Pentium II processor 366MHz.....$2399
System Order Code: pcw05t05

I-SERIES "DESKTOP REPLACEMENT" NOTEBOOKS

Quantex I-1510 $2599

Business lease: $94/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw05i07

- ▲ *New* Pentium® II processor 333MHz
- ▲ 256K Performance Enhanced on-die cache
- ▲ 15" XGA Active Matrix Display
- ■ 64MB SDRAM / 6GB Ultra-ATA HD
- ■ 56K V.90 Fax/Modem
- ■ Removable Combo Ultra-Fast DVD-ROM Drive & 3.5" Floppy Drive
- ▲ *New* ATI Rage Lt Pro 3D AGP Video w/8MB
- ■ ESS 3D Wavetable Surround Sound and Speakers
- ■ Long-Lasting 12-Cell Smart Lithium Ion Battery
- ■ USB and Fast IR Ports / Integrated Personal Touchpad
- ■ MS Windows 98 / Corel WordPerfect Office Suite 8
- ■ **Quantex Deluxe Carrying Case - *Limited time offer!***
- ■ 3-year limited warranty on CPU and Main Memory
- ■ 1-Year parts and labor warranty on all other components
- ■ *Upgrade from 64MB SDRAM to 128MB SDRAM, add $149*
- ■ *Upgrade to MS Office 97 SBE v2.0 (FREE upgrade to Office 2000), add $99*

Quantex I-1510 w/Pentium II processor 300MHz.....$2499
System Order Code: pcw05i06

Quantex I-1511 $3199

Business lease: $109/Mo., 36 Mos. *$0 Money Down*
System Order Code: pcw05i11

- ▲ *New* Pentium® II processor 366MHz
- ▲ 256K Performance Enhanced on-die cache
- ▲ 15" XGA Active Matrix Display
- ▲ 128MB SDRAM
- ▲ **New 10GB Ultra-ATA HD**
- ■ 56K V.90 Fax/Modem
- ■ Removable Combo Ultra-Fast DVD-ROM Drive & 3.5" Floppy Drive
- ▲ New ATI Rage Lt Pro 3D AGP Video w/8MB
- ■ ESS 3D Wavetable Surround Sound and Speakers
- ■ Long-Lasting 12-Cell Smart Lithium Ion Battery
- ■ USB and Fast IR Ports / Integrated Personal Touchpad
- ■ MS Windows 98
- ▲ MS Office 97 SBE v2.0 ***(FREE MS Office 2000 upgrade offer!)***
- ■ Quantex Carrying Case - *Upgrade to Deluxe Carrying Case for $89*
- ■ 3-year limited warranty on CPU and Main Memory
- ■ 1-Year parts and labor warranty on all other components

Quantex I-1511 w/Pentium II processor 333MHz.....$2999
System Order Code: pcw05i10

Notebook Upgrade Options:
■ Quantex Mini-Docking Station...add $149 ■ Smart Lithium Ion Battery...add $129 ■ PCMCIA Network Interface Card...add $129 ■ Quantex Deluxe Carrying Case...add $89
■ Internal Zip Drive (T-Series Only)...add $149 ■ Upgrade from 64MB SDRAM to 128MB SDRAM...add $149 ■ Upgrade from 6GB Ultra-ATA HD to 10GB Ultra-ATA HD...add $299

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C|Net Comdex '98 Coverage

SLIMLINE PCS

Quantex VX-400c $999

Business lease: $52/Mo., 24 Mos. *$0 Money Down*

System Order Code: pcw05v01

- Intel® Celeron™ Processor 400MHz
- 32MB SDRAM Memory / 128KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 15" Digital Monitor (13.8" viewable)
- Intel740 3D 2x AGP Graphics w/8MB SDRAM
- Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32x Max Variable Speed CD-ROM Drive
- ESS Solo Wavetable Audio
- *New* Quantex Slimline Case (12.9"x3.3"x14.2")
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- QSentry Technology (including Intel LANDesk Client Manager)
- WfM Compliant, DMI 2.0, ACPI

Quantex VX-400 $1299

Order Code: pcw05v04

Above system with Pentium II processor 400MHz, 64MB SDRAM, 512KB Cache, 10.2GB Ultra ATA Hard Drive, 17" Monitor (15.8" viewable) and Creative Labs SoundBlaster Audio

Quantex VX-450 $1699

Business lease: $61/Mo., 36 Mos. *$0 Money Down*

System Order Code: pcw05v09

- *New* Intel® Pentium® III processor 450MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 10.2GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Monitor w/OSD & NEC ChromaClear CRT (16.0" viewable, 1600X1200 max resolution, 25dp)
- Intel740 3D 2x AGP Graphics w/8MB SDRAM
- Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- *New* Sony CD-RW Drive (24x CD/4x CD-R/2x CD-RW)
- Creative Labs SoundBlaster Audio
- *New* Quantex Slimline Case (12.9"x3.3"x14.2")
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows 98
- QSentry Technology (including Intel LANDesk Client Manager)
- 3-Year Limited Warranty with 1-Year On-Site Service**
- *Upgrade to Windows NT Workstation 4.0, add $99*
- *Add Altec Lansing ACS-90 Stereo Speakers for just $29*

Quantex VX-500 $2699

Business lease: $97/Mo., 36 Mos. *$0 Money Down*

System Order Code: pcw05v13

- *New* Intel® Pentium® III processor 500MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- *New* Quantex 15" LCD Flat-Panel Display
- Intel740 3D 2X AGP Graphics w/8MB SDRAM
- Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- *New* Sony CD-RW Drive (24x CD/4x CD-R/2x CD-RW)
- Creative Labs SoundBlaster Audio
- *New* Quantex Slimline Case (12.9"x3.3"x14.2")
- MS Natural Keyboard Elite with MS IntelliMouse
- MS Windows NT Workstation 4.0
- MS Office 97 SBE v2.0 *(FREE MS Office 2000 upgrade offer*)*
- QSentry Technology (including Intel LANDesk Client Manager)
- WfM Compliant, DMI 2.0, ACPI
- *Add Altec Lansing ACS-90 Stereo Speakers for just $29*

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Computer Buyers Guide and Handbook (Feb. 99)

QP6/450 SB-4: Winner PC World Best Buy Award
Top 20 Power Desktops—April 1999

BUSINESS DESKTOPS

QP6/333 SB-1c $999

Business lease: $52/Mo., 24 Mos. *$0 Money Down*

System Order Code: pcw05b00

- Intel® Celeron™ Processor 333MHz
- 64MB SDRAM Memory / 512KB Pipelined Burst Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Digital Monitor (15.9" viewable)
- 64-bit 3D AGP Graphics Card with 4MB RDRAM
- Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- 32x Max Variable Speed CD-ROM Drive
- Quantex Highly-Expandable ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows 98
- 3-Year Limited Warranty with 1-Year On-Site Service**
- WfM Compliant, DMI 2.0, ACPI
- QSentry Technology (including Intel LANDesk Client Manager)
- Cable Modem Ready / Year 2000 Compliant

QP6/400 SB-2 $1349

Order Code:pcw05b04

Above system with Intel Pentium® II processor 400MHz, 8.4GB Ultra ATA HD, Internal 100MB Zip Drive, Intel740 3D 2x AGP Graphics w/8MB SDRAM and MS Office 97 SBE v2.0 (FREE MS Office 2000 upgrade offer*)

QP6/450 SB-3 $1699

Business lease: $61/Mo., 36 Mos. *$0 Money Down*

System Order Code: pcw05b08

- *New* Intel® Pentium® III processor 450MHz
- 64MB PC100 SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 17" Monitor w/OSD & NEC ChromaClear CRT (16.0" viewable, 1600X1200 max resolution, 25dp)
- *New* Ultra-Fast #9 Revolution IV 128-bit 3D AGP Video w/32MB
- Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- *New* 40x Max Variable Speed CD-ROM Drive
- Quantex Highly-Expandable ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows NT Workstation 4.0
- MS Office 97 SBE v2.0 *(FREE MS Office 2000 upgrade offer*)*
- 3-Year Limited Warranty with 1-Year On-Site Service**
- WfM Compliant, DMI 2.0, ACPI
- QSentry Technology (including Intel LANDesk Client Manager)
- Cable Modem Ready / Year 2000 Compliant / Windows 2000 Ready

QP5/500 SB-3(w/Pentium III processor 500MHz).....$1899
System Order Code: pcw05b09

QP6/500 SB-4 $2299

Business lease: $83/Mo., 36 Mos. *$0 Money Down*

System Order Code: pcw05b11

- *New* Intel® Pentium® III processor 500MHz
- 128MB PC100 SDRAM Memory / 512KB Secondary Cache
- 13GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- *New* 19" Monitor w/Diamondtron Natural Flat CRT Revolutionary Flat-Faced CRT Technology (18" viewable, 25dp)
- *New* Ultra Fast #9 Revolution IV 128-bit 3D AGP Video w/32MB
- Internal 100MB Zip Drive w/one cartridge
- Intel Pro 10/100 PCI Fast Ethernet Controller w/RJ-45 and Wake-On-LAN Technology
- *New* 40x Max Variable Speed CD-ROM Drive
- Quantex Highly-Expandable ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows NT Workstation 4.0
- MS Office 97 SBE v2.0 *(FREE MS Office 2000 upgrade offer*)*
- 3-Year Limited Warranty with 1-Year On-Site Service**
- WfM Compliant, DMI 2.0, ACPI
- QSentry Technology (including Intel LANDesk Client Manager)
- Cable Modem Ready / Year 2000 Compliant / Windows 2000 Ready

QP6/450 SB-4(w/Pentium III processor 450MHz).....$2099
System Order Code: pcw05b10

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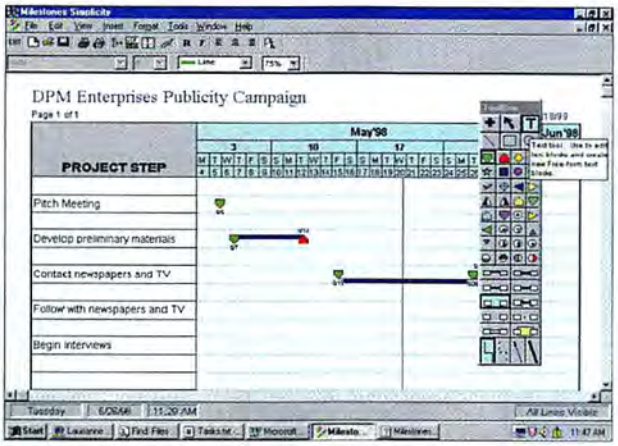
Milestones Simplicity: Easy Project Schedules

PROJECT SCHEDULER

WHEN YOU need a project schedule in a hurry, turn to Kidasa's **Milestones Simplicity 2.0**. The $49 package, which I tested in shipping form, lets you create polished Gantt charts or calendars detailing project schedules in less than half an hour. You can then e-mail your project schedule, print it, pop it into a presentation, or post it on the Web.



MILESTONES SIMPLICITY CREATES polished schedules. The floating toolbox, shown at right, makes it painless to add symbols and text.

Milestones Simplicity 2.0

PRO: Lets you generate project-schedule charts or calendars quickly.

CON: Not a full-blown project manager with advanced features.

VALUE: The program does one thing and does it well.

Street price: $49

Kidasa Software

800/765-0167

www.kidasa.com

PRODUCT INFO NO. 721

A quick tutorial shows you how to drag and drop symbols onto a basic Gantt chart, enter dates and text, and customize a schedule. Or you can skip the tutorial and move directly to the Schedule Setup Wizard. Milestones Simplicity 2.0 lets you choose from an array of graphic symbols for project milestones and attach hidden notes to those symbols. You may also use your own graphics—company logos, clip art, and the like.

The previous version didn't support online-friendly formats, but you can now save charts or calendars in HTML, JPEG, or GIF formats for posting on an intranet or Web page via the Internet Publishing Wizard. If you e-mail a schedule to colleagues who don't have Milestones Simplicity 2.0, they can download a free viewer from Kidasa's Web site. You can also embed the charts or calendars inside a Word document or PowerPoint presentation.

Milestones Simplicity is not a full-blown project manager like Microsoft's $499 Project, or even Kidasa's $169 Milestones, Etc. It won't let you coordinate people's schedules, send e-mail ticklers, calculate costs, or do related tasks. But it's an affordable, effective program that works with Windows 95, 98, and NT; takes up less than 10MB of hard drive space; and comes in handy when the boss asks for a quick, presentable progress report.

—Laurianne McLaughlin

Complex Business Modeling Made Easy

RISK ANALYSIS

IF YOU'RE trying to model complex business situations, Excel's Solver function will get you only so far; traditional risk-optimization products like @Risk and Evolver (see *New Products*, November 1998, www.pcworld.com/nov98/npevolver) take you a bit further. **RiskOptimizer**, from the maker of @Risk and Evolver, handles scheduling, equipment usage, and financial and other problems that cannot readily be crunched with conventional risk-optimization software. For instance, it could allow a shop to use staffing costs and its sales records to determine the best business hours. Scheduling studies in RiskOptimizer could also use time-based estimates of traffic jams, rather than simple distance, to plan optimal routes.

In a plain Excel model, you use single numbers for all variables to come up with a simple result—for example, Profit = Income – Expense. Classic tools like Solver let you plug in a range of values for variables to optimize the result. RiskOptimizer incorporates probability data, so you get not only a range of results but also an assessment of the most likely outcomes. The ability to optimize using actual data from business records as well as most-likely values of inputs (while adjusting statistically for other possible values) makes RiskOptimizer a better tool than its predecessors.

The product demands hefty processing power: In my tests with a shipping copy, small problems with ten adjustable cells took a minute or so to process at 300 MHz. But this beats the weeks you'd need using simple spreadsheets to calculate scheduling, portfolio, distribution, or other problems. This Excel add-in costs more than Excel itself, and it's serious, MBA-level software. But it's easy to learn, and for many business problems, it's the most practical power tool around. *—Charles Seiter* ▶

RiskOptimizer

PRO: Uniquely versatile business problem-solver that is surprisingly easy to learn.

CON: Puts serious number-crunching demands on hardware.

VALUE: Easily pays for itself on complex problems.

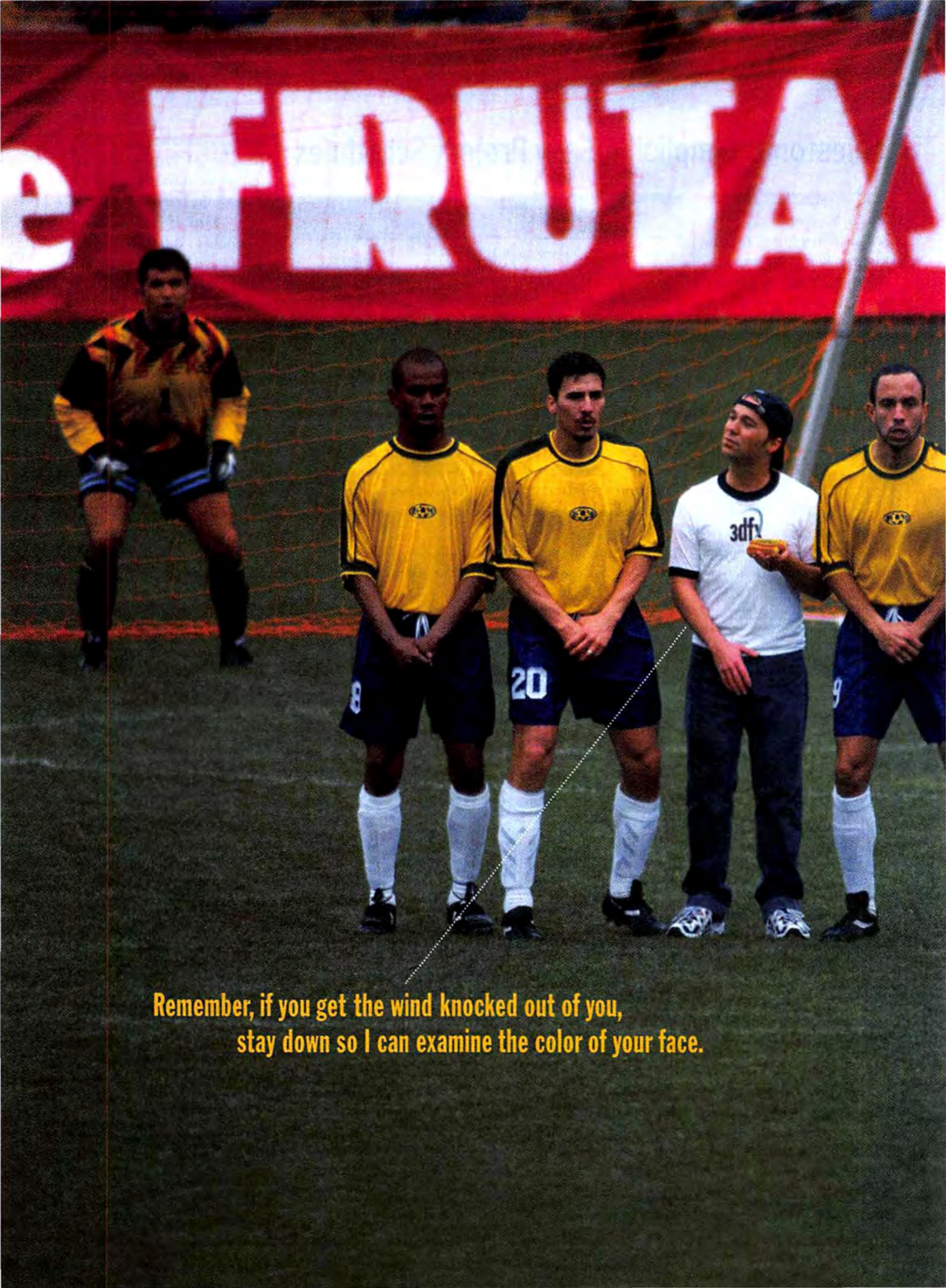
Street price: standard $695 (80 adjustable cells), industrial $995 (unlimited adjustable cells)

Palisade

800/432-7475

www.palisade.com

PRODUCT INFO NO. 722



Remember, if you get the wind knocked out of you,
stay down so I can examine the color of your face.

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Guess you could say we like to go out of our way to make sure stuff looks real.
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3dfx™
For more information, check out our website at www.3dfx.com. So powerful, it's kind of ridiculous.

PaperPort Now Archives Web Pages, Too

DOCUMENT MANAGER

DOCUMENT management software, which began as a way to organize scanned material, has since added functions such as the ability to combine scanned and electronic files into a searchable database. Now PaperPort, the perennially popular document manager from ScanSoft (formerly Visioneer) extends this capability to Web pages. **PaperPort Deluxe 6.0**, which I tested in final preproduction form, lets you save pages while you surf and displays them, along with other documents in its database, as thumbnails in a window. Click on a Web thumbnail, and the page appears in your browser.

PaperPort saves scanned documents in its proprietary .max bitmap format; no conversion is needed for text-based documents in popular word processing, spreadsheet, and other formats. You can share scanned .max documents with a colleague who doesn't use PaperPort by embedding the new Miniviewer in the files and e-mailing them as attachments. The viewer adds 200KB to each file but lets your coworkers see annotations, including sticky notes, scribbles on pages, or keywords for searches. Unfortunately, you can't annotate electronic text files without converting them to .max format—and then you can no longer use PaperPort's powerful text search engine.

FIX THE PIX: ScanSoft's PaperPort Deluxe 6.0 lets you color-correct and fine-tune scanned graphics before storing them in a database.

To its credit, PaperPort can create a reusable electronic form from a scanned paper one. Powerful image-editing tools allow you to color-correct scanned photographs. And ScanSoft's excellent TextBridge optical character recognition software replaces Visioneer's marginally acceptable ProOCR application.

Despite some design flaws, PaperPort is an inexpensive, effective tool for filing, retrieving, and sharing documents—on paper, on your computer, and now on the Web.

—Dan Littman

PaperPort Deluxe 6.0

PRO: Very easy to use, lets you embed a viewer into image files.

CON: Proprietary .max format that is required for annotation features prevents you from using the product's text search engine.

VALUE: Inexpensive document manager for its capabilities.

List price: $50

ScanSoft

800/248-6550

www.scansoft.com

PRODUCT INFO NO. 723

QUICK TAKES

Ssshhh! Hopper at Work

PORTABLE projectors are getting smaller, cheaper, and lighter, but most remain noisy. Philips' Hopper SV10 solves this problem, making it ideal for boardrooms. Bundled with cables for use with notebooks and DVD and laserdisc players, my shipping unit also featured good built-in stereo speakers, a remote control, and a carrying case. The ultrahigh-power lamp's 600-ANSI-lumens brightness is impressive. The Hopper weighs 18 pounds with case and cables, and it carries a $4099 street price. Cheaper and lighter models exist, but this quiet projector is a good bet. Philips Electronics; 800/504-9978; www.philipslcd.com.

PRODUCT INFO NO. 728

—Richard Jantz

Cheap Scans, So-So Software: HP's $99 Flatbed

SCANNER

FOR OVER a year, sub-$100 flatbed scanners have been a dime a dozen (so to speak). But the $99 **ScanJet 3200C** is Hewlett-Packard's first model to hit that magic price point.

I was up and scanning within 10 minutes of unpacking a shipping unit, thanks to the 3200C's simple parallel interface. With its 600-dots-per-inch optical resolution and 30-bit color, the scanner provides good image quality for Web graphics, photo printing, and optical character recognition (to put scanned text into editable form). Yet HP's software—which automatically crops images and offers optimum settings—is made for novices. It's easy to use, but if you want to adjust brightness or contrast, you're out of luck. Even specifying resolution is counterintuitive (you do it *after* scanning).

HP also cut some corners to keep this unit's price low. The 3200C comes with Adobe's PhotoDeluxe image editor and Caere's OmniPage OCR package, but there's no document manager to help you organize scanned pages. And the scanner's 90-day warranty is downright parsimonious.

This ScanJet is worth considering if you're a casual user on a tight budget; otherwise, you'll likely be happier with a more upscale model.

—Harry McCracken ▶

ScanJet 3200C

PRO: Inexpensive, provides decent image quality.

CON: Limited scanning controls, no document management software, skimpy warranty.

VALUE: Okay for beginners, underpowered for serious scanners.

List price: $99

Hewlett-Packard

800/722-6538

www.scanjet.hp.com

PRODUCT INFO NO. 724

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Microsoft's Expedia 2000: What a Trip!

TRIP PLANNING

MICROSOFT HAS made a good deal better by merging two products—Streets 98 and Trip Planner 98—into its new **Expedia Streets & Trips 2000**. At $45, this terrific aid for planning a road trip or printing a route map costs as much as the previous two products sold in a bundle. But it's still less than half the combined cost of Rand McNally's competing TripMaker and StreetFinder packages. And my preproduction copy of Streets & Trips 2000 rivals Rand McNally's trip-planning duo in content while surpassing it in accessibility and design.

The planner launches with a map of the United States on the right and a route-planning box on the left. Identify start, finish, and stopping-off points; enter options such as the start and end times of your driving day; click the calculate button; and the program generates a map and itinerary, including overnight stopping points. By clicking a stopping point and then a What's Nearby button, you can call up a list of hotels, restaurants, and attractions within a specified radius. To add a stop manually, you can type it in or click the highlighted route and drag it to a stopping point; the app automatically makes changes as needed.

Also new: Multiple printing options, some map styles, and expanded listings from old and new content partners like Zagat Survey and Moon Travel Handbooks. Web-linked services include route information updates and thousands of links to other travel sources.

You'll need a Pentium-class PC with 24MB of RAM (32MB recommended) and Windows 95, 98, or NT Workstation. You also need the CD-ROM in your drive to run the program. But with Expedia Streets & Trips 2000, Microsoft sets a new standard for ease of use in consumer travel planning software. —*Yardena Arar*

Expedia Streets & Trips 2000

PRO: Outstanding interface design, merges two formerly separate products into a single bargain.

CON: You need the CD-ROM in your drive to run the application.

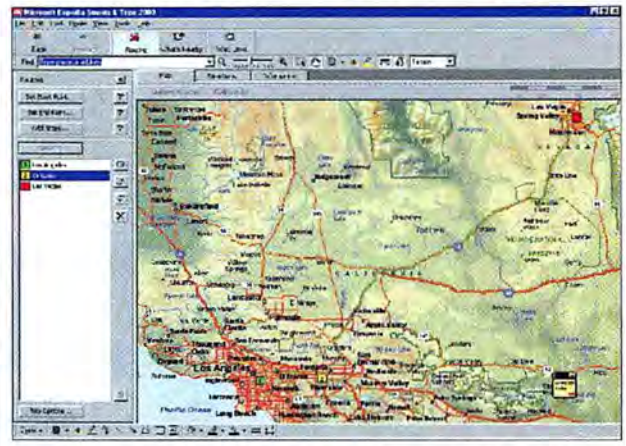
VALUE: Great tool for planning road trips or generating printed maps.

Street price: $45

Microsoft

www.microsoft.com/expedia/cd

PRODUCT INFO NO. 725



MOUNTAIN HIGH, VALLEY LOW: Expedia Streets & Trips 2000's terrain-view maps show topography as well as cities and highways.

Put a Speedy CD-RW on Your Parallel Port

CD-RW

IF YOU'VE WANTED the convenience—but not the traditionally poor performance—of a portable CD-RW drive that hooks up to a parallel port, take a look at MicroSolutions' **Backpack CD-Rewriter**. It's not the fastest reader around (the quickest read speed is 6X), and its CD-RW speed falls short of its 2X rating. But the Backpack reliably writes CD-R discs at 4X speed, or about 20 minutes per 650MB, even on early Pentium machines—and as such it's the only parallel port–based writer I've seen that can make that claim.

I tested a shipping unit on a Pentium-200 MMX PC with an Enhanced Parallel Port, which MicroSolutions says is needed for optimal performance. I was impressed by how fast it wrote two 650MB recordable CDs—one data, one audio—with nary an error. But the CD-RW speed was 1.6X, or about 215 KBps, as opposed to the 300 KBps of full 2X performance. To be fair, though, most CD-RW drives don't live up to their speed ratings.

MicroSolutions bundles outdated versions of Adaptec's DirectCD CD-RW software and Easy CD Creator for data and audio CD creation. You can update them with patches from Adaptec's Web site, but after doing this I had to reinstall the CD-Rewriter's drivers.

The quick-start guide should suffice for getting things up and running. One quibble: The unit has no on/off switch, so it runs constantly and relies on side vents and a fan to keep from overheating.

Although the drive's $379 price is on the high side, the parallel port hookup allows easy sharing among multiple PCs, making the CD-Rewriter a bargain compared to the cost of multiple EIDE drives, or even of one SCSI drive and multiple SCSI controllers. If your business must cater economically to the backup and CD-R needs of multiple users, or you just need a CD-RW drive that travels gracefully, you'll love the Backpack CD-Rewriter. —*Jon L. Jacobi* ■

Backpack CD-Rewriter

PRO: First parallel port 4X CD-R writer, error-free performance.

CON: Bundled apps are one version behind, no on/off switch.

VALUE: A good CD-RW drive for sharing among multiple PCs.

Street price: $379

MicroSolutions

800/890-7227

www.micro-solutions.com

PRODUCT INFO NO. 726

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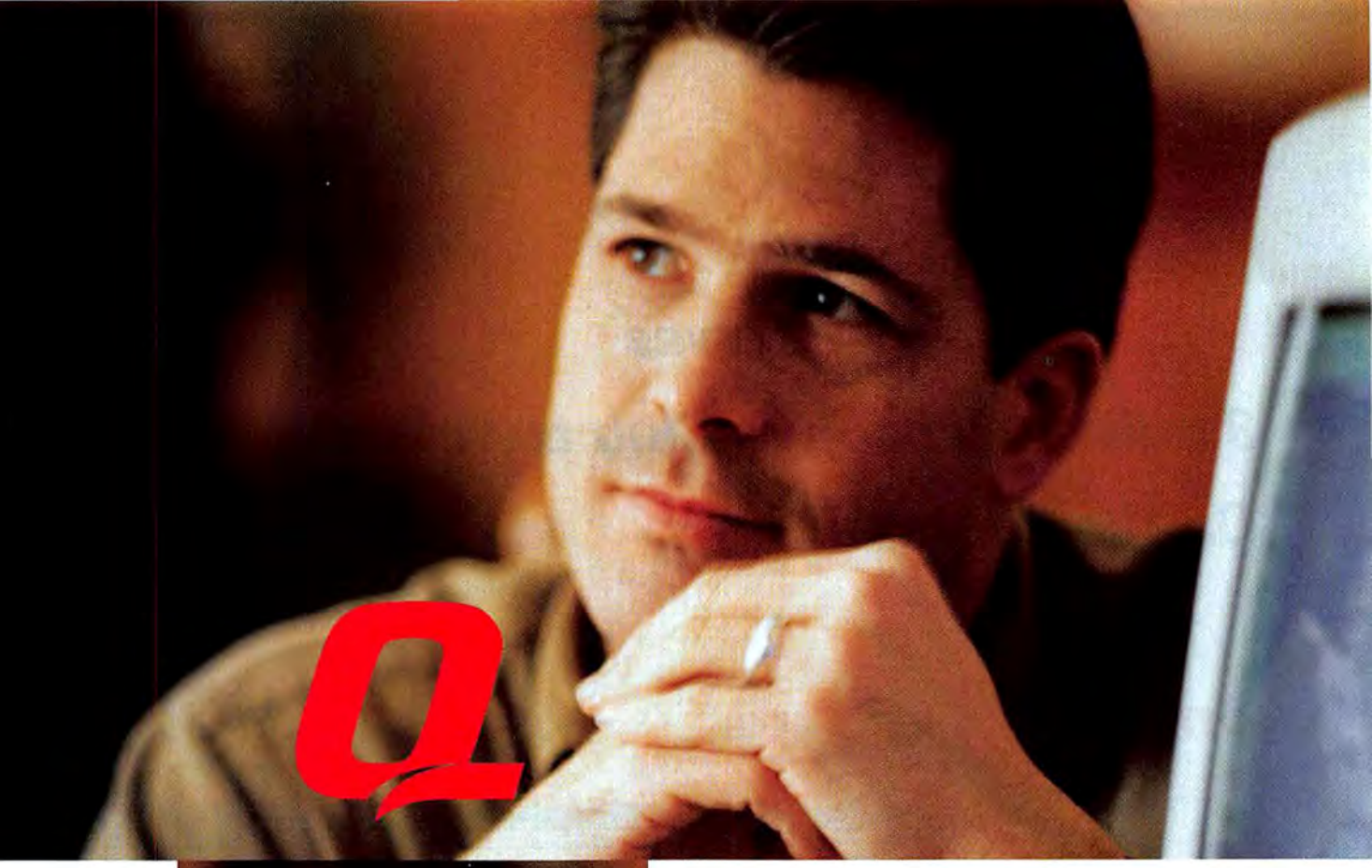

You want to e-mail.
He needs to download.
She'd like to surf.
Who will be left standing?

Compaq Awards

September 1998 **PC WORLD/FAMILY CIRCLE/ COMPUTERS MADE EASY** One of the 10 best PCs for home- or school-power systems • **PRESARIO 5630**

July/August 1998 **FAMILY PC** Family PC Recommended Award • **PRESARIO 5600**

August/September 1998 **WINDOWS MAGAZINE** WIN LIST • **PRESARIO 5600 SERIES**

PRESARIO 5600i-500/3 INTERNET PC	**PRESARIO 5600i-500/3 INTERNET PC**
Intel® Pentium® III Processor, 500 MHz	Intel Pentium III Processor, 500 MHz
128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB
16.8 GB UltraDMA Hard Drive[2]	13.0 GB UltraDMA Hard Drive[2]
6X DVD-ROM Drive[3]	6X DVD-ROM Drive[3]
Diamond Viper 550 AGP w/16 MB SDRAM	Diamond Viper 550 AGP w/16 MB SDRAM
Diamond Monster Sound MX300 PCI Audio Card	Aureal 8820 PCI Audio Card
6.0Mb Max Digital Modem[4]	6.0Mb Max Digital Modem[4]
JBL Pro Premium Speakers w/Subwoofer	JBL Pro Premium Speakers w/Subwoofer
Digital Creativity Imaging Center[5]	10 Mbps Ethernet Port, Cable Modem Ready[6]
10 Mbps Ethernet Port, Cable Modem Ready[6]	Microsoft Featured Home Collection
Home Phoneline Networking[7] (Integrated)	Microsoft Word
Microsoft® Featured Home Collection & MS® Word	Microsoft Windows98
Microsoft Windows®98	Compaq V910 19" Monitor (18.0" VIA)
Compaq FP700 15" Flat Panel Monitor	
$3199 As low as $90 per month[1]	**$2499** As low as $70 per month[1]
Personalize with these options:	
256 MB SyncDRAM: Add $300	19.2 GB UltraDMA Hard Drive (4500 rpm):[2] Add $59
Iomega® Zip Built-In™ Drive with 1 disk: Add $79	Home Phoneline Networking[7] for 2 computers:** Add $99
22.0 GB UltraDMA Hard Drive (7200 rpm):[2] Add $225	Tripp Lite Internet Office 700 UPS: Add $189.95

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intel inside
pentium® III

Peace, harmony, and multiple Internet access. Signs of a happy household.

"It's my turn to go online." "No, it's my turn." "Is not!" "Is too!" Was this what the Internet promised? The people at Compaq don't think so. That's why we created these new Compaq Presario 5600 Internet PCs. They're the first computers with Home Phoneline Networking,[7] which lets you plug your family's PCs into your home's phone jacks. This allows everybody to surf the Net at the same time, on the same phone line.[8] So while dad e-mails his college roommate, the kids can visit their school's Web site. You can also share printers, files, and games. And there's more, like one-touch Internet access and 50 free hours on the Net.* Plus, these PCs are available with a 6.0Mb Max Digital Modem,[6] which works with your 56K dial-up access sources for incredibly fast access right away. As an added bonus, it lets you talk on the phone while you surf. And since it's ADSL and cable modem ready,[9] you can tap into those new high-speed technologies as soon as they come to your area. Of course, these PCs are loaded with tons of other great features, like Intel® Pentium® III processors, thrilling 3D graphics, DVD- or CD-ROM drives, and more — all at an incredible value. So now, your family can e-mail, download, and surf in a whole new way: peacefully.

PRESARIO 5600i-500/3 INTERNET PC	**PRESARIO 5600i-450/3 INTERNET PC**	**PRESARIO 5600i-450/3 INTERNET PC**	**PRESARIO 5600i-400 INTERNET PC**
Intel Pentium III Processor, 500 MHz	Intel Pentium III Processor, 450 MHz	Intel Pentium III Processor, 450 MHz	Intel Pentium II Processor, 400 MHz
128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB	64 MB SyncDRAM expandable to 384 MB
13.0 GB UltraDMA Hard Drive[1]	13.0 GB UltraDMA Hard Drive[1]	13.0 GB UltraDMA Hard Drive[1]	10.0 GB UltraDMA Hard Drive[1]
6X DVD-ROM Drive[4]	32X Max CD-ROM Drive[4]	32X Max CD-ROM Drive[4]	6X DVD-ROM Drive[4]
Diamond Viper 550 AGP w/16 MB SDRAM	2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM
Aureal 8820 PCI Audio Card	Aureal 8820 PCI Audio Card	Aureal 8820 PCI Audio Card	Aureal 8820 PCI Audio Card
56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]
JBL Pro Speakers	JBL Pro Speakers	JBL Pro Speakers	JBL Pro Speakers
10 Mbps Ethernet Port, Cable Modem Ready[9]	Digital Creativity Imaging Center[5]	Digital Creativity Imaging Center[5]	10 Mbps Ethernet Port, Cable Modem Ready[9]
Microsoft Featured Home Collection	10 Mbps Ethernet Port, Cable Modem Ready[9]	10 Mbps Ethernet Port, Cable Modem Ready[9]	Microsoft Featured Home Collection
Microsoft Word	Microsoft Office 97 Small Business Edition®	Microsoft Featured Home Collection	Microsoft Word
Microsoft Windows98	Microsoft Windows98	Microsoft Word	Microsoft Windows98
Compaq V720 17" Monitor (15.9" VIA)	Compaq V720 17" Monitor (15.9" VIA)	Microsoft Windows98	Compaq V720 17" Monitor (15.9" VIA)
		Compaq V720 17" Monitor (15.9" VIA)	
$2199 As low as $62 per month[†]	**$1999** As low as $56 per month[†]	**$1899** As low as $53 per month[†]	**$1599** As low as $45 per month[†]
16.8 GB UltraDMA Hard Drive:[1] Add $89	Diamond Viper 550 AGP w/16 MB SDRAM: Add $60	6.0Mb Max Digital Modem:[6] Add $99	128 MB SyncDRAM: Add $120
6.0Mb Max Digital Modem:[6] Add $99	6.0Mb Max Digital Modem:[6] Add $99	6X DVD-ROM Drive:[4] Add $59	Iomega Zip Built-In™ Drive with 1 disk: Add $79
Compaq V910 19" Monitor (18.0" VIA): Add $170	Iomega Zip Built-In™ Drive with 1 disk: Add $79	Diamond Monster Sound MX300 PCI Audio Card & JBL Pro Premium Speakers w/Subwoofer: Add $89	Home Phoneline Networking:[7] Add $49

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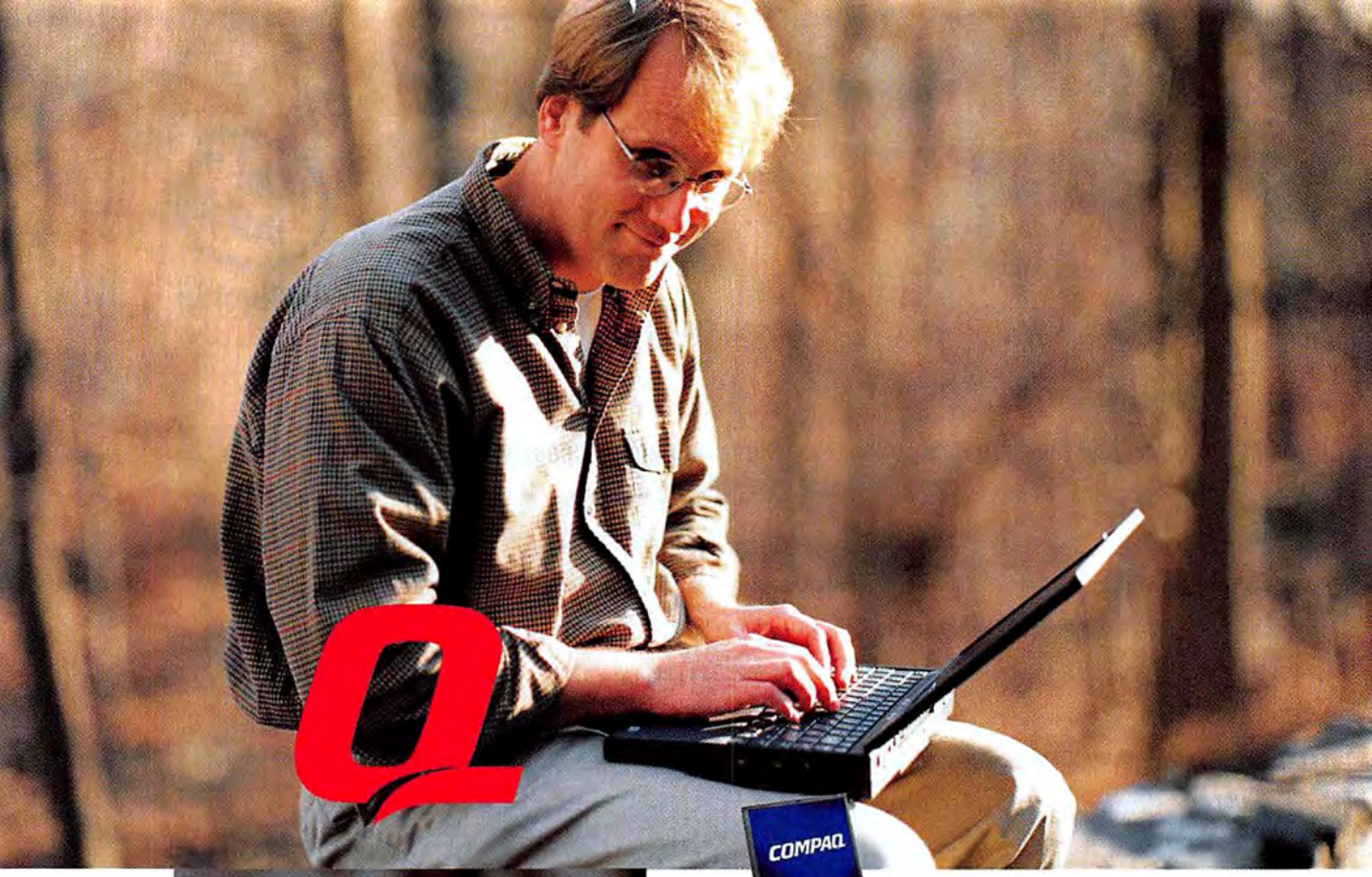

Moves fast,
is incredibly thin,
and has a
fantastic memory.
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you were like that?

Compaq Awards

October 1998 **EQUIP MAGAZINE**
5 Star Rating and Best Overall Notebook Award • **PRESARIO 1650**

July/August 1998 **FAMILY PC**
Best Multimedia Notebook of the Year • **PRESARIO 1680**

April 1998 **LAPTOP BUYERS GUIDE & HANDBOOK**
BEST BUY Award • **PRESARIO 1621**

	PRESARIO 1900-366 INTERNET NOTEBOOK PC	**PRESARIO 1900-333 INTERNET NOTEBOOK PC**
	Intel® Pentium® II Processor, 366 MHz	Intel Pentium II Processor, 333 MHz
	13.3" TFT Active Matrix XGA Display	13.3" TFT Active Matrix XGA Display
	128 MB SyncDRAM expandable to 192 MB	64 MB SyncDRAM expandable to 192 MB
	6.4 GB UltraDMA Hard Drive[3]	10.0 GB UltraDMA Hard Drive[3]
	2nd-Generation DVD-ROM Drive[4]	2nd-Generation DVD-ROM Drive[4]
	256-bit AGP Accelerated 3D Graphics w/2.5 MB VRAM	256-bit AGP Accelerated 3D Graphics w/2.5 MB VRAM
	56K ITU V.90 Modem[5]	56K ITU V.90 Modem[5]
	Smart Lilon Battery	Smart Lilon Battery
	256 KB Integrated "On-chip" cache	256 KB Integrated "On-chip" cache
	External Iomega® Zip® Drive	Folio Carrying Case
	Microsoft® Featured Home Collection	Microsoft Featured Home Collection
	Microsoft Windows®98	Microsoft Windows98
	$3299 As low as $92 per month[1]	**$3149** As low as $88 per month[1]
Personalize with these options:	192 MB SyncDRAM: Add $150	128 MB SyncDRAM: Add $200
	10.0 GB UltraDMA Hard Drive:[3] Add $350	Extra Smart Lilon Battery: Add $129
	Stylish Briefcase: Add $115	Xircom 10/100 Ethernet PC Card: Add $169

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Hey, even the good old days were never this good. Because now you can have a movie theater on your lap. Your clients in the palm of your hand. And the world at your fingertips. All you need is the new Compaq Presario 1900 Internet Notebook PC. Amazingly, it's two computers in one. A fully loaded next-generation notebook. And one of the lightest, sleekest computers you've ever tucked under your arm. How did we manage to create both? A revolutionary new feature: the removable drive wedge.

Have it all without carrying it all.

We created a precision-engineered wedge that contains a DVD-ROM, floppy drive, and port replicator connector. With the wedge on, you've got the ultimate, all-in-one multimedia notebook. Snap off the wedge and you've got a lean, mean, 1.2-inch-thick notebook that weighs in at only 5 lbs. (Which is a good thing when you're sprinting for a plane.) Either way, you'll have a notebook with one-touch Internet access, outrageous graphics, a high-speed modem, and a large, vibrant screen. It's everything you could wish for.

PRESARIO 1900-300 INTERNET NOTEBOOK PC	PRESARIO 1600i-366 INTERNET NOTEBOOK PC	PRESARIO 1600i-333 INTERNET NOTEBOOK PC	PRESARIO 1600i-300 INTERNET NOTEBOOK PC
Intel Pentium II Processor, 300 MHz	Intel Pentium II Processor, 366 MHz	Intel Pentium II Processor, 333 MHz	Intel Pentium II Processor, 300 MHz
13.3" TFT Active Matrix XGA Display	14.1" TFT Active Matrix XGA Display	14.1" TFT Active Matrix XGA Display	14.1" TFT Active Matrix XGA Display
64 MB SyncDRAM expandable to 192 MB	96 MB SyncDRAM expandable to 192 MB	64 MB SyncDRAM expandable to 192 MB	64 MB SyncDRAM expandable to 128 MB
6.4 GB UltraDMA Hard Drive[1]	6.4 GB UltraDMA Hard Drive[1]	4.3 GB UltraDMA Hard Drive[1]	4.3 GB UltraDMA Hard Drive[1]
2nd-Generation DVD-ROM Drive[1]	24X Max CD-ROM Drive[1]	2nd-Generation DVD-ROM Drive[1]	24X Max CD-ROM Drive[1]
256-bit AGP Accelerated 3D Graphics w/2.5 MB VRAM	256-bit Accelerated 3D Graphics w/2.5 MB VRAM	256-bit Accelerated 3D Graphics w/2.5 MB VRAM	256-bit Accelerated 3D Graphics w/2.5 MB VRAM
56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]	56K ITU V.90 Modem[2]
Smart Lilon Battery	Smart Lilon Battery	Smart Lilon Battery	Smart Lilon Battery
256 KB Integrated "On-chip" cache	256 KB Integrated "On-chip" cache	256 KB Integrated "On-chip" cache	256 KB Integrated "On-chip" cache
Folio Carrying Case	Microsoft Office 97 Small Business Edition	Microsoft Office 97 Small Business Edition	Microsoft Featured Home Collection
Microsoft Office 97 Small Business Edition[3]	Microsoft Windows98	Microsoft Windows98	Microsoft Windows98
Microsoft Windows98			
$2799 As low as $79 per month[4]	**$2899** As low as $81 per month[4]	**$2649** As low as $74 per month[4]	**$2199** As low as $62 per month[4]
10.0 GB UltraDMA Hard Drive:[1] Add $350	192 MB SyncDRAM: Add $250	96 MB SyncDRAM: Add $100	6.4 GB UltraDMA Hard Drive:[1] Add $100
Extra AC Adapter: Add $49	2nd-Generation DVD-ROM Drive:[1] Add $149	Port Replicator: Add $129	Extra AC Adapter: Add $49
External Iomega Zip Drive: Add $149	Port Replicator: Add $129	Tripp Lite 140 Watt Inverter: Add $49[5]	Tripp Lite Super Notebook Protector: Add $14[5]

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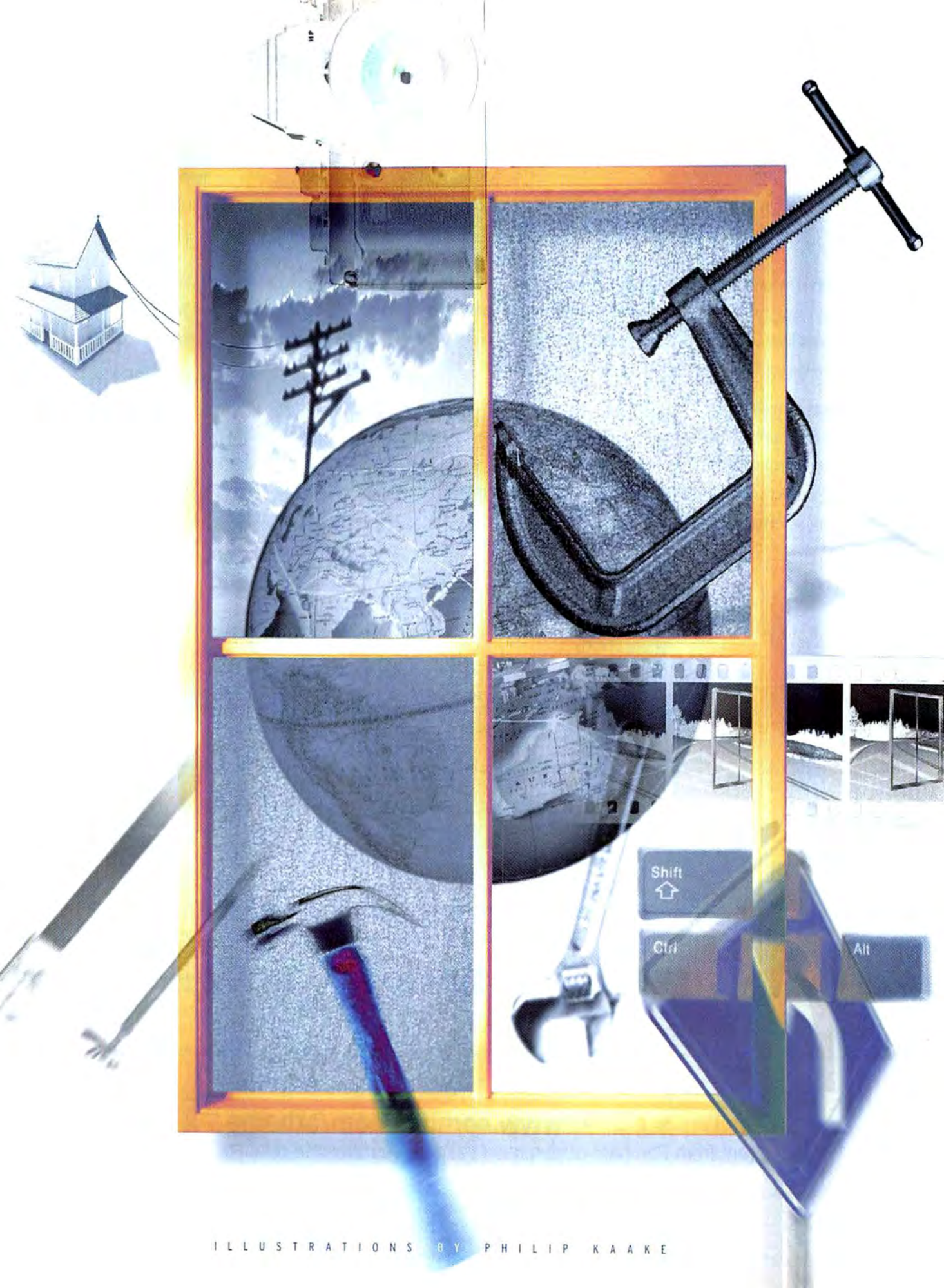


ILLUSTRATIONS BY PHILIP KAAKE

The Ultimate Insider's Guide to Windows

PSSST, CHECK OUT OUR EXPERTS' ANSWERS TO THE MOST-ASKED QUESTIONS ABOUT WINDOWS 95, WINDOWS 98, AND INTERNET EXPLORER.

BY TIM BOONE, MATT LAKE, ROBERT LAURISTON, AND VALERIE RYAN

Hey, you! Yes, you—the one who's spent precious years developing your secret arsenal of custom tweaks for Windows 95. You think it might be time to jump in and make the upgrade to Windows 98, but the thought of reconfiguring your operating system is about as appealing as an afternoon at the DMV.

Well, take heart. It's not as scary as it sounds. After all, Windows 98 isn't exactly a brand-new operating system. It's Windows 95 with an improved file system, a dash of speed, a smattering of fixes and updates, and tighter integration with Internet Explorer. Windows 98 also offers better customization, improves hard drive performance, and adds a few very useful system tools of its own.

Whether you're going to stick with Windows 95 or upgrade to Windows 98, here are a bunch of tips and tricks for both versions. And if you want it all, we even have tips for running both operating systems on the same machine. ▶

INSIDE ***PERFORMANCE 106*** ***CUSTOMIZATION 107*** ***NAVIGATION 114*** ***FILE MANAGEMENT 116*** ***HARDWARE 126*** ***MORE GOODIES 134***

PERFORMANCE

The Speed You Need

WINDOWS 98 ALONE doesn't offer huge performance boosts, though it does make applications load faster. As with Win 95, your system can bog down when you have a lot of programs running—and that goes double for Active Desktop items. Here are a few ways to keep things moving.

Q 98 How can I speed up my big, sluggish software suites?

A It's possible to make programs *load* more quickly—especially those in Microsoft Office—but this won't help them run faster. The Intel Application Launch Accelerator, a tool included with Windows 98's Disk Defragmenter, does the trick for you. This utility arranges the pieces of your most commonly used software on your hard disk in the order they'll load the fastest—a step beyond regular defragmenting, which merely consolidates files into contiguous clusters and doesn't take into consideration when various *parts* of a file get loaded. Select *Start•Programs•Accessories•System Tools•Disk Defragmenter*. When the utility's opening screen pops up, click the *Settings* button, make sure the 'Rearrange program files so my programs start faster' option is checked, and then click *OK*. On the opening screen, click *OK* again, and leave your PC for an hour or so while it does the job.

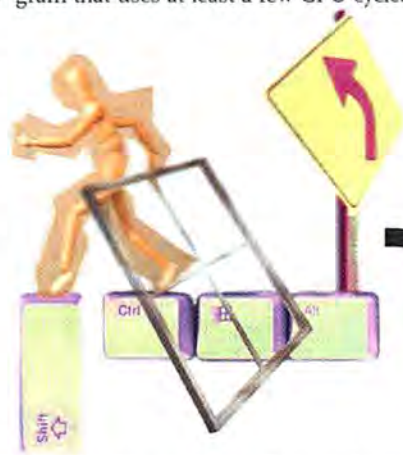
Q 95 98 Does having an Active Desktop slow down my system? If so, how can I speed it up again?

A Active Desktop by itself doesn't cause any performance problems, but the elements you include in it might. Active Desktop consists of three elements, all of which were introduced with Internet Explorer 4.0 and have continued with Windows 98 and IE 5. The first, Web View, turns your desktop into one big Web page with clickable links, which by itself won't slow down your computer. The second feature allows you to add active items—such as HTML code or JavaScript tickers—to your desktop. You can also plant items drawn from the Web onto the desktop and receive updates periodically. Both of these capabilities can put significant drag on your system.

If you suspect a Web site subscription is slowing you down, try changing the update profile of your subscription. Right-click the desktop, select *Properties*, and click the *Web* tab. Select the item in question and click the *Properties* button. Under the Receiving tab, you can elect to not have IE update the changed item and instead just tell you, with a pop-up dialog box or an e-mail, that an update is available. Under the Schedule tab, you can reduce the frequency of updates or turn updates off completely. You can always update pages manually by right-clicking the desktop and selecting *Active Desktop•Update Now*. In general, we recommend avoiding subscriptions—a much-hyped feature that isn't worth the hassle.

Q 98 The more software I install, the slower my system seems to get. How can I reverse the trend?

A Many applications install little programs that run every time you start up Windows, although you can't see them; if you have a lot of them, they slow your system down. Check the contents of your system tray: Each icon represents a program that uses at least a few CPU cycles

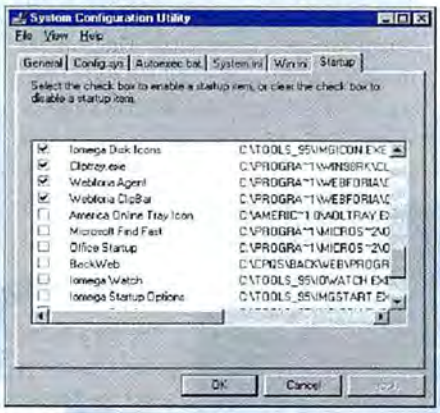


Shortcuts to Success

MOUSE HAND HURTING? Give your wrist a rest. Windows 9*x* makes good use of keystroke combinations, so you don't need to constantly take your hands off the keyboard. We've provided keystrokes for both a standard keyboard and a "Windows" keyboard, which has two keys with the Windows logo (⊞) and one with a menu icon (▤):

TASK	KEYSTROKES: STANDARD KEYBOARD	KEYSTROKES: "WINDOWS" KEYBOARD
Close active application	<Alt>-<F4>	<Alt>-<F4>
Close active window within application	<Ctrl>-<F4>	<Ctrl>-<F4>
Copy selected item to the Clipboard	<Ctrl>-C	<Ctrl>-C
Cut selected item	<Ctrl>-X	<Ctrl>-X
Delete an item without sending it to the Recycle Bin	<Shift>-<Delete>	<Shift>-<Delete>
Display a "right-click" context menu	<Shift>-<F10>	<▤> or <Shift>-<F10>
Display the Run dialog box	no shortcut	<⊞>-R
Display the System Properties dialog box (including Device Manager)	no shortcut	<⊞>-<Break>
Find a computer on the network	no shortcut	<Ctrl>-<⊞>-F
Find a file or folder on your PC	no shortcut	<⊞>-F
Minimize all running applications	no shortcut	<⊞>-D (in Windows 95, <⊞>-M)
Open the Start menu	<Ctrl>-<Esc>	<⊞>
Open the Windows Help dialog box	no shortcut	<⊞>-<F1>
Paste an item from the Clipboard	<Ctrl>-V	<Ctrl>-V
Prevent a CD or CD-ROM from autoplaying	hold down <Shift> while inserting disc	hold down <Shift> while inserting disc
Restore all minimized apps	no shortcut	<⊞>-D (in Windows 95, <Shift>-<⊞>-M)
Start Explorer	no shortcut	<⊞>-E
Switch between running applications	<Alt>-<Tab>	<Alt>-<Tab>
Undo previous task	<Ctrl>-Z	<Ctrl>-Z

and some system resources, and there are many more you can't see. To monitor or turn off these programs, load Windows 98's System Configuration Utility. Select *Start•Run*, enter **msconfig**, and click *OK*. In the SCU dialog box, click the *Startup* tab and scroll through the list of items for unnecessary tools. These could include monitor programs, scheduling agents, and others. Click to remove the check mark next to any you don't want to run. If you change your mind, you can run any disabled start-up item by selecting it from the *Start•Programs•Disabled Startup Items*. To get an item to run at start-up again, return to the SCU's *Startup* tab and re-select the item.



GET RID OF PESKY start-up programs with the System Configuration Utility.

Q **98** How can I regularly scan and defrag a 4GB or larger hard drive without losing hours of productive time?

A Windows 98's all-in-one Maintenance Wizard can automatically run cleanup tools on a schedule you set. Maintenance Wizard can clean up your Start menu, scan for and remove viruses, flush the browser cache and temp folders, check the hard disk for errors, defragment your hard drive, and even optimize compressed drives. To schedule a tune-up, select *Start•Programs•Accessories•System Tools•Maintenance Wizard*. To set up a loose schedule, make sure the Express radio button is selected, click the *Next* button, and then choose the stretch of time—day, evening, or night—when your system is normally running but you're not working on it. Maintenance Wizard will kick in only when your computer is idle during the period you've chosen.

Q **98** With several gigabytes of free space on my drive, I'd rather use the biggest clusters possible for maximum performance. How can I do that?

A PartitionMagic lets you resize the clusters of FAT32 drives without disturbing your data. You can also manually set the cluster size to 16KB using the undocumented /z option in Windows 98's command-line format utility. For example, typing **format c: /s /z:32** will repartition the drive into 16KB clusters and install DOS. But be careful—it will also erase all the data on drive C:. You'll need a start-up disk and a backup to restore Windows.

• **PartitionMagic 4.0;** $70 street; PowerQuest; 800/379-2566; www.powerquest.com

PRODUCT INFO NO. 641

Q **98** Do animated menus impair my computer's performance?

A Windows 98's growing and shrinking menus and windows are a matter of taste—and on slower systems, especially those in which the CPU takes on graphics processing (as Cyrix's MediaGX does), they may slow things down a bit. To remove them, right-click the desktop, select *Properties*, and, on the *Effects* tab, look for the check boxes under 'Visual effects'. Uncheck *Animate windows menus and lists*, and click *Apply*. If you want really plain visuals, you can also uncheck *Show window contents while dragging*—another effect that might drag down some graphics subsystems.

Q **95** **98** I use DriveSpace to get more storage on an older PC, but it seems to make the PC run slower. How can I reverse this?

A Compressing a hard drive with DriveSpace can slow PCs with older CPUs, since every time you write to or read from a compressed drive, the CPU has to decompress or compress the bits you're handling. If you want to retain DriveSpace, you can strike a balance between compression and performance using Windows 9*x*'s Compression Agent. Select *Start•Programs•Accessories•System Tools•Compression Agent*, and click *Settings*. Use the UltraPack option for files not used in the past 15 to 30 days, and set HiPack to not compress any other files.

CUSTOMIZATION

As You Like It

AS WINDOWS grows up, it provides more opportunities for customization. Whether it's the desktop or Explorer, chances are you can tweak it to your liking.

ACTIVE DESKTOP

Q **IE4** **IE5** How can Active Desktop help with searching the Web?

A Because Windows 98 (and Windows 95—if you also have IE) is closely integrated with the Web, it's easy to add Web pages on an Active Desktop—and that includes search forms. Relax, it's not as hard as it sounds. Most Web search sites provide you with the HTML code to cut and paste into a text editor. Fire up a Web browser, point it to your favorite search site, and look under the Help section for the code for a search form (for some examples, see HotBot's Web site at www.hotbot.com/help/tools). Highlight the code, press **<Ctrl>-C**, and open a new document in Notepad. Then press **<Ctrl>-V** to paste the new code, and save the document in any folder as **search.html**. Go to that folder, make sure it's not maximized, right-drag search.html onto the desktop, and release. Select *Create Active Desktop Item Here*. Click *Yes* in the ensuing dialog boxes (if Active Desktop isn't enabled, Windows will do it for you). The search form will appear on your desktop—just resize it to fit, and it'll be there for good.

YOU CAN PUT A WEB search field right on your desktop using HTML code from almost any Web search site.

If your desktop has a certain background color, you can match the background color of the search form so it appears to be seamless on the desktop. If the desktop is black, open search.html in Notepad or any other text editor, and add the line **<BODY bgcolor="black">** (note, however, that some colors may require hex code) above the line that starts with '<FORM>'.

Q 95 98 How can I keep all the Active Desktop elements on my desktop?

A Fortunately, these objects are not like regular Windows wallpaper—you can resize them, move them, or turn them off as you wish. Move your mouse over an active element and slide the pointer upward without clicking. A gray window frame and title bar will appear. Move your mouse to the edge of the bar until the pointer becomes a two-headed arrow; you can then resize the box in any direction you want. To move it, click and drag the title bar. And to remove the item from the desktop altogether, click the *X* (close) button on the top right.

Q 98 How can I get rid of My Computer, the Inbox, and other icons that are in the way of my Active Desktop item?

A If you've turned on the Active Desktop's View As Web Page option, you can make desktop icons disappear as easily as David Copperfield can hide an elephant. Simply right-click the desktop, select *Properties*, and, on the dialog box's *Effects* tab, locate the row of icons at the top. Beneath them, you'll see a check box with the caption 'Hide icons when the desktop is viewed as a Web page'. Click it, and—presto!—all the icons will be invisible as long as the Active Desktop is viewed as a Web page. Should you need to get to the Recycle Bin or My Computer in a hurry, right-click the desktop, and under the *Active Desktop* option, deselect *View As Web Page* to disable the option. Then, when you're finished, repeat the process in order to restore your Web desktop.

TOOLBARS

Q 95 98 How do I add new toolbars to the Windows taskbar?

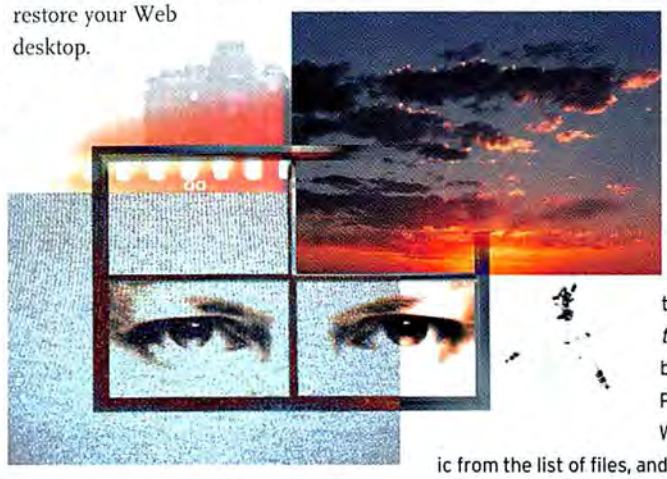
A Right-click a blank space on any toolbar, select *Toolbars*, and you're given a list: Address, Links, Desktop, Quick Launch, and New Toolbar. You can select any or all of these toolbars to have them appear on the taskbar. Choose *New Toolbars* to create your own. From the dialog box that appears, choose an existing folder (such as My Computer or My Documents) or type in a URL, and click *OK*. You now have a new toolbar. Drag onto it the icons of the programs you want until you've built the perfect toolbar for your needs. To remove the toolbar, right-click the taskbar, select *Toolbars*, and uncheck the toolbar that you don't want.

You've Got the Look

Q IE4 IE5 How can I change the appearance of my Explorer window?

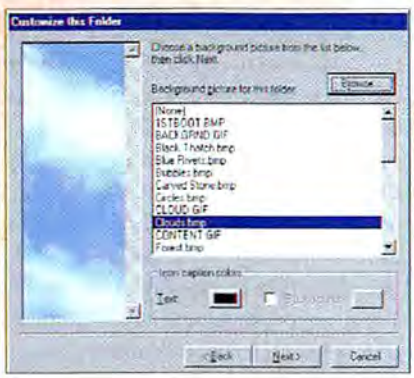
A There are many different looks for Windows Explorer windows, and the big secret is that every scheme is simply an HTML file that's easy to swap in or out. So it's worth experimenting with different schemes until you settle on one you can live with. To start, select any folder and then select *View•as Web Page*. This provides a left-hand frame with information about any file selected—and gives thumbnail previews of some graphics and Web files (see below left).

Next, select *View•Customize this Folder*. The dialog box that appears enables you to add a background picture to the right-hand frame of the Explorer folder, or add HTML coding such as hyperlinks to the left-hand frame. If you select 'Create or edit an HTML document', you'll need to have some basic HTML coding skills to enter codes into a text editor (removing comment-out marks and inserting live text into dummy code such as *myhomepage*). The result is a folder with Web links.



To add a background picture, select the *Choose a background picture* option from the *View•Customize this Folder* dialog box and click *Next*. Pick a GIF, JPEG, or Windows BMP graphic from the list of files, and you'll get a preview in the left frame (see below center). You may need to change the text color in order to make it visible over brighter background images. When you've finally made your selection, click *Next*, then *Finish*, and your Explorer makeover will be complete (see below right).

To undo all customization in one swoop, select *View•Customize this Folder•Remove Customization*, and click *Next*, then *Finish*.



Q 95 98 How do I add or cut items to and from the Quick Launch toolbar?

A That toolbar, squeezed between the Start button and the taskbar, appears by default when you install Internet Explorer 4.*x* or 5 under either Windows 95 or 98. To add an item (for example, the Word icon), right-drag it from the source folder to the toolbar (an I-beam is displayed where the icon will appear), release the mouse button, and select *Create Shortcut(s) Here*. You can change the order of the icons simply by dragging them. The Quick Launch toolbar does tend to get cluttered quickly if you keep adding items to it. To remove an item, right-click it and select *Delete* from the context menu.

A RIGHT mouse-click on any Start menu item brings up a menu with a Delete option.

Q 95 98 Toolbars that give me quick access to often-used programs, URLs, files, and folders are great, but my screen space is precious. How can I save space without giving up this feature?

A By default, when you create a toolbar, Windows adds it to the taskbar. You can make the taskbar taller (point to the top edge of the bar; when the pointer changes to a double-headed arrow, click and hold down the mouse button and drag the edge up), but that consumes even more of the screen. To shrink a toolbar, you can right-click its handle or title and select *View•Small* or uncheck *Show Title* or *Show Text*. To regain even more desktop real estate, right-click a blank spot of the taskbar or of a toolbar on the taskbar, select *Properties*, and check both *Always on top* and *Auto hide*. You can also drag the handle of a toolbar off the taskbar to another edge of the desktop, right-click the toolbar's handle, and check the *Always on Top* and *Auto Hide* options. Now, when you point your mouse to the edge of the screen, the hidden bar will pop up.

Q 95 98 I've dragged several new items onto a toolbar, and I can't tell their icons apart. Is there any way to make them look more distinctive?

A When you add a new item to a toolbar, you are creating a Windows shortcut to the original item. As with all shortcuts, you can change the icon at will. Right-click the nondescript icon, select *Properties*, and click the *Change Icon* button. Pick one of the displayed icons, or select *Browse* for more choices. Note: If you select All Files from the Files of Type list box, you can use .bmp or .gif files for icons too—Windows will scrunch bitmaps of any dimension down to icon size. Once you have chosen an icon, click *OK*, then *Apply*. IE 5 users can turn on *Show Text* (see previous tip) and shrink the length of the toolbar, because IE 5 displays the toolbar's hidden items when you click the toolbar's double-arrow scroll button.

EXPLORER/DESKTOP

Q 98 Can I run a systemwide check for broken shortcuts left by deleted apps?

A The Windows 98 Resource Kit provides just such a tool, and it's available on the Windows 98 setup CD (see "When Windows 98 Is Not Enough," page 116, for details). The Link Check Wizard (checklinks.exe in \Program Files\Win98RK) checks for broken links and shortcuts automatically.

Q 95 98 How do I get rid of some of the program icons on my Start menu?

A Items on the Start menu are hard-coded, except for those above the horizontal line at the top. But icons in the Programs submenu are standard Windows shortcuts that you can modify as you need. You can right-click them to bring up a context menu, which lets you delete the item, rename it, or find out where its target program is. (This shortcut information is hidden under the Properties option). If you're using Windows 95 without IE 4.x, getting rid of a program icon requires an extra step: Right-click *Start*, select *Open*, and then double-click *Programs*. Navigate to the unwanted icon, right-click it, and select *Delete*.

Q 95 98 Now that my folders look more like Web pages, I'd like to make them act more like Web pages, with underlined links that I can single-click on. How can I accomplish this?

A If you've changed your folders so that they look like Web pages (see "You've Got the Look," page 108), it's easy to give them more Weblike features. From any folder or Explorer window (including My Computer), select *View• Folder Options* and click *Web style*.

Q 98 How can I make Explorer show my three most important folders, no matter which hard drive or folder I'm exploring?

A Using the Links toolbar, you can access your working folders by treating them as links. First activate the Links toolbar: In My Computer or Explorer, select *View•Toolbars*. Click *Links* to activate the toolbar, or right-click the taskbar, then select *Toolbars*, and click *Links*. If the toolbar consists only of the word 'Links', it's being crowded out by other toolbars; to expand it, either drag the vertical divider next to it or double-click the word *Links*. By default, the Links toolbar contains Web links to several Microsoft Web sites—you can delete these by right-clicking them and selecting *Delete*. To add shortcuts to your favorite folders, just drag them from Explorer onto the Links toolbar.

Q 95 98 How can I set up my PC so that the users who share it can each store their own settings?

A First make sure you know all your network passwords. Then go to *Start•Settings•Control Panel* and dou- ▶

CREATE DIFFERENT SETTINGS for each user on your system, but don't forget to tell them they'll have to enter a user name and password.

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Integrated AC Adapter; 2 Li-Ion Batteries
Microsoft Windows 98
Microsoft Office 97 Small Business Edition
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Compaq S900 19" Monitor (18" viewable)
DVD-ROM G3
Compaq 10/100 Network Controller
Altec Lansing ACS44 Speakers
Matrox Millennium G200 AGP 16 MB
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ble-click *Users*. If you haven't set up users, the Enable Multi-user Settings dialog box will appear; click *Next*. If you have set up users, the User Settings dialog box appears; click *New User*. Follow the Add User Wizard prompts to create a user name and password for yourself. When you get to the Personalized Items Settings, check all five boxes. If you want to keep the settings, click *Create copies...*; if you want to abandon the current settings and start over, click *Create new items...*, click *OK*, and click *Yes* if prompted to reboot. Each time you're finished working on the PC, log off before others log on, or they'll use (and can change) your settings.

From now on, when you turn on or log on to the PC, your settings will be restored. Tell the other users they'll have to enter a user name and password when they log on. Also, make sure everyone knows that the password protects only other passwords, not the PC's files.

NAVIGATION

Destination: Web

WHILE WINDOWS 95 and 98 may deliver an enhanced Web experience thanks to their greater integration with Internet Explorer, some features remain less obvious than others. Follow these tips to enhance your browsing.

Q 98 IE5 How can I reduce the amount of typing I do when filling in addresses or locations in Windows 98 or Explorer?

A You can assign shortcut names to sites in your Favorites folder (say, "MS" for www.microsoft.com). To do so, click the *Favorites* button on the toolbar (not on the menu), right-click the item to rename, and select *Rename*. Now you can type the shortcut in the address box, and Windows/IE will present a drop-down list of matching sites or subfolder names in your History and Favorites folders. Press **<Down Arrow>** to scroll to the shortcut.

Q 95 98 IE5 Can I control the placement of items that I add to the Start or Programs menus by dragging and dropping?

A If you drag a file onto the Start button, Windows adds a shortcut to the top of the Start menu, above a horizontal bar. But if you drag the file over the Start button and don't drop it, the Start menu will open and you can position the new shortcut exactly where you want it, even onto a submenu (just hover over the submenu's name, and it will open). If you've installed IE 5, you can also sort these entries by name: Just right-click anywhere within them and select *Sort by Name*.

Q IE4 IE5 How can I view my favorite Web pages offline?

A In IE 4, viewing Web pages offline is as simple as going to the *File* menu and selecting *Work Offline*. IE will always start in offline mode until you deselect this option. Windows stores the last-viewed version of the page on your hard drive for quick access. In addition to viewing subscribed Web sites offline, you can also view Web pages stored in your History or Temporary Internet Files folders.

In IE 5, the best way to make pages viewable offline is to select *File•Save As* when you're on the page you wish to save, and choose *Web page, complete* in the 'Save as type' box. This will save the page, complete with all its images, to your hard disk. A more sophisticated solution, though not quite as intuitive, requires you to first save the page you want to view offline as a Favorite. Then right-click that page's *Favorites* entry, select *Make available offline*, click *Next* if the introductory screen appears, click the radio button next to *Yes*, and select the depth of Web pages you want to save for offline viewing (don't exceed two or three levels, or you'll run out of hard disk space).

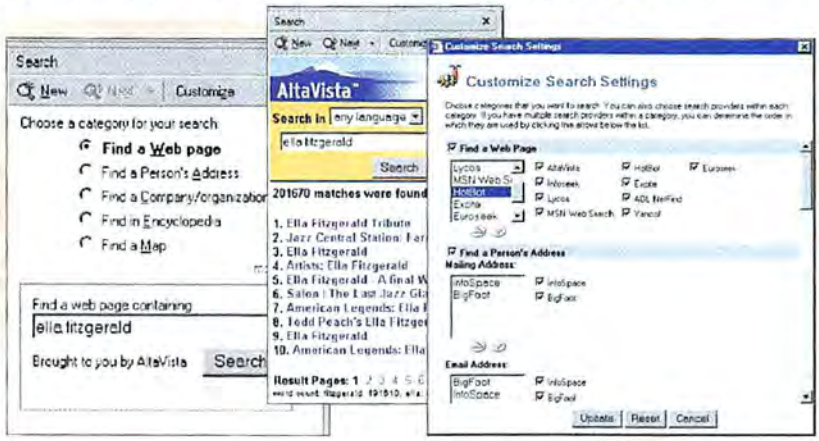
Q IE4 IE5 Is there an easier way to return to a previously visited site than clicking the Back button over and over?

A Use the History feature. In IE 4, select *View•Explorer Bar•History* ▶

Smarter Searches

Q IE5 Is there a way to perform more comprehensive searches than selecting Start•Find to use the standard Windows Find tool?

A With Internet Explorer 5's Search Assistant, you can search by specifying the category of information you're trying to find (see below left). Click the *Search* button on Internet Explorer's toolbar, click the button next to the type of information you're looking for (e-mail address, encyclopedia entry, and so on), and type your query into the provided Search field. If you select *Find a Web page*, Internet Explorer will kick into metasearch mode and look for your keywords in several search engines simultaneously. The first list of matches represents those found on just one of those search engines (AltaVista, for example; see below center); to view the results from another engine, click *Next* at the top of the Search pane. If you want to change the order in which the engines' results appear, click *Customize*. The right-hand side of the screen (see below right) will show the participating search engines. You can click any of them or use the up and down arrows to rearrange the order.

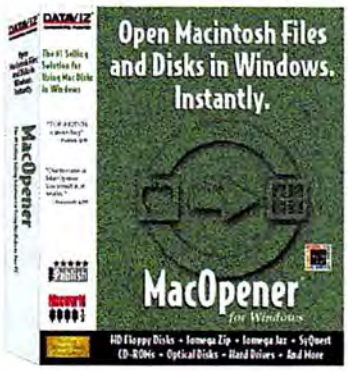


Trouble mounting?

In a world where Windows and Macintosh incompatibility causes endless problems, DataViz offers a little help. MacOpener®. A convenient utility that surmounts all obstacles when your PC needs to read, write and format Macintosh disks.

With MacOpener installed on your PC, reading and writing files on a Mac-formatted disk, cartridge or CD is a breeze. MacOpener lets you open the disk on your PC just as if it were formatted for Windows. You can then view the contents and copy files to and from the disk from any Windows application. MacOpener automatically adds the right PC extension to Macintosh files, so you can launch a Windows application by simply clicking on the file. It even lets you format the Mac disk just as if it were a PC disk. How's that for trouble free performance?

At DataViz, solving PC to Mac compatibility problems is our business. As well as MacOpener, we offer Conversions Plus®, the premier file conversion program that translates hundreds of different file formats between PC applications or Macintosh and PC applications. Quickly and accurately. And offers over 1,000 file translation combinations, to solve almost any file conversion needs.



So discover for yourself that with DataViz, no file compatibility problems are insurmountable.

For answers to all your Mac to PC disk and file compatibility needs, call us at 1-800-270-0030 Ext 121 or visit our web site at http://www.dataviz.com/mopcw

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Compatibility. Instantly.

Runs on Windows 3.1, Windows 95 & 98, Windows NT.

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Circle 176 on card or go to www.pcworld.com/infonet

When Windows 98 Is Not Enough

STRUGGLING with Windows? Here are some utilities and resources that can help. If we do not list contact information for an item, you can find a trial version on FileWorld at www.fileworld.com/magazine.

Aladdin Expander 5.0
Windows won't help you view compressed downloads or certain kinds of e-mail attachments. Expander lets you view and decompress formats like StuffIt, uuencoded, ARC, BinHex, MacBinary, and .zip.

Critical Update Notification
Microsoft alerts you whenever crucial updates such as security patches and system files are available, and doesn't bother you with fluff like desktop themes.

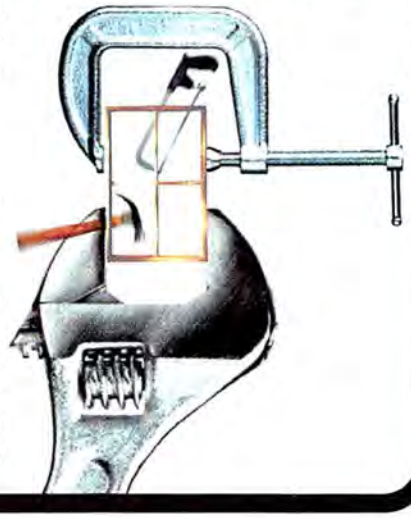
Internet Explorer 4.01 Service Pack
Interim upgrade to IE 4.0 and 4.01 (version 4.72.3110.8) enhances several features and fixes several known problems. Find it at www.microsoft.com/ie/download

O'Reilly Utilities 1.1
This collection of more than 30 utilities slightly overlaps with TweakUI but adds valuable twists ranging from batch-renaming of files to running interference between dueling Web browsers.

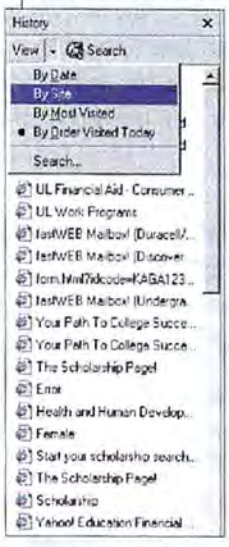
PGP Personal Privacy
File encryption utility allows you to keep private files on a shared PC.

Update for Microsoft Internet Explorer With Accessibility Aids
Update to Windows' Accessibility Tools (intended for disabled users) addresses several key performance, stability, and compatibility issues. You can download it from support.microsoft.com/support/downloads/LNP2005.asp

Windows 98 Year 2000 Update
This patch fixes a minor Y2K-related glitch in Windows 98. Download it via the Windows Update tool on your Start menu, or order a CD by calling 800/363-2896.



to see previously visited sites, listed by date. The top-level URLs are shown; when you click one, you'll see all the pages you've visited within that site. To change the number of days for which pages stay active in the History folder, or to clear the folder, go to *View•Internet Options*, select the *General* tab, and make the change under the History heading. Internet Explorer 5 further enhances the History folder, letting you view a list of the sites you've visited in any of four ways: by date, alphabetically by site name, by the number of visits you've made to each site, or by the order in which you visited the sites today. To access the different views, click *History*, and then click the *View* button at the top of the History pane.



WINDOWS 98's better History lets you view previously accessed Web sites four different ways.

FILE MANAGEMENT

Good Housekeeping

BOTH WINDOWS 95 and 98 offer plenty of powerful file management options. Better still, many of them can be customized to best suit your personal style.

Q 95 98 My "personal" computer isn't—I share it with several coworkers. How can I keep my personal files private?

A The most secure method is not to leave private documents on your PC's hard disk. Instead, store them on floppy disks or on some other removable media. A personal directory on a network is another option, but it's not illegal for your employer to look at files on company hardware. If you have a personal account with an ISP, it may come with private disk space, which you can access via a shareware file-transfer utility like WS_FTP 6.0, available from PC World Online's FileWorld.

You can also encrypt the file with a utility like PGP Personal Privacy, also available from FileWorld. It won't prevent other people from deleting the file, but they won't be able to read it.

Q IE4 IE5 How can I display graphics files as thumbnail images?

A If you have IE and want to view all your images at once, right-click a folder containing images, click *Properties*, check *Enable thumbnail view*, and click *OK*. Then open the folder and select *View•Thumbnails*. Graphics files recognized by Internet Explorer (including the most popular formats, such as .bmp, .gif, .jpg, .tif, and so on) will appear as thumbnails, as will HTML documents. If you have 'Show all files' selected in View•Folder Options View, you'll also see desktop.ini and Thumbs.db, which Windows uses to track and manage the thumbnail properties and images. But this method puts unreasonable demands on your system resources, so use it only for your clip art folder, if you have one.

A simpler method that won't tax your system's resources enables you to view single thumbnails. Use the folder or Explorer menu and select *View•as Web*

Continued on page 126 ▶

SONY VAIO

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WITH THE STUNNING ARRAY OF SONY VAIO NOTEBOOK CHOICES

personalize

THE NEW ALL-IN-ONE NOTEBOOK

Everything you want in a notebook—built right in.

There's a lot more than an Intel processor inside this slim notebook (less than 7 lbs. and 1.6" thin). Now, the DVD-ROM or CD-ROM, floppy disk and hard drives are all built in, so you'll never have to hook up any externals. All three models have even bigger screens than before and come with dual battery capability for up to 7 hours[1] of on-the-go power. Plus, each model comes pre-loaded with a host of software for some powerful multimedia capabilities. The only thing we didn't add to this notebook was weight and size. So you can see why **3MAX+**™ means **MaxMobility, MaxScreen** and **MaxBattery** plus a whole lot more.

3MAX+ Features (all models):
- MaxMobility: Less than 7 lbs.[1]; 1.6" thin
- MaxBattery: 2X battery life
- MaxScreen: 14.1" XGA TFT

Plus:
- All-in-one design
- i.LINK (IEEE-1394) port for DV still image capture

Pre-installed Software (all models)
- Windows 98
- Microsoft Outlook 98
- Microsoft Works
- Adobe PhotoDeluxe
- Sony Picture Gear
- Sony DVgate Still

3MAX+

60 days FREE Internet access, no credit card required (no daily maximum, up to 100 hours total). Certain restrictions apply.

1 Using optional second battery in floppy drive bay. Battery life based on usage.
2 With weight saver in floppy drive bay.

F190 $3,099.99

As low as $55.95 a month*
- **Intel Pentium II processor 366 MHz**
- 64 MB SDRAM
- **6.4 GB hard drive**
- **2X DVD-ROM drive**
- 14.1" XGA TFT Display
- V.90 modem
- High-capacity Lithium-Ion battery, dual battery capability
- 128-bit graphics acceleration
- Built-in stereo speakers
- Digital touch pad
- Digital video movie editing capability via i.LINK and DV Camcorder

Customize with:
★ Upgrade to 128 MB RAM add: $200.00

$200 Rebate with purchase of F190 All-in-One Notebook. (Offer expires 5/31/99)

10 FREE DVD rentals from NetFlix™ with purchase* (offer expires 5/31/99).

FREE USB Mouse with upgrade, a $49.99 value

F180 $2,299.99

As low as $41.51 a month*
- **Intel Pentium II processor 333 MHz**
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- **4.3 GB hard drive**
- **2X DVD-ROM drive**
- 14.1" XGA TFT Display
- V.90 modem
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- Digital touch pad

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- **4.3 GB hard drive**
- **24X MAX CD-ROM drive**
- 14.1" XGA TFT Display
- V.90 modem
- High-capacity Lithium-Ion battery, dual battery capability
- 128-bit graphics acceleration
- Built-in stereo speakers
- Digital touch pad

Customize with:
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★ Upgrade to 6.4 GB hard drive add: $200.00

FREE USB Mouse with upgrade, a $49.99 value

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ALL-IN-ONE ACCESSORIES

- **AC Adapter** PCGA-AC71: **$99.99.** Get an additional AC adapter and keep one at home and one at work.

- **Rechargeable Battery Pack** PCGA-BP71: **$249.99.** Up to 7 hours with two batteries. Note: Battery life may vary based on usage.

- **Network Port Replicator** PCGA-PRF1: **$199.99.** Built-in Ethernet 10 Base-T, USB parallel, serial VGA, DC-in, PS/2 keyboard and PS/2 mouse.

- **All-in-One Carrying Case** PCGA-CCF: **$99.99.** Easily holds notebook and accessories.

VAIO 505 SUPERSLIM NOTEBOOK

So light, yet so powerful.

Only 2.7 lbs. and .9" thin. The newest Sony VAIO® 505 SuperSlim Notebooks are even lighter and slimmer than before. Each sports a light, durable magnesium-alloy case inside which you'll find: an Intel® Pentium® processor with MMX™ technology; crisp, clear display; 90%-sized keyboard; heavy-duty hard drive; built-in modem; **Programmable Power Key** for one-button access to your e-mail, calendar or browser; plus **Signature Capture** so you can sign off on original documents in your own handwriting. What more (or less) could you want in a portable PC?

Pre-Installed Software (both models):

- Windows® 98
- Microsoft® Outlook™ 98
- Microsoft Works
- Adobe PhotoDeluxe®
- Sony Picture Gear™
- Sony DVgate™ Still

SONY Exclusive Features (both models):

- i.LINK™ (IEEE-1394) port for DV still image capture
- Pen-based signature and drawing capture
- Programmable Power Key -Unattended e-mail retrieval

60 days FREE Internet access, no credit card required (no daily maximum, up to 100 hours total). Certain restrictions apply.

505 ACCESSORIES

- **External 14X CD-ROM Drive**
  PCGA-CD5: **$299.99.** AC adapter and PC Card interface supplied. Requires AC power for operation.

- **Leather Carrying Case**
  PCGA-CC5: **$149.99.** Custom case includes detachable compartments for all of its accessories.

- **Rechargeable Battery Pack**
  Long-Life: PCGA-BP52: **$299.99.** Up to 7 hours with 505TS; up to 6 hours with 505TX.
  Note: Battery life may vary based on usage.
  Standard: PCGA-BP51: **$149.99.** Up to 3 hours with 505TS; up to 2.5 hours with 505TX.
  Note: Battery life may vary based on usage.

- **Port Replicator**
  PCGA-PR5: **$99.99.** Ports: Parallel printer, PS/2® keyboard, PS/2 mouse and VGA monitor.

- **Stereo Speakers**
  PCGA-SP51: **$99.99.**
  External clip-on speakers that give you even more sound.

- **AC Adapter**
  PCGA-AC51: **$99.99.** Get an additional AC adapter and keep one at home and one at work.

- **Battery Charger** PCGA-BC5: **$199.99.**
  You can charge 2 batteries simultaneously. Compatible with both Long-Life (L) and Standard (S) batteries.

505TX $2,199.99

As low as $39.70 a month*

- Intel Pentium processor with MMX technology 300 MHz
- 64 MB SDRAM (expandable to 128 MB)
- **6.4 GB fixed hard drive**
- 0.9" thin; 2.7 lbs.
- **10.4" XBRITE™ XGA Active Matrix Display**
- V.90 modem
- High-capacity Lithium-Ion battery
- Touch pad with pen operation
- Bundled port replicator and external floppy disk drive
- One type II PC Card slot with card bus zoomed video support

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with purchase of VAIO 505TX and CD-ROM Drive (PCGA-CD5). (Offer expires 5/31/99)

FREE USB Mouse with upgrade, a $49.99 value

Customize with:
★ Upgrade to 128 MB RAM
add: $300.00

505TS $1,799.99

As low as $32.48 a month*

- **Intel Pentium processor with MMX technology 300 MHz**
- 64 MB SDRAM (expandable to 128 MB)
- **4.3 GB fixed hard drive**
- 0.9" thin; 2.7 lbs.
- 10.4" SVGA Active Matrix Display
- V.90 modem
- High-capacity Lithium-Ion battery
- Touch pad with pen operation
- Bundled port replicator and external floppy disk drive
- One type II PC Card slot with card bus zoomed video support

$100 Rebate
with purchase of VAIO 505TS and CD-ROM Drive (PCGA-CD5). (Offer expires 5/31/99)

FREE USB Mouse with upgrade, a $49.99 value

Customize with:
★ Upgrade to 128 MB RAM
add: $300.00

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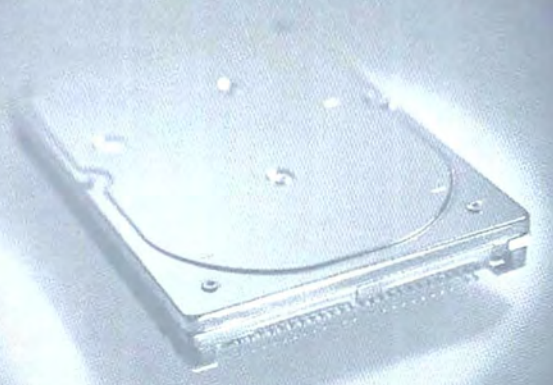

accessorize

FROM THE GROWING GALLERY OF SONY VAIO® COMPATIBLE AND ADD-ONS

SONY DIGITAL MAVICA CAMERA

This sleek, semi-pro Digital Mavica® Camera gives you instant imaging and endless storage because it captures all your pictures on floppy disk. Just take your photos and transfer them to any Sony PC—without wires or adapters. Then e-mail them to anyone, anywhere in the world.[1] (For details on the full line of Digital Mavica Cameras, see the reverse.)

Model: MVC-FD91
Price: $999.00

SONY IC CHIP RECORDER

With the Sony IC Chip Recorder, you get a palm-sized device (just 2.5 oz.) that captures your voice with digital clarity. And links right to your Sony PC. Giving you a swift, effortless way to save, download and e-mail your voice messages and memos. Holds up to 24 minutes of recording, in five separate message categories. Includes digital VOR that starts and stops with your voice, so you never miss a single word.

Model: ICD-70PC
Price: $149.95

SONY PC GLASSTRON MONITOR

A big-screen display that's portable? The PC Glasstron™ monitor creates a virtual 30" high-resolution image—for your eyes only. It's head-mounted to offer you the most in mobility and privacy. And its built-in headphones make your multimedia experience even more amazing. Just plug it into your notebook and other video sources and let the games begin.[2]

Model: PLM-S700
Price: $2,599.00
As low as $46.92 a month*

[2] See advisories on back page

MEMORY STICK IC RECORDING MEDIA

Introducing the next generation of digital data storage—Memory Stick™ Media. Smaller than a stick of gum, but with five times the storage capacity (MSA-8A model) of a standard 3.5" floppy disk, Memory Stick Media is expected to become the new industry standard for storage and transfer media. Plus, it makes it even easier for you to transfer images, sounds, data and text between cameras, computers and more.

4 MB Memory Stick Media Model: MSA-4A Price: $29.99
8 MB Memory Stick Media Model: MSA-8A Price: $39.99

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THE 838 MODULAR NOTEBOOK

Swap any drives and battery to take only what you need.

The new Sony VAIO 838 Notebook is just what every power-hungry office nomad is looking for. More power and portability. Packed with our road-warrior **3MAX**™ features, this notebook offers **MaxMobility** (under 6 lbs. and less than 1.75" thin), **MaxScreen** (a full-color 13.3" high-resolution XGA display) and **MaxBattery** (up to 8 hours of power without a charge). Plus, the DVD-ROM drive, floppy disk drive, second battery[1] or second hard drive[1] are all interchangeable so you take only what you need. All told, it's a mighty powerful PC wrapped in a light and slim package.

3MAX Features:
- MaxMobility: Less than 7 lbs.[2]; 1.75" thin
- MaxScreen: 13.3" Active Matrix LCD Display
- MaxBattery: 2X battery life[2,3]
- Using optional second battery in floppy drive bay

Pre-installed Software:
- Windows 98
- Microsoft Outlook 98
- Microsoft Works
- Adobe PhotoDeluxe

3MAX™

[1] Using optional second battery in floppy drive bay. Battery life based on usage.
[2] With weight saver in floppy drive bay.
[3] With optional second hard drive and removable drive bay. Battery life may vary based on usage.

838 $2,699.99

As low as $48.73 a month*

- Intel Pentium II processor 366 MHz
- 64 MB SDRAM
- 6.4 GB removable hard drive
- 2X DVD-ROM drive
- Removable drive bay for DVD-ROM drive, floppy disk drive, second battery, second hard drive
- 13.3" XGA TFT LCD Display
- V.90 modem
- High-capacity Lithium-Ion battery, dual battery capability
- 128-bit graphics acceleration
- Built-in stereo speakers
- Digital touch pad

10 FREE DVD rentals from NetFlix with purchase* (offer expires 5/31/99).

FREE USB Mouse with upgrade, a $49.99 value

Customize with:
★ Upgrade to 128 MB RAM add: $200.00

838 ACCESSORIES

- **Carrying Case** PCGA-CC7: **$99.99.** Air-cushioned, this case holds your notebook, AC adapter, extra battery and floppy or CD-ROM drive.

- **AC Adapter** PCGA-AC71: **$99.99.** Get an additional AC adapter and keep one at home and one at work.

- **Network Docking Station** PCGA-DB8: **$599.99.** Offers everything you need to connect your notebook to your company's PC network.

- **Rechargeable Battery Pack** PCGA-BP71: **$249.99.** Up to 8 hours with two batteries. Note: Battery life may vary based on usage.
- **Extra 4 GB Hard Drive** PCGA-HD740: **$499.99.** Placing a second 4 GB hard drive in the versatile drive bay increases your storage capacity for large applications.

THE NEW C1 PICTUREBOOK™

The new Sony notebook with a built-in digital camera.

This compact wonder makes using digital pictures in documents, e-mail or Websites easier than ever before—because the digital camera is built right in. Just swivel the camera toward your subject and capture video clips or still shots. Pre-installed software allows you to create animated special effects or even a 360° panorama from still frames. Not much bigger than a paperback book, it also delivers full notebook functionality that lets you run Windows 98.

PCG-C1X $2,299.99

As low as $41.51 a month*

- Intel Pentium processor with MMX technology 266 MHz
- 64 MB SDRAM
- 4.3 GB hard drive
- Built-in CCD camera (Motion Eye)
- 8.9" XWIDE TFT LCD Display (1024 x 480)
- Windows 98
- Adobe PhotoDeluxe
- Pre-installed original Sony multimedia software with Smart Write, Smart Publisher and Smart Capture
- 17mm pitch/2mm stroke keyboard
- 2.5 lbs., 1.5" thin
- i.LINK (IEEE-1394) port for DV still image capture
- Magnesium-alloy display housing
- Integrated Universal Serial Bus (USB)
- Integrated V.90 modem
- External USB floppy drive

C1X ACCESSORIES

- **External 14X CD-ROM Drive** PCGA-CD5: **$299.99**
- **AC Adapter** PCGA-AC51: **$99.99**
- **Long-Life Rechargeable Battery Pack** PCGA-BP12: **$299.99**
- **C1 Carrying Case** PCGA-CC1A: **$149.99**
- **Battery Charger** PCGA-BC1: **$199.99**
- **Standard Rechargeable Battery Pack** PCGA-BP11: **$149.99**

Sony Digital Mavica Cameras

THE WORLD'S ONLY FLOPPY-DISK DIGITAL CAMERA

The Sony Digital Mavica* Camera isn't just the world's favorite digital camera. It's the only digital camera in the world to use a standard floppy disk for film. So it works seamlessly with any PC. And gives you an effortless way to do some pretty amazing things.

Just point, shoot and preview your images on the camera's color LCD display. Pop the floppy in your PC and e-mail your images, post them to the Web or use them to create a polished presentation.‡ Some models even let you record up to 60 seconds of live video and audio on a single floppy. So you can do things like e-mail a video clip of your newborn baby—complete with sound—just minutes after she's born.

It's easy to imagine all the amazing things you could do with a Digital Mavica Camera. The tough part is deciding which model is best suited to help you make it all happen.

MVC-FD91

$999

Designed for the serious photo enthusiast, this semi-pro model is loaded with top-of-the-line features, like MPEG audio/video capabilities, a 14X Optical Zoom lens, Optical SteadyShot* and special manual controls.

MVC-FD81

$799

This model comes with most of the perks of our semi-pro model, plus all the great features of our standard Mavica Cameras. Highlights include: XGA picture quality, as well as MPEG audio/video and voice memo capabilities.

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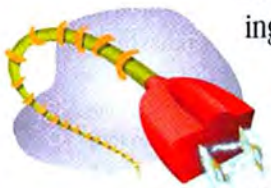

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Continued from page 116

Page. Then select the image you want to preview, and the thumbnail will appear on the left side of the folder.

Q **98** How can I free up hard disk space, short of tossing out stuff I need?

A Right-click the drive icon in My Computer, select *Properties*, click *Disk Cleanup*, check all the boxes under 'Files to delete', and click *OK*. This will clear out a lot of the junk files from your disk, and empty the Recycle Bin.

Next, open Control Panel and click *Add/Remove Programs*. If you see a program in the list of uninstallable apps that you don't use, select it and click *Add/Remove* to uninstall it. Repeat this for other apps you don't need. (To get rid of everything, you may need to delete the program directory manually after uninstalling.) If you upgraded from an earlier Windows version and you're sure you won't want to uninstall Windows 98 later, select *Delete Windows 98 uninstall information* and click *Add/Remove*.

YOU CAN RECOVER disk space by deleting backups of old system files, but you'll lose the ability to uninstall Windows 98.

When you finish uninstalling all unwanted programs, select the *Windows Setup* tab in the Add/Remove Programs Properties dialog box. One at a time, double-click each entry in the Components list; in the sublist that appears, uncheck items you don't use or want—such as screen savers or games. When you've unchecked everything you can, click *OK* to uninstall all of them at once.

Q **95** **98** When I launch Explorer, it displays the top level of my C: drive. How can I change that?

A First, navigate to C:\Windows\Start Menu\Programs. Right-click *Windows Explorer*, select *Properties*, and choose the *Shortcut* tab. Replace the C:\ at the end of the Target field entry with the path to the folder you want opened (such as, C:\My Documents), and click *OK*.

HARDWARE

Ready to Ware

FINALLY, WINDOWS has taken some steps toward improved hardware support and troubleshooting. Whether you've got Windows 95 or 98, you'll find tips to make your devices run more smoothly.

Q **95** **98** What are the minimum requirements for upgrading to Win 98?

A Microsoft claims you can run Windows 98 on a 66-MHz PC with only 16MB of RAM, but those numbers are a bit misleading. Sure, Windows 98 can *run* on older PCs but if you want to *do* anything, say, use an application, you'll need at least a 100-MHz Pentium PC with 32MB of RAM.

In terms of hard disk space, you'll need approximately 195MB to upgrade from Windows 95 to Win 98, and 225MB for a full Win 98 installation (175MB on a FAT32 drive). However, depending on your system and the optional components you choose to install, like desktop themes and Web TV for Windows, Windows 98 could gobble up as much as 355MB of your FAT16 hard disk.

Q **95** **98** Can I use a Universal Serial Bus device on my older PC?

A Windows 98 has built-in support for USB, so you no longer have to fiddle with installing the correct drivers, as you did in Windows 95, but that won't do you any good without the right hardware. If your computer doesn't have a USB—most systems more than two years old don't have one—we recommend Entrega Technologies' 2 Port USB Upgrade. Simply plug the card into an empty PCI slot, turn your system on, let Windows 98 do its thing, and presto—you're ready to plug in your new scanner, digital camera, monitor, modem, or other USB device.

Windows 95 OSRs 2.1 and 2.5 provide limited—and problematic—USB support through the USB Supplement. If you have 2.1 or 2.5 and don't want to upgrade to Windows 98, make sure that USB is enabled in your BIOS' system setup program and that any USB device you buy has a Windows 95 driver.

USBReady, available on FileWorld, will examine your system hardware, OS version, and drivers, and identify what you need. For information on daisy-chaining USB devices—and determining whether your system is even ready for USB—see this month's *Hardware Tips*, page 274.

- **2 Port USB Upgrade;** $40 list; Entrega Technologies; 949/859-8866; www.entrega.com

PRODUCT INFO NO. 642

Q **95** **98** How do I connect multiple devices to one USB port?

A In theory, USB allows you to daisy-chain up to 127 peripherals in either Windows 95 or 98. The problem is, most USB devices don't provide an extra port for this type of connection, and even if they did, multiple devices attached to the same USB port would quickly overload its power supply. Consider purchasing a USB hub, such as one of the products available from ADS or Entrega Technologies, to expand a single USB port into four or more separate ports. Be sure to check for compatibility—not all hubs can be installed on a Win 95 system; with Win 98, you can take your pick. Installation is a breeze: Just attach the hub to one of your USB ports using the cable provided.

- **4 Port USB Hub;** $80 list; Entrega Technologies; 949/859-8866; www.entrega.com

PRODUCT INFO NO. 643

- **USB Hub;** $70 list; ADS Technologies; 800/888-5244; www.adstech.com

PRODUCT INFO NO. 644

Q **98** What's the best way to troubleshoot hardware conflicts that occur after I've installed new devices?

A Sure, Windows 98 has improved hardware compatibility, but Plug and Play is still a work in progress. If you have problems booting into Windows after installing new hardware, Windows 98 allows you to temporarily disable the driver so you can find the conflict. ▶

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*Bandwidth based on graphics to main memory. ‡Requires additional software under Windows NT Workstation 4.0. **I/O bandwidth as compared to 32-bit PCI. ††For information on the 1999 availability of the Silicon Graphics 540 workstation, please call 1 888 SGI-4291. Prices quoted are for U.S. only.

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Select *Start•Programs•Accessories•System Tools•System Information Utility*, and then *Tools•Automatic Skip Driver Agent*. When you reboot, Windows will disable the driver that failed, and the Skip Driver Agent will identify it, but you'll still have to identify the problem. To do so, right-click *My Computer*, click *Properties•Device Manager*, and check the properties of devices with problems (such as an interrupt conflict). You can then reenable the driver and try booting again.

Q 95 98 Graphics seem to load really slowly on my PC. How can I improve my monitor's performance?

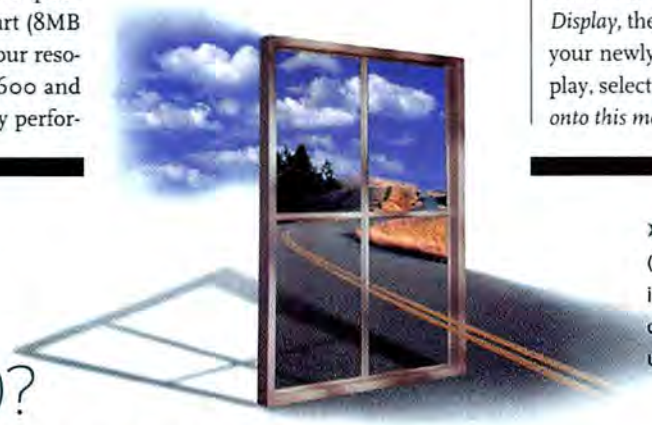
A Unless you work with a lot of complicated graphics, such as photographs, or have a state-of-the-art (8MB or higher) graphics card, keep your resolution and color set to 800 by 600 and 256 colors for maximum display performance. (The fewer dots and colors Windows has to work with, the faster it can redraw each screen.) In Windows 95, click *Start•Settings•Control Panel•System*, select *Display*, then click the *Settings* tab and make the necessary changes.

If you've got Windows 98, the fix is much simpler. In the System Tray to the right of the taskbar, you'll see an icon that looks like a monitor. Click it once and select the desired resolution/color setting combination from the pop-up list—*800 x 600 256 Colors* should do the trick. Windows 95 users aren't out of luck. They can get the same feature by installing TweakUI, which is available as a free download from FileWorld.

Q 98 How can I use two monitors with my PC at the same time?

A Windows 98 allows you to use up to nine—count 'em, nine—monitors at the same time. But that's only if all the graphics cards on your system (you'll need one for each monitor) support multiple-monitor display. So before you run out and buy a brand-new monitor and a 16MB AGP graphics card, check your current card against Microsoft's listing of compatible PCI and AGP graphics cards at support.microsoft.com/support/kb/articles/q188/4/81.asp. If your card is not on the list, you're going to have to purchase *two* brand-new cards.

If you've installed the right hardware, select *Start•Settings•Control Panel•System•Display*, then click the *Settings* tab. Choose your newly installed monitor under Display, select *Extend my Windows 98 desktop onto this monitor*, then click *OK*. ▶



Should You Wait for Windows 2000?

SOONER OR LATER, whether you like it or not, you'll need to upgrade your operating system. Sure, there are still a few folks out there using the DOS version of WordPerfect 5.1 on 286 systems of 1990 vintage, but you can bet they're not doing much Web browsing or file sharing.

Still, not all upgrades are necessary. Indeed, some are downright gratuitous. For instance, Windows 98 may seem particularly unattractive if you're a Windows 95 user with your eyes on Microsoft's next-generation operating system, Windows 2000. After all, who wants to upgrade their operating system twice in a year? (The smart money says that Windows 2000 will ship sometime in early 2000.) So here's our best upgrade advice for you fence-sitters, long may you straddle.

Windows 95 is still for you if...

➤ you're planning to eventually move to Windows 2000 and don't want to suffer through back-to-back upgrades.

➤ you're worried about bugs in Windows 98. Remember, though, that a Service Pack intended to fix many of the known bugs should be available by the time you read this.

➤ your PC is three or more years old and doesn't support Universal Serial Bus.

➤ you have plenty of hard disk space (Windows 98's FAT32 can "create" more space on your existing drive).

Windows 98 is for you if...

➤ you're in no rush to upgrade to Windows 2000 when it comes out. That operating system's expected security and stability enhancements, as well as its pure 32-bit kernel, may mean nothing to you if your current system behaves exactly as you want it to.

➤ your system is equipped with a USB port and you're eyeing a new USB printer, scanner, modem, or other peripheral.

➤ you want to take advantage of FAT32 to squeeze out a little more usable space on your hard disk.

➤ you're getting a new computer. (Guess what? You have no choice in the matter—all new Pentium-class PCs come with Windows 98 unless you request NT.)

Windows 2000 is for you if...

➤ you're patient. Microsoft has a history of late-to-market operating systems. The folks in Redmond have suggested Windows 2000 will ship this year. We're not so sure.

➤ you're an NT 4.0 user. Windows 2000 is simply the next version of Windows NT, but with a warm and fuzzy name. According to Dan Kusnetzky, director for operating environments and serverware at the research firm International Data Corporation, Microsoft came up with the new name to make the complex, sometimes intimidating OS more palatable.

➤ you need more security. Windows 2000 lets you assign access rights to specific files and folders on your system, an important consideration if others have access to your system.

➤ you crave the stability that a pure 32-bit operating system can provide. Windows 9*x* is a hybrid of 16- and 32-bit subsystems—a compromise that allows backward compatibility with older hardware and software but makes the OS more crash-prone.

—Yael Li-Ron

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MORE GOODIES

Grab Bag

STILL NOT SURE if you should upgrade to Windows 98? Well, go ahead and kick the tires. You can always go back. Here are some tips we couldn't fit elsewhere.

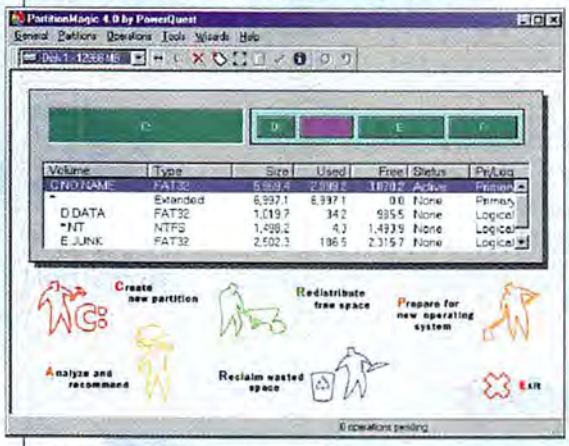
Q 95 How can I tell which version of Windows 95 I'm using?

A What features you have depends on which Service Release of Windows 95 you're using. To find out, right-click *My Computer* and select *Properties*; under the General tab you'll see the version number. If that number is 4.00.950, you have the original; 4.00.950a means your version's been updated with Service Pack 1; and if it's 4.00.950b, you have the OSR2 (OEM Service Release 2) version.

Q 95 98 How can I install Windows 98 and FAT32 but still retain the option of switching back to Win 95 ?

A You can do this with PartitionMagic (see page 107 for buying information). By creating hard disk partitions, you trick Windows into thinking that you have separate hard disks, so it won't delete the files needed to restore Windows 95. After installing Windows 98, use PartitionMagic to convert to FAT32. To do so, select *Start•Partition Magic by PowerQuest•PartitionMagic*. When you are prompted, click *Yes* to switch to MS-DOS mode. In PartitionMagic, select *Advanced•Advanced FAT Properties*. From the Partition Type menu, choose *FAT32*. If you wish, set the cluster size; click *OK* to start the conversion. If you later decide that you want to return to Windows 95, use PartitionMagic to convert the drive back to FAT16, then uninstall Windows 98 as described in the *Getting Started* book.

You can also use PartitionMagic to install Windows 98 in a separate partition, which will enable you to run Windows 95 with FAT16 and Windows 98 with FAT32. If you don't have a spare partition, PartitionMagic can create one. When you select one of the operating systems from PartitionMagic's boot menu, the partition with the other OS is hidden, so both OSs think they're running on the C: drive. This method has a drawback, however: Windows 98 can't access the applications you've installed in Windows 95, so you'll need to install separate copies of your apps for both operating systems.



PARTITIONMAGIC enables you to install Windows 98 and then reconvert to Windows 95 if you don't like the new OS.

MICROSOFT'S FAT32 Conversion Information utility tells you just how much free space you'll gain by running Drive Converter.

Q 98 Should I use Drive Converter to free up space on my hard disk?

A Yes, but be aware that it may also degrade drive performance. In converting a 1GB or 2GB drive from FAT16 to FAT32, Drive Converter *(Start•Programs•Accessories•System Tools•Drive Converter)* breaks each 32KB cluster—in which Windows parcels out disk space to files—into eight 4KB clusters. On 512MB to 1023MB drives, it divides each 16KB cluster in four. (The conversion won't work on smaller drives, and a 2GB drive is the largest that FAT16 can create.) Since every file, no matter how small, uses at least one whole cluster, this reallocation causes a significant gain in drive space. Unfortunately, more clusters means more information for Windows to track, and some disk-intensive operations such as defragging may take twice as long after conversion.

You can free up more than half the space with less slowdown by using Drive Converter's command-line version, which allows you to override the default cluster size. First, make a full backup and restart in MS-DOS. For a 512MB to 1023MB C: drive, enter **cvt c: /cvt32 /16** for 8KB clusters; for a 1GB to 2GB drive, use **cvt c: /cvt32 /32** for 16KB clusters.

Q 95 98 How can I install both Windows 95 and 98 on the same PC?

A Windows 98 can get along fine with Windows 3.1, NT 4.0, and even Linux, but it wasn't designed to coexist with Windows 95. The easiest way around that limitation is V Communications' System Commander 98. This utility creates a copy of your existing Windows 95 setup, which you can then upgrade to Windows 98 in the usual way. All of your settings are preserved, and you don't have to reinstall your apps, but you *must* use the upgrade version of Windows 98, and when you reach the Win 98 installation's Save System Files dialog, select *No*—there's no reason to back up the copied Win 95 files, since System Commander 98 preserves the originals. If you decide to uninstall Windows 98, System Commander 98 can handle that job too—or if you decide to run Windows 98 full-time, you can use System Commander 98 to delete Windows 95 and free up disk space.

• **System Commander 98; $20 street; V Communications; 800/648-8266; www.v-com.com**

PRODUCT INFO NO. 645

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Tim Boone, Matt Lake, Robert Lauriston, and Valerie Ryan are freelance writers. Yael Li-Ron is an executive editor for PC World. ■

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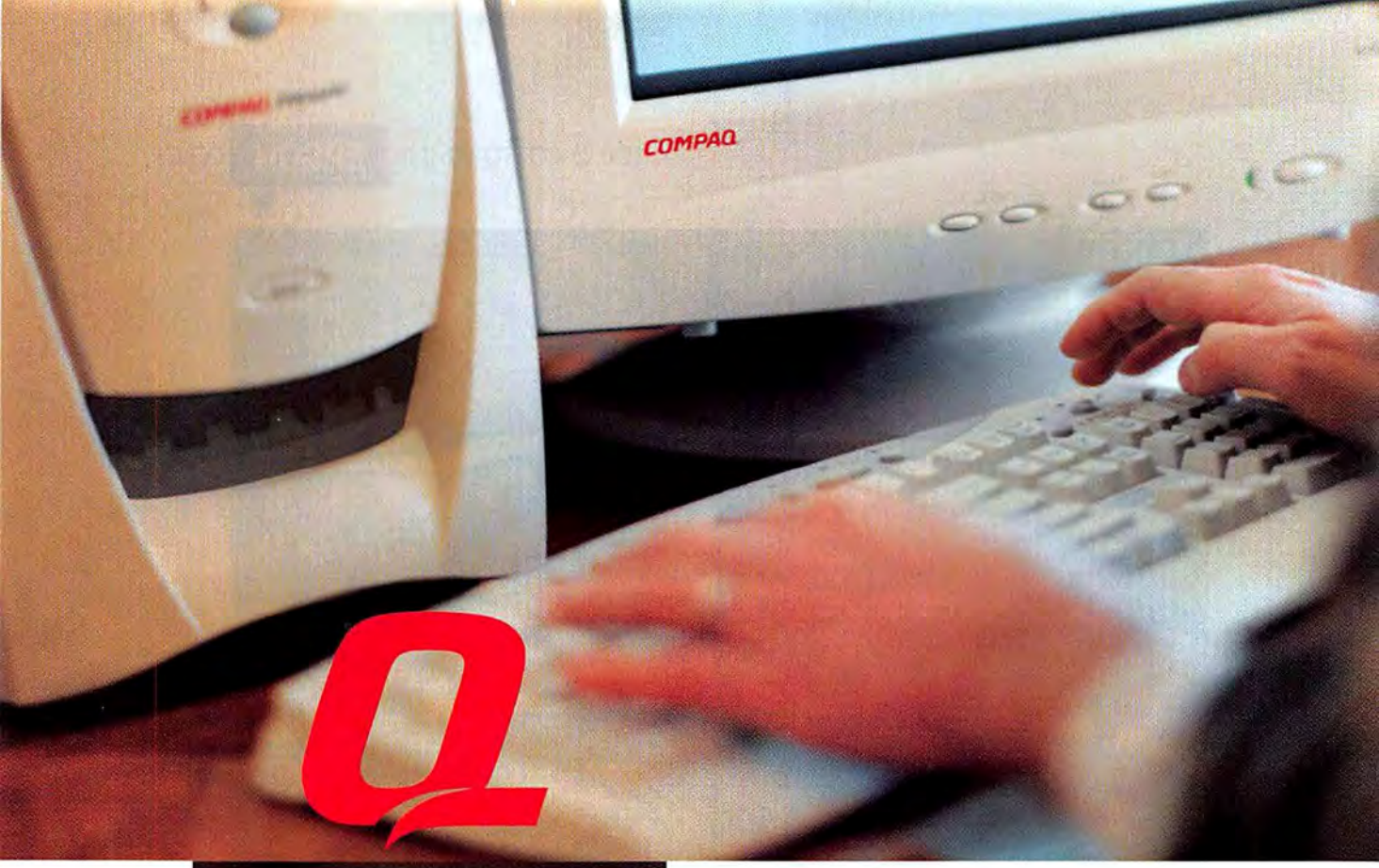

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128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB	128 MB SyncDRAM expandable to 384 MB	64 MB SyncDRAM expandable to 384 MB
13.0 GB UltraDMA Hard Drive[1]	13.0 GB UltraDMA Hard Drive[1]	13.0 GB UltraDMA Hard Drive[1]	10.0 GB UltraDMA Hard Drive[1]
6X DVD-ROM Drive[5]	32X Max CD-ROM Drive[4]	52X True X CD-ROM Drive[4]	6X DVD-ROM Drive[5]
Diamond Viper 550 AGP w/16 MB SDRAM	2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM	2X AGP Graphics w/8 MB SDRAM
Aureal 8820 PCI Audio Card	Aureal 8820 PCI Audio Card	Aureal 8820 PCI Audio Card	Aureal 8820 PCI Audio Card
56K ITU V.90 Modem[6]	56K ITU V.90 Modem[6]	56K ITU V.90 Modem[6]	56K ITU V.90 Modem[6]
JBL Pro Premium Speakers w/Subwoofer	JBL Pro Speakers	JBL Pro Premium Speakers w/Subwoofer	JBL Pro Premium Speakers w/Subwoofer
Digital Creativity Imaging Center[2]	Digital Creativity Imaging Center[2]	Digital Creativity Imaging Center[2]	Digital Creativity Imaging Center[2]
TriLevel Cache—1.3 MB	10 Mbps Ethernet Port, Cable Modem Ready[7]	TriLevel Cache—1.3 MB	TriLevel Cache—1.3 MB
Microsoft Office 97 Small Business Edition®	Microsoft Featured Home Collection	Microsoft Featured Home Collection	Microsoft Featured Home Collection
Microsoft Windows98	Microsoft Word	Microsoft Word	Microsoft Word
Compaq CV915 19" Monitor (18.0" VIA)	Microsoft Windows98	Microsoft Windows98	Microsoft Windows98
	Compaq V720 17" Monitor (15.9" VIA)	Compaq V720 17" Monitor (15.9" VIA)	Compaq V720 17" Monitor (15.9" VIA)
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19-Inch Monitors

BY SUSAN SILVIUS

Flat-Out FABULOUS

NOT LONG AGO, only design and imaging professionals could afford the extravagance of a large display, but today falling prices and new technologies make 19-inch monitors a compelling choice even for office-bound mortals. Not only do 19-inch displays offer dramatically more viewable area than their 15- and 17-inch counterparts, but the newest CRTs also feature technological innovations like flatter picture tubes and reduced-depth cases.

To help you decide which 19-inch monitor is right for you, we tested 24 models. We ran each monitor through extensive image-quality tests, and then analyzed its features, price, service and support policies, ease of use, and compliance with emission standards. Two of the tested monitors earn Best Buys. Dell's UltraScan P990 grabs first place on the strength of its great $549 price, nicely balanced picture quality, and mainstream business capabilities. Mitsubishi's $799 Diamond Pro 900u claims the second slot, courtesy of its new flat screen, ▶

Today's 19-inch models sport **flatter screens, lower** price tags, and **fantastic** image quality.

PHOTOGRAPHS BY MICHAL VENERA

Universal Serial Bus hub, and advanced controls. It should appeal to those who work with graphics-intensive applications.

THE REST OF THE BEST

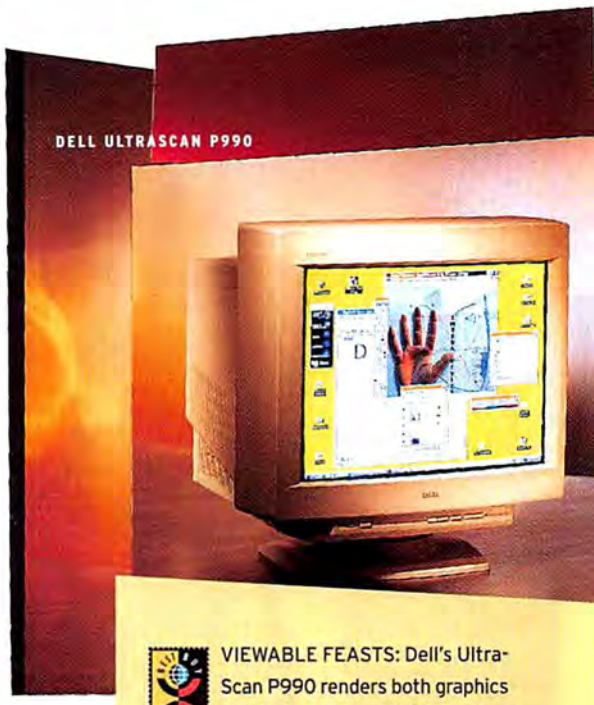
MODELS ROUNDING out the Top 10 list include the Sony Multiscan CPD-420GS, NEC MultiSync FP950, IBM P92, Princeton AGX 900, ViewSonic PT795, Iiyama Vision Master 450, Samsung SyncMaster 900p, and Compaq V900. Each monitor, ranging in price from $449 to $999, excels in at least one key area, such as text or graphics quality, price, ease of use, or support policies. The sixth-place Princeton AGX 900, for example, provides the best image quality for the price after the Dell UltraScan P990. The Compaq V900, bringing up the rear, offers exceptional tech support, including a three-year warranty, 24-hour toll-free phone support, and one year of free on-site service.

BEYOND THE TOP 10

NOTEWORTHY ALSO-RANS include Panasonic's newest flat-screen PanaSync SL90, a near miss for the tenth spot. The PanaSync was held back by its undistinguished text quality and lack of advanced features, such as USB connectivity and focus controls. Various factors barred 13 other models from the chart, despite some attractive prices and compelling feature sets. Even with prices below $600, lackluster image quality on text documents, graphic images, or both kept the AcerView 99c, CTX VL 950S, Hewlett-Packard M900, Mag InnoVision XJ810, Sampo AlphaScan 800S, and Sceptre Dragon Eye D97A from Top 10 territory. The Dragon Eye D97A's ranking also suffered from Sceptre's 9 hours of weekday phone support—the second skimpiest we saw—though the firm's generous five-year warranty prevented it from faltering further.

The sleek Nokia 446XS missed the Top 10 due to its high price ($899) and unimpressive graphics quality, although it received excellent marks for having three USB ports and for its futuristic design, an ergonomic cut above the rest. Nokia builds the 446XS's cabinet around a shorter and wider CRT tube, complete with a shallow case.

Two other chart-missers, the $699 ViewSonic MB90 and $649 Philips Brilliance 109, each come with integrated microphone and speakers, a boon for small-office/home-office workers who want multimedia features but don't need per-



VIEWABLE FEASTS: Dell's UltraScan P990 renders both graphics and text well, and at $549, it's a terrific value. Mitsubishi's $799 Diamond Pro 900u offers the latest in 19-inch monitor technology—a flat CRT screen, a wide array of on-screen controls, and a front-mounted port for USB devices.

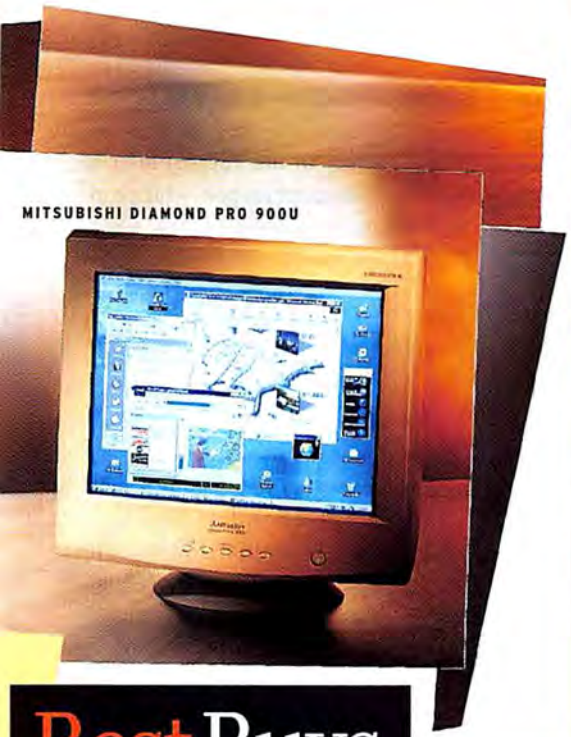
TOP 10 MONITORS — FEATURES COMPARISON

	19-INCH MONITOR	Street price (2/1/99)	Overall rating [1]	Quality of text/ graphics	Tube manufacturer	Pitch type (mm)	Rated/tested viewable area (inches)	Max. refresh rate at 1024 by 768/ 1280 by 1024 (Hz)	Depth (inches)	BNC [2] input
1	Dell UltraScan P990 800/289-3355 www.dell.com	$549	86	very good/ very good	Sony	.25/.27 variable stripe [4]	18/17.8	119/90	18.2	○
2	Mitsubishi Diamond Pro 900u 800/843-2515 www.mitsubishi-display.com	$799	85	very good/ excellent	Mitsubishi	.25/.27 variable stripe [4]	18/18	117/88	18	●
3	Sony Multiscan CPD-420GS 800/352-7669 www.sonypc.com/display	$649	82	good/ excellent	Sony	.25/.27 variable stripe [4]	18/18	85/85	18	○
4	NEC MultiSync FP950 800/632-4636 www.nectech.com	$899	82	very good/ excellent	Mitsubishi	.25/.27 variable stripe [4]	18/18	136/102	17.6	●
5	IBM P92 800/426-7255 www.pc.ibm.com/us/accessories	$799	81	very good/ excellent	Sony	.25/.27 variable stripe [4]	17.9/17.9	131/85	18.8	○
6	Princeton AGX 900 800/747-6249 www.prgr.com	$549	81	very good/ very good	Sony	.25 stripe	17.9/17.7	116/88	18.7	○
7	ViewSonic PT795 800/888-8583 www.viewsonic.com	$999	81	very good/ excellent	Mitsubishi	.25/.27 variable stripe [4]	18/18	133/101	18.1	●
8	Iiyama Vision Master 450 800/394-4335 www.iiyama.com	$599	81	good/ very good	Hitachi	.26 dot	18/17.6	120/100	17.6	●
9	Samsung SyncMaster 900p 800/933-4110 www.sosimple.com	$449	80	good/ good	Hitachi	.26 dot	18/18	119/90	19.4	●
10	Compaq V900 800/345-1518 www.compaq.com	$649	78	good/ very good	Hitachi	.26 dot	18/18	85/85	17	○

Best Buy ● Yes ○ No

[1] For more information on how we tested monitors in this review, go to www.pcworld.com/may99/monitors.

[2] Specialized connector used with some high-end graphics cards for complex graphic design and publishing.



Best Buys

fect sound. But neither monitor scored well enough overall to make the Top 10. Among other things, an awkwardly placed power switch and huge cabinet hindered the Philips model, whereas the ViewSonic's colors appeared overly saturated.

Finally, a combination of above-average prices (up to $789), a dearth of advanced features, and/or tepid graphics quality kept the Cornerstone P1400, Eizo Nanao FlexScan FX-D7, Hitachi SuperScan Elite753, and NEC E900+ from cracking the Top 10 list. For reviews of these and other displays that did not make the Top 10, go to www.pcworld.com/may99/monitors.

PRICES PLUMMET

THE AVERAGE street price of 19-inch monitors these days is about $650—almost a third lower than the average price six months ago. Prices for the 24 units we evaluated in this review range from $429 to $999. But most users will want to think hard before deciding on the least expensive offering, Sampo's AlphaScan 800S. The AlphaScan produces unrealistic colors, and the company offers only 10 hours of weekday tech support. If price is your prime priority, check out Samsung's $449 SyncMaster 900p, which grabbed ninth place thanks to its low price, solid image quality, and around-the-clock support.

At the other end of the price spectrum, an elite class of graphics monitors offer pinpoint image accuracy, built-in connectivity, and fantastic color fidelity. But of course, you pay for these benefits: The $999 ViewSonic PT795—the most expensive professional-class model we reviewed—costs more than some 21-inch displays (see "Real Estate Bargains: Budget 21-Inch Monitors," page 148). But even the first-class 19-inchers include some relatively good deals: The number-two Mitsubishi Diamond Pro 900u delivers stellar graphics quality, yet at $799 costs $200 less than the ViewSonic.

SHAPING UP: SHORTER NECKS, FLATTER SCREENS

THE NEWEST monitor buzzword, *short-neck*, refers to technology that permits a shallower tube and—theoretically at least—saves desktop space. Alas, not every vendor makes good use of this innovation. The fifth-place IBM P92, for example, uses a short-neck tube but encases it in the second-largest cabinet here.

Still, if free desktop space eludes you, consider a monitor with reduced depth, though you'll save only about two inches of desk space on average. The shortest-depth monitor among the Top 10, Compaq's V900, measures just 17 inches deep. A handful of other displays beyond the ▶

	On-screen controls						Compliance		Support			
USB ports (upstream/downstream)	Screen position and size	Pincushion/barrel	Trapezoid/keystone	Focus/convergence	Image tilt/manual degauss	Color temperature/RGB control	MPR-II low emission	TCO shielding ('95/'99)	Warranty (years)	Toll-free support hours	Weekend support	Product info number [3]
0/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	1[5]	24	●	–
2/3	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	12	●	625
0/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	24	●	626
1/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'99	3	12.5	○	627
0/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	11[6]	○	–
0/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	24	●	628
1/4	●/●	●/●	●/●	●/●	●/●	●/●	●	'99	3	11	○	629
0/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	12	○	630
0/0	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	24	●	631
1/2	●/●	●/●	●/●	○/●	●/●	●/●	●	'95	3	24	●	632

[3] For more information about all products in this table, select product info no. 903, or visit www.pcworld.com/productinfo.

[4] Uses an aperture grille tube with a variable stripe pitch of .25mm at the center and .27mm around the perimeter.

[5] Three years if purchased with a Dell system.

[6] Automated after 5 p.m. PST.

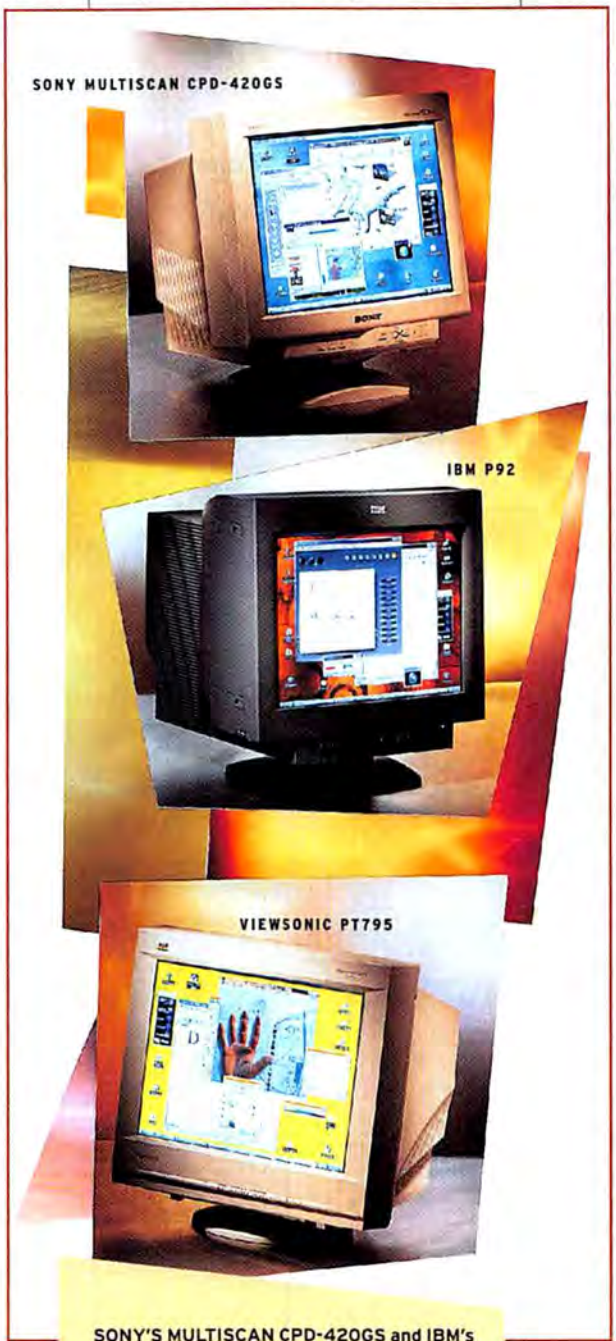
Top 10 (including the Cornerstone P1400, CTX VL 950S, Nokia 446XS, and Panasonic PanaSync SL90) feature cases shallower than 17 inches. The Nokia and Panasonic use shorter-yoked tubes, while the CTX and Cornerstone minimize case depth by rearranging and miniaturizing the internal components. If having enough space concerns you, measure your work surface and ask the sales rep about a monitor's depth before buying it.

VARIATIONS ON THE THEME OF FLAT

YOU MIGHT ASSUME that *flat* means lacking three-dimensional curves, but in the realm of monitor tubes, it's more abstraction than geometric reality. All the vendors here describe their monitors with some variant on the word *flat*—flat-square, optically flat, perfect flat, or vertically flat—though all the screens are curved to a degree. At present, no industry standard defines *flat*, so variances abound.

Three of the units we reviewed feature the newest generation of flat screens, and they shine. Mitsubishi's Diamond Pro 900u, NEC's MultiSync FP950, and ViewSonic's PT795 use a variation of Mitsubishi's Diamondtron tube. IBM's P92 and Sony's Multiscan CPD-420GS employ Sony's Trinitron vertically flat tube. Though the IBM and Sony screens display a slight degree of curvature on the outside glass, image quality is comparable to that provided by the Diamondtron. None of these five displays showed any pronounced visual distortion, and all eliminate the concavity of older-generation "flat-screen" monitors such as Panasonic's PanaFlat PF70. All five grab a spot on the Top 10 chart, earning excellent scores for rendering images with color accuracy and pronounced 3D effects.

These new flatter tubes offer two distinct advantages over old-style CRTs: There's virtually no reflected glare to tire your eyes and little if any detectable curvature around the edges of the image. Spreadsheets appear square and symmetrical, and color images look as though they were laid out on a piece of photographic paper—an improvement over earlier "flat" CRTs. As such, the newer flat-screen CRTs are better for graphic artists or others who need to work extensively with complex images.



SONY'S MULTISCAN CPD-420GS and IBM's P92 feature a vertically flat tube, whereas ViewSonic's PT795 sports the newest flat CRT. Each monitor displays colors vividly.

CONNECTIONS AND COMPLIANCE

EIGHT OF THE monitors we reviewed (including four in the Top 10) offer at least one USB upstream port, which connects the monitor to the PC and allows you to adjust settings through a Windows 98 utility. Some designs also feature downstream ports for attaching USB peripherals like scanners, printers, or videoconferencing cameras. Some monitor vendors provide optional stand-alone hubs, most of which cost less than $100 (see "To USB or Not to USB: Weighing the Pros and Cons," page 145, for more on this).

In addition, two monitors here—NEC's MultiSync FP950 and ViewSonic's PT795—comply with the latest and strictest TCO'99 emissions standards. TCO'92 and TCO'95 set limits on manufacturing plant emissions as well as on the use of toxic substances such as lead and mercury in the fabrication process. TCO'99 also lowers acceptable levels of reflective glare, inconsistencies in color temperature and uniformity, and screen jitter—all of which can produce stress associated with eye fatigue.

SHOULD A BIG SCREEN BE ON YOUR DESKTOP?

THE NEW VANGUARD of 19-inch displays offer smaller footprints, flatter screens, lower prices, and less glare than ever before. Our Top 10 chart includes a monitor for every kind of user—from number cruncher to home-office professional to computer-aided design specialist. Monitors from Compaq, Dell, Iiyama, Princeton, Samsung, and Sony represent solid choices for buyers with an eye on the bottom line, while the IBM, Mitsubishi, NEC, and ViewSonic displays focus on excellent graphics quality in the high-rent district. Whether you need picture-perfect images or worry that your wallet will be flatter than your screen, there's never been a better time to buy. ▶

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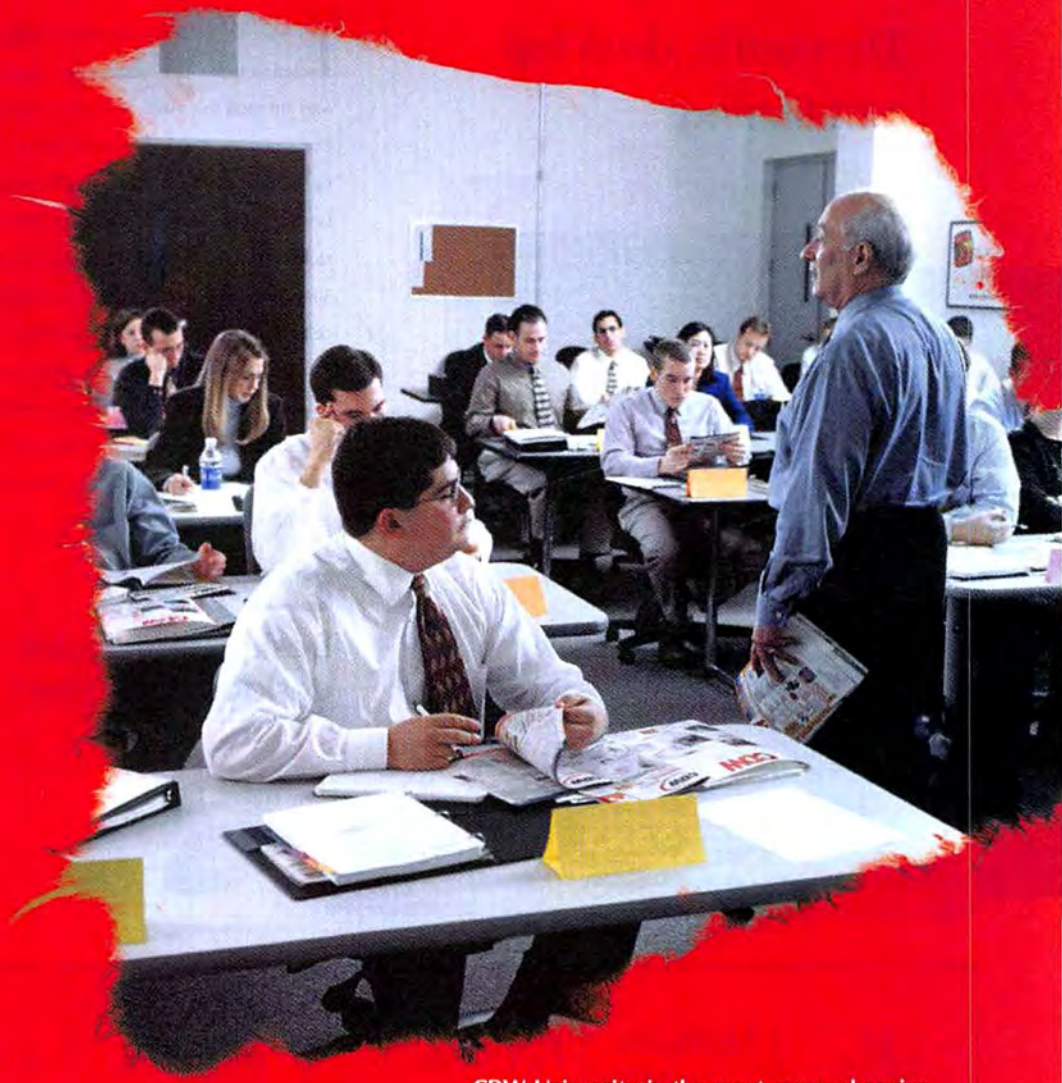

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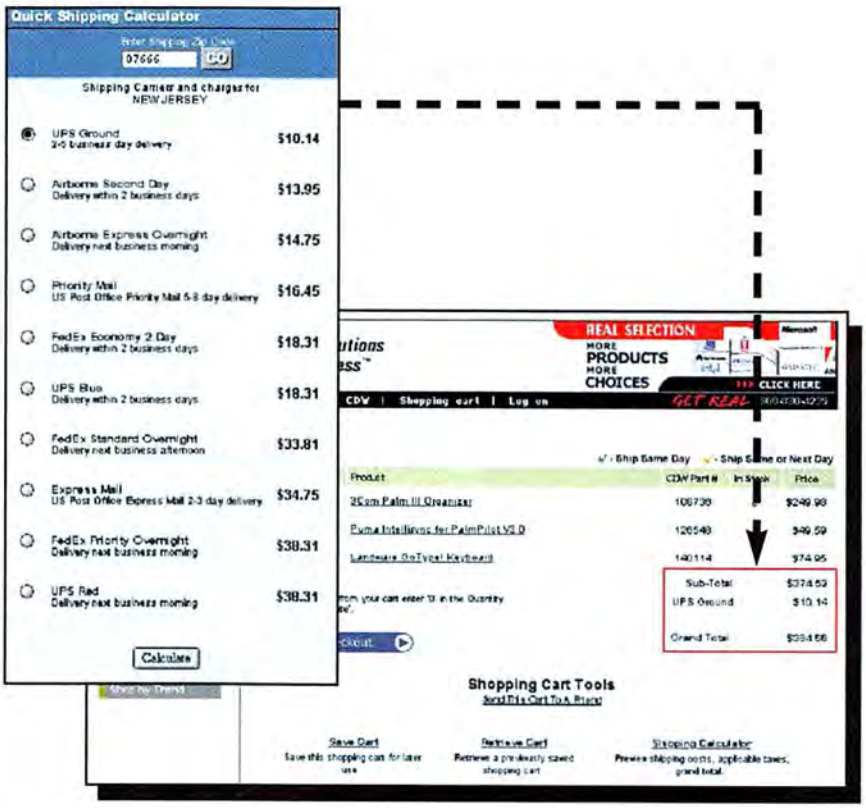

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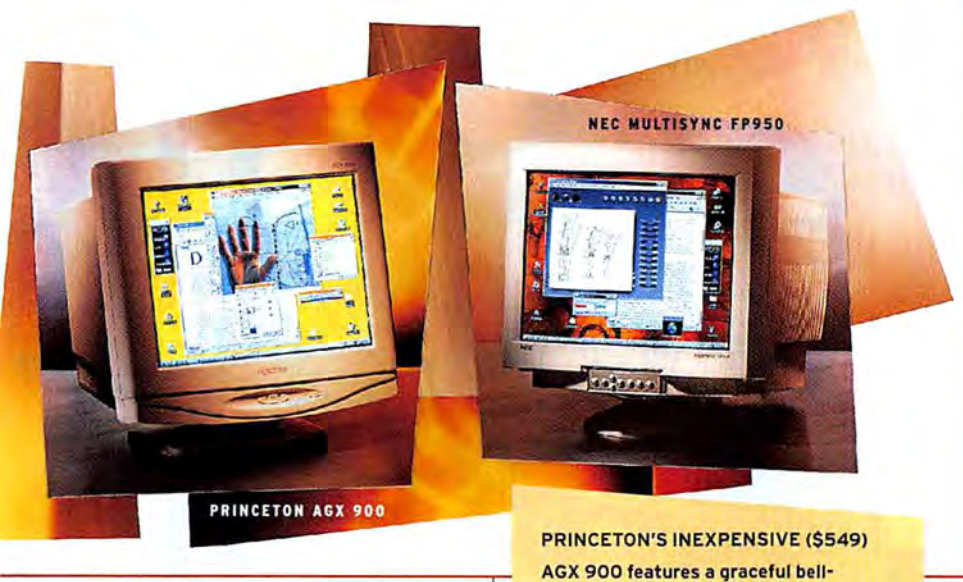


PRINCETON'S INEXPENSIVE ($549) AGX 900 features a graceful bell-shaped front bezel while NEC's pricey ($899) MultiSync FP950 offers the newest-generation flat screen.

1 Dell UltraScan P990

What's Hot Inexpensive ($549), displays text and graphics well, one button lets you center and resize images.

What's Not Lacks advanced features like BNC input (a connector used with some high-end graphics cards) and focus controls; enhanced viewing modes don't boost image quality; brief one-year warranty (three years if you also purchase a Dell system).

Image Quality Strong text and graphics quality indicate this model's versatility with business-oriented apps.

Best For Business and home users.

2 Mitsubishi Diamond Pro 900u

What's Hot Elegant design; comes with advanced features (such as a front-mounted USB port); top-notch graphics quality along with very good text quality; new, flatter Diamondtron tube helps keep focus consistently sharp across the entire screen.

What's Not Steep price ($799); phone support comes with limited hours; digital controls for common functions have overly technical names (for example, "PCC-AMP" for pincushion).

Image Quality Displays text commendably but really shines on graphics—of all the monitors evaluated for this roundup, the 900u placed first on our graphics tests for bright, realistic colors.

Best For Exacting power users who need the best graphics quality and who are willing to pay for it, or those who want to connect USB devices. ▶

To USB or Not to USB

WEIGHING THE PROS AND CONS

HAMLET DIDN'T LOSE SLEEP over whether to buy a monitor equipped with the Universal Serial Bus, but you might. Adding $50 or more to a monitor's price—plus the cost of buying compatible peripherals—USB is typically found only on premium monitors.

A third of the units we reviewed include some form of USB connectivity, but most buyers don't consider the option a priority yet, according to Stanford Resources, a monitor research organization. Analysts there estimate that fewer than one-fifth of the monitors purchased in the first half of 1999 will have USB connectivity.

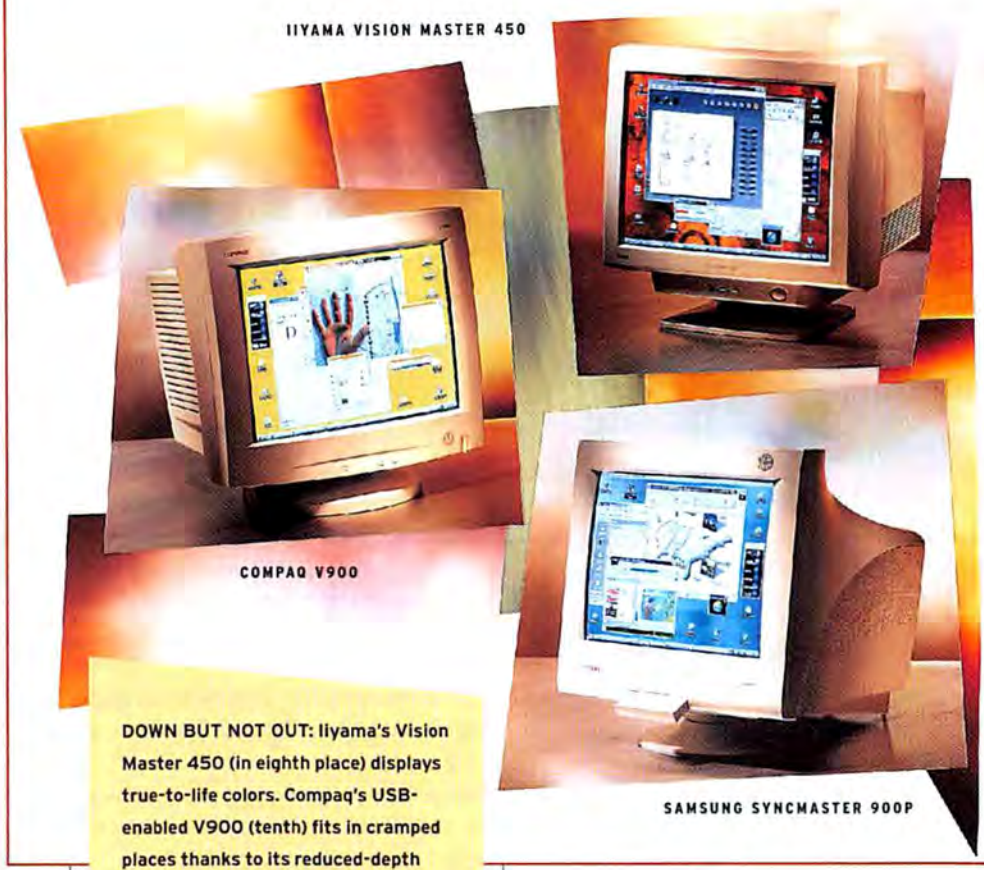
USB came of age only recently with the release of Windows 98, which made USB truly Plug and Play and devices simpler to add. Late versions of Windows 95 supported USB, but compatibility was as predictable as the stock market.

The most practical USB configurations sport an integrated active hub with up to four downstream ports for attaching USB peripherals directly to the monitor. Older devices that lack a USB interface can't connect to your monitor's USB ports—and if you've got old devices, usually the cost of buying compatible peripherals far outweighs the benefits.

The Mitsubishi Diamond Pro 900u, which snagged a second-place Best Buy, and the Nokia 446XS, which failed to make the Top 10, provide the best-designed USB implementations among the monitors we tested. Both have an adjustment-control utility that's a convenient alternative to front-mounted controls. Nokia's design has three downstream ports on the lower right front. Mitsubishi's has two downstream ports around back; a third swings down from a retractable wedge in front.

If you can't decide if a USB monitor is for you, you can get a stand-alone USB hub and attach devices that way. In the end, whether to buy a USB monitor will depend on how much you're willing to spend for ease of use.

ONE SOLUTION to the to-USB-or-not-to-USB dilemma: NEC's $79 IntelliBase, a replaceable pedestal with an active USB hub installed. It's compatible with some MultiSync FP models (including the FP950).



DOWN BUT NOT OUT: Iiyama's Vision Master 450 (in eighth place) displays true-to-life colors. Compaq's USB-enabled V900 (tenth) fits in cramped places thanks to its reduced-depth case. Samsung's SyncMaster 900p (ninth) is the least expensive here.

3

Sony Multiscan CPD-420GS

What's Hot Gorgeous colors, three picture enhancement modes; on-screen controls are logically organized and easy to navigate.

What's Not Expensive for a non–Sony Trinitron display (at $649), although the price is average overall; lacks high-end features such as BNC connectors; refresh rates are adequate but are lower than some other monitors'.

Image Quality Top-notch results on our graphics-based tests, but scores for text and spreadsheets trailed those of other Top 10 monitors.

Best For Graphics and video users with an eye toward motion and color rather than text, or those performing less rigorous word processing and spreadsheet tasks.

4

NEC MultiSync FP950

What's Hot Excellent colors, especially on photos; features a new-generation flat-screen CRT and a full range of adjustment controls with straightforward names; highest refresh rates among the Top 10 monitors at 1280 by 1024 resolution; complies with superstrict TCO'99 emission and ergonomic standards.

What's Not At $899, pricey for what you get; lacks USB downstream ports, so you can't attach peripherals without an optional hub (which costs $79); a mere 12.5 hours of phone support on weekdays only.

Image Quality Performs admirably on text, and among the best on graphics.

Best For Those who work primarily with graphics and image-editing applications.

5

IBM P92

What's Hot Available in two case colors—off-white and stealth black; terrific color quality; controls include all the basics as well as zoom and autosizing functions.

What's Not Above-average price of $799; does not include USB and BNC connectors; buttons and icons for on-screen controls are microscopic, making picture adjustments cumbersome.

Image Quality A virtuoso at displaying graphics, and very good with text.

Best For Image editors and Web designers; also good for the corporate crowd for creating newsletters and spreadsheets.

6

Princeton AGX 900

What's Hot Among the least expensive displays on the chart at $549; combines consistently good image quality with style and functionality.

What's Not On-screen controls require extra button-pressing before taking effect; slight curvature along the screen's edges.

Image Quality Small text appears sharp and easy to read, colors look lush, and 3D effects are impressive on photographs. However, focus deteriorates a bit at the extreme edge of the screen.

Best For Serious business users and home enthusiasts who are looking for an affordable monitor that handles text and graphic images equally well.

7

ViewSonic PT795

What's Hot New flat-screen CRT has an 18-inch viewable area; best feature set we've seen, including the highest refresh rates (up to 87 Hz at 1600 by 1200 resolution), a well-executed USB hub, and focus controls; complies with TCO'99 standards.

What's Not Most expensive monitor on the chart ($999), paltry 11-hour toll-free support on weekdays only.

Image Quality Very good at displaying text, but strong suit is with graphics.

Best For CAD specialists who need pinpoint image accuracy.

8

Iiyama Vision Master 450

What's Hot Loaded with advanced features such as BNC connectors, maximum refresh rates of up to 100 Hz at 1280 by 1024 resolution, on-screen display menus are clear and well organized.

What's Not Exhibited an uneven focus in our tests that no amount of adjustment would correct, lacks weekend tech support as well as support on some key online services such as AOL and CompuServe. ▶

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Real Estate Bargains

BUDGET 21-INCH MONITORS

THOUGH 21-INCH monitors offer a greater viewable area and support for higher resolutions than their 19-inch cousins, their average price hovers near $1150. A few 21-inch displays, however, cost less than some of the 19-inch monitors we reviewed. To see if cheaper means inferior quality, we tested Dell's $899 M1110 and Princeton's $849 EO2010. They sell for $250 to $300 less than the average 21-inch model, and even cost less than the high-end 19-inchers we tested.

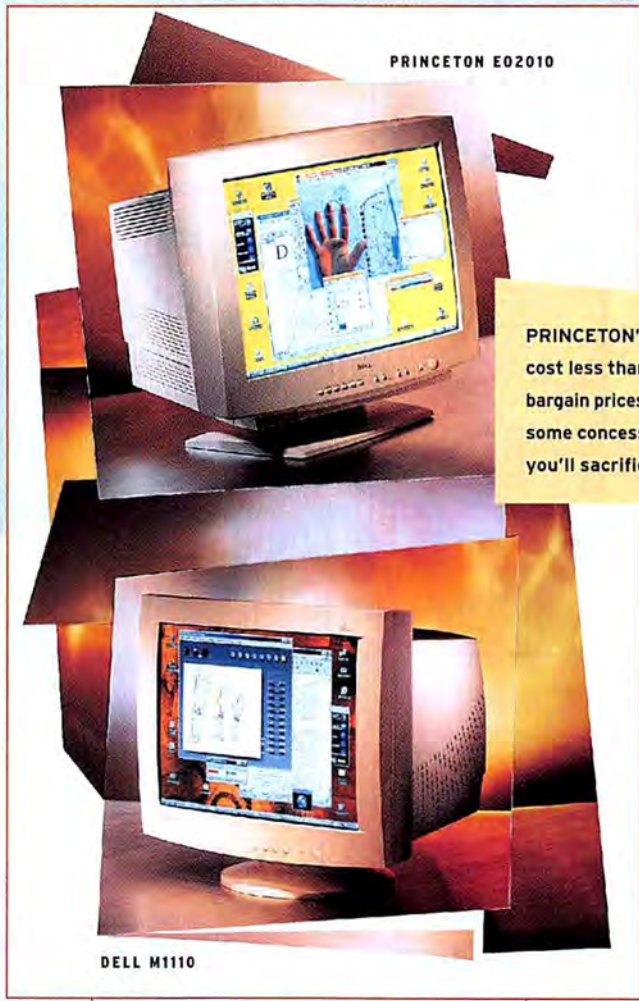
A fast refresh rate at a high resolution can make a 21-inch display tempting, but that attraction proved illusory on the 21-inchers we examined. Neither monitor displayed clear and flicker-free text above resolutions of 1280 by 1024. Of the two, the Dell produced sharper images and is the better choice if you run mostly text-based apps.

The Dell M1110 yielded bright, realistic colors. Although the results aren't on a par with those produced by the best 19-inch displays, the M1110 does a creditable job, suitable for office graphics such as spreadsheet charts. The Princeton unit fared worse. Our sample Web page appeared fuzzy in places, with uneven focus across the screen. And colors on a photo of summer fruit looked artificial.

Neither model offers exact tuning controls—just ones for basic contrast and geometric functions. And neither display comes with advanced features like BNC connectors (for video-out capabilities) or USB ports.

But size is the biggest drawback of these monitors. Each model is nearly 30 percent larger than the average 19-inch display. Dell fits the M1110 into a cabinet 18 inches deep (average by 19-inch display standards), but the plastic housing surrounding the face is huge. The Princeton unit is even bigger.

If you need precision focus for computer-aided design or graphic design, we recommend you stick with the best of the 19-inch crowd, or go for broke with a high-end 21-inch display.



PRINCETON'S EO2010 AND DELL'S M1110 cost less than some 19-inchers. Their bargain prices are attractive, but you'll make some concessions in image quality, and you'll sacrifice precious desktop space.

Image Quality Yields good text overall, but type was fuzzy in some areas; strong color saturation and fidelity on graphics.
Best For Those who work regularly with graphics or photos.

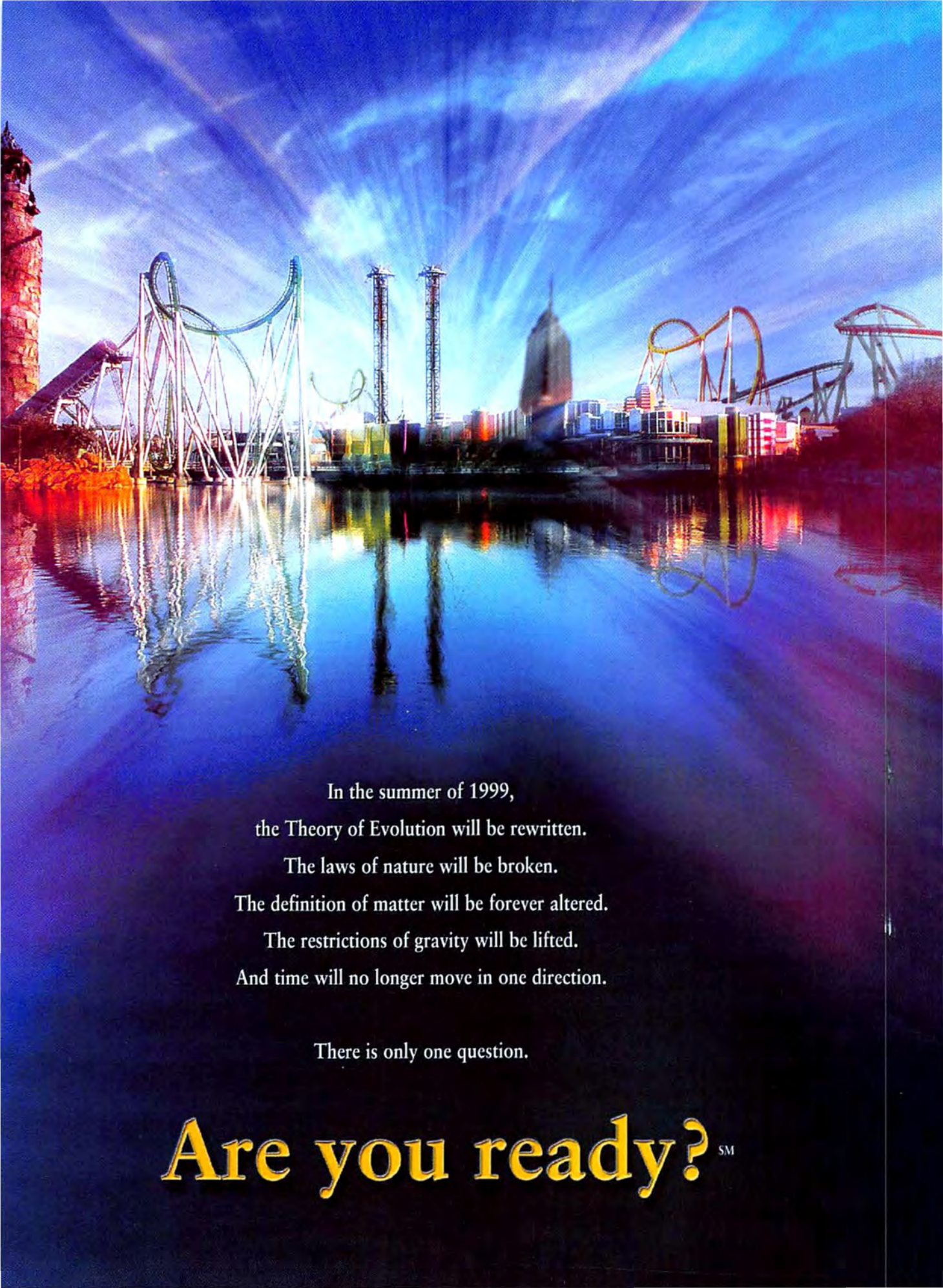
9
Samsung SyncMaster 900p

What's Hot Exceptionally low price ($449); comes bundled with an electronic version of the user guide and Colorific's color matching software—the only monitor reviewed to supply either; includes generous tech support and well-designed on-screen controls.
What's Not Bulky, with the greatest case depth among models in the Top 10; colors pale next to the vibrancy and realism of some costlier, higher-scoring displays.
Image Quality Good but unremarkable performance on both text and graphics.
Best For Bargain hunters who don't require precise image control or the best text and graphics quality.

10
Compaq V900

What's Hot Small and lightweight, the most economical display to offer USB support, includes solid support policies (a three year warranty, 24-hour phone support, and one year of free on-site service).
What's Not Digital, on-screen controls cover the basics, but not advanced settings such as focus control; maximum refresh rates of 85 Hz are adequate but lag behind those of most monitors that made the Top 10.
Image Quality Results on both text and graphics are acceptable, but we found ourselves squinting at the fine print.
Best For General business users.

online *For information on how we tested products for this roundup and for reviews of monitors that did not score high enough to make the Top 10 list, visit www.pcworld.com/may99/monitors. Susan Silvius is a freelance writer living in Northern California.* ■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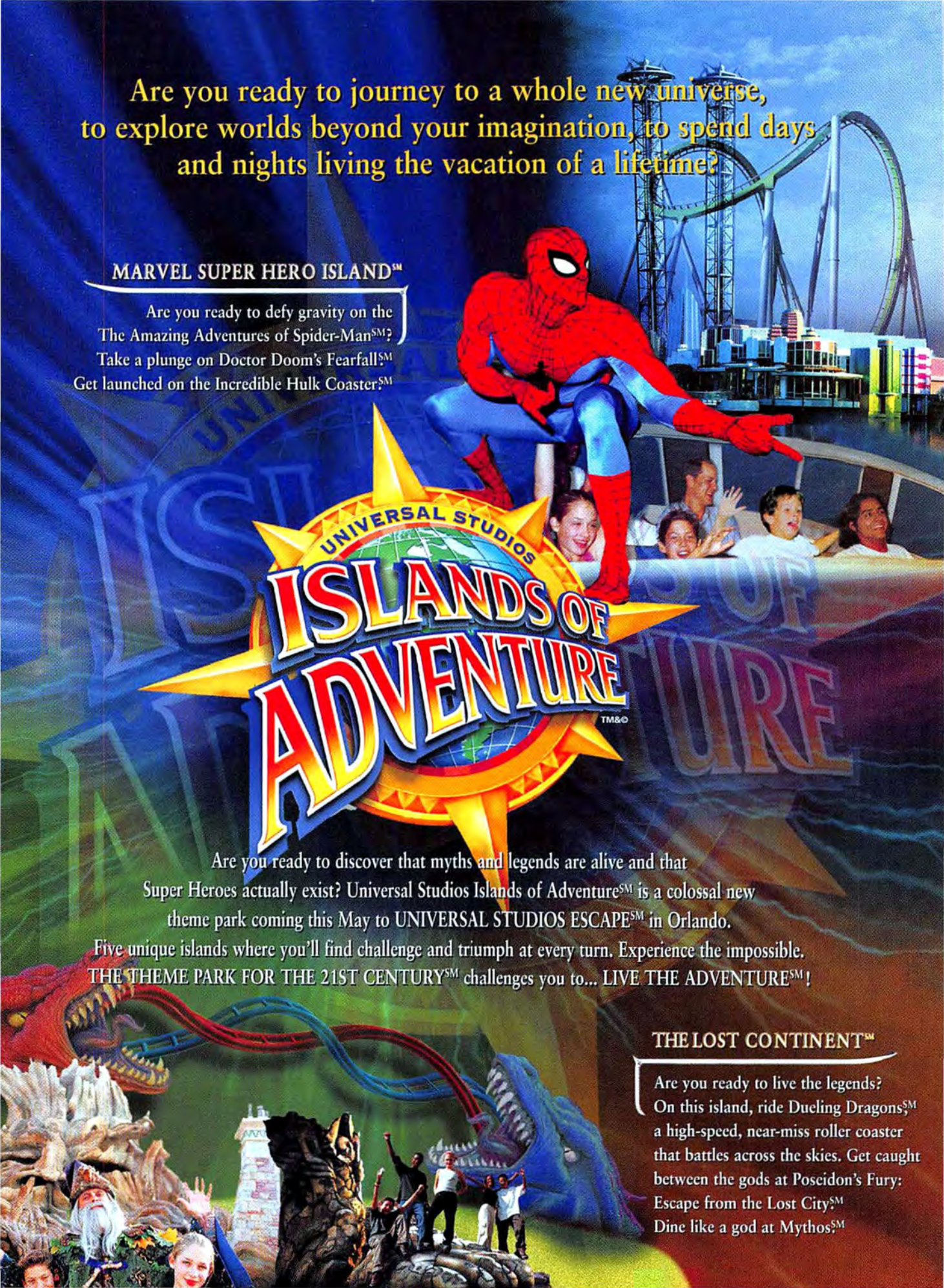
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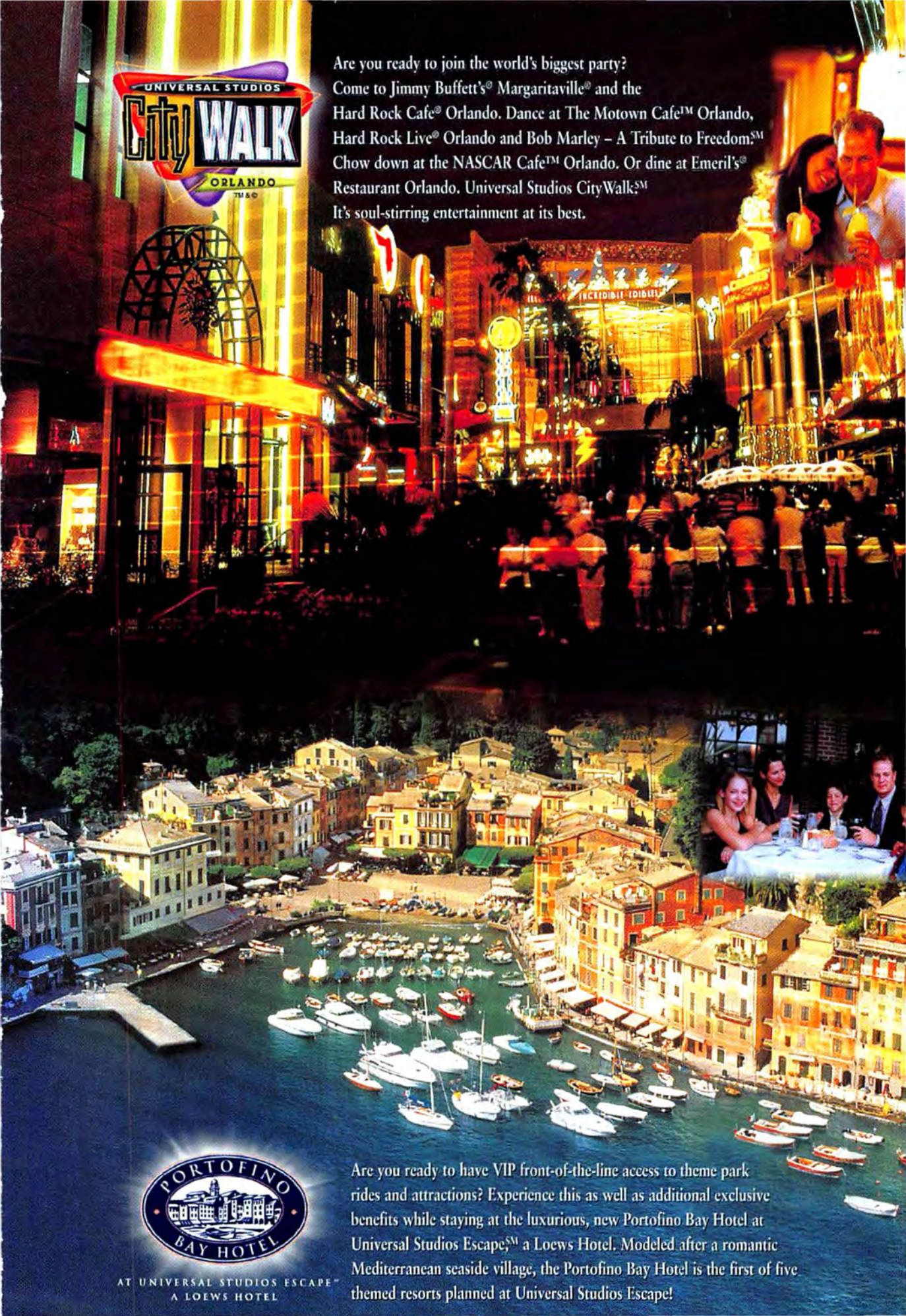
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PC WORLD

PC RELIABILITY & SERVICE

The Best Are a Phone Call Away

ILLUSTRATIONS BY DOUG ROSS

BY BRAD GRIMES

PC makers that sell their systems direct have won the hearts—and wallets—of consumers. So say 10,000 PC World readers who rated work, home, and notebook PCs and the companies that make them.

ROD TEEPLE
Can't get enough of Dell's PCs

Some of us don't call certain relatives as often as Rod Teeple has called Dell's sales line. Teeple, a former marketing director from Wilmington, Delaware, bought his third Dell PC last October and talks as if a fourth is in the cards.

"All three have performed almost without problems," says Teeple. "And when there has been a glitch, Dell has solved it promptly. Once the fan drive broke down, and one of their service people was at my front door the next day to replace it. Another time I bought an internal tape backup drive from a local computer store and called a Dell support rep to walk me through the installation. He acted as if he had all the time in the world."

Sounds like a marriage made in digital heaven. In fact, Dell always receives high ratings from readers in our PC Reliability and Service survey, and this time was no exception. Dell home PC users were so pleased, they gave the company the only five-star rating for overall reliability and service in the entire report.

But Dell isn't the only company with happy customers. Micron is another longtime favorite, and over the last couple of years Gateway and Quantex have also ascended in rank. Even CyberMax, which debuted in our ratings just last November, wins high marks for its home PCs. The common thread? These companies all sell their systems direct to customers.

According to Bruce Stephen, group vice president of worldwide PC research at IDC Consulting, the affinity consumers have for direct vendors "reflects loyalty to the company because users perceive that direct vendors can take ownership of users' problems."

Warm fuzzy feelings aside, these direct vendors must be doing something right. According to our survey results, they deliver the most reliable PCs and the best service. On average, their users report fewer problems, faster and more knowledgeable technical support, and higher satisfaction. Little wonder that Compaq is making a second foray into selling direct and Sony has launched its own program.

THE VOTES ARE IN

LAST DECEMBER, nearly 10,000 *PC World* subscribers participated in our online survey, hosted by World Research of San Jose, California. The survey covered desktop PCs used at work, desktops used at home, and notebook PCs used

WHERE SHOULD I BUY?

The happiest customers bought their computers direct from the companies that built them.

PURCHASE CHANNEL	Percent "very satisfied" [1]
DIRECT FROM MANUFACTURER By phone, Web site, or catalog, or via a field salesperson	75
RESELLER Corporate computer reseller, value-added reseller (VAR)	53
RETAIL Computer superstore, consumer electronics store, mass merchandising store, or office products superstore	51

[1] Percentage of PC owners who said they were "very satisfied" overall with their PC.
Source: *PC World*'s December 1998–January 1999 Reliability and Service survey.

PHOTOGRAPH: BILL CRAMER

anywhere and in between. Respondents were asked about problems they'd had with their PCs, support they'd received, and their general satisfaction with the system and the company behind it (see "A Word About the Numbers," page 159).

In the end, we rated 15 different vendors for reliability and service (see "Winners & Losers," below). The results offer some good news for PC users.

Compared to survey results reported last November ("PC Reliability and Service: Who Can You Trust?" www.pcworld.com/nov98/service), the percentage of respondents who reported problems when their PCs first arrived is down across all three categories. Whether the machine in question was a desktop or a notebook, roughly 7.6 percent of participants in the current survey reported a problem on arrival, versus about 10 percent in our last Reliability and Service survey.

Similarly, the percentage of people who told us their vendor never resolved their most recent problem is down across all categories and among most PC makers. IBM's notebook PCs registered the biggest improvement—just 3.3 percent of IBM notebook users said their problem went unresolved, down from a frightening 11.6 percent reported last fall.

What else did people have to say?

■ **At work:** IBM is a big winner, joining Dell and Gateway as the top companies for reliability and service. You say IBM isn't a direct vendor? Interestingly, more IBM work PC users in our study bought their systems from IBM's sales line than by any other method. As far as service goes, 76 percent of these IBM customers waited 5 minutes or less to reach a support rep. Micron's tech support line is a different story. The company's work PC customers complain that they aren't getting through quickly very often.

■ **At home:** The highlight of the survey is Dell's Outstanding rating—it's the only company to receive five stars overall—but Gateway, Micron, and Quantex are close behind. And as we discovered in our last Reliability and Service survey, CyberMax and Sony rate well overall, though CyberMax's reliability and Sony's service rank just Fair. Just Fair would be a step up for Acer and Packard Bell: Both get Poor marks for overall reliability and service.

■ **On the road:** We're not surprised readers report a higher rate of problems due to component failure with notebooks than with desktops, given the jostling that portable PCs undergo. But which company keeps headaches to a minimum? Respondents say Dell's notebooks are the most reliable, while IBM has significantly improved its service. On the other hand, Toshiba has slipped a notch from Good to Fair overall, and Fujitsu—despite improving in reliability—receives the same Poor rating for service it got collared with before.

All this good news about direct marketers doesn't mean that PCs sold direct are problem-free. In fact, 44 percent of Dell home PC users who answered our survey said they'd had a problem with their system. Generally, even if you go with a PC from one of the highest-rated direct-mail vendors in our survey, you face a fifty-fifty chance of encountering a problem.

To be fair, not everyone loves Dell, nor do they all love Gateway and Micron. Just ask Dell owner Ellen Benkin. An information services coordinator at the University of California, Los Angeles, Benkin reports enduring a bear of a time while trying to get her Dimension XPS R450 to work correctly. "I began experiencing problems with it within a week of receiving it," she says. "The support I got over the Web didn't help, neither did suggestions from Dell's phone support." Even an on-site technician with the right replacement part couldn't fix Benkin's PC. "The technician then spent at least an hour on the phone with Dell, trying—unsuccessfully—to resolve the problem," recalls Benkin. Dell ended up replacing her computer with another one that also had problems.

Direct PC sellers do not excel in every ▶

Winners & Losers

OF THE 15 companies we rated, only one PC maker performed well enough to rank as Outstanding: Dell, for its home PCs. No other manufacturer scored high enough to earn this distinction for its work, home, or notebook machines. The company was no slouch in the work desktop and portable classes, either; Dell, Gateway, and IBM were the only vendors to receive ratings of Good or higher in all three categories. The bad news? Compared to our November 1998 survey, Micron's work PCs slipped from Good to Fair, while Toshiba dropped from Good to Fair in its laptop line. Meanwhile, Acer's home PCs climbed a notch from Unacceptable to Poor—a step up, to be sure, but one that leaves a lot of room for improvement.

Work PCs	Home PCs	Notebooks
OUTSTANDING	**OUTSTANDING**	**OUTSTANDING**
none	Dell	none
GOOD	**GOOD**	**GOOD**
Dell Gateway IBM	CyberMax Gateway IBM Micron Quantex Sony	Dell Gateway IBM Micron
FAIR	**FAIR**	**FAIR**
Compaq Hewlett-Packard Micron	AST Compaq Hewlett-Packard NEC	Compaq Fujitsu NEC Toshiba
POOR	**POOR**	**POOR**
none	Acer Packard Bell	none
UNACCEPTABLE	**UNACCEPTABLE**	**UNACCEPTABLE**
none	none	none

SOURCE: *PC World* **Reliability and Service survey, based on online participants' responses recorded between December 1998 and January 1999. Companies are listed alphabetically within each tier. See "A Word About the Numbers" (page 159) for a description of our methodology, or visit PC World Online at www.pcworld.com/may99/reliability for a more detailed explanation.**

service measure either. For example, only 40 percent of all Micron work PC users reported hold times of 5 minutes or less. That's the worst figure for any PC manufacturer in our survey and deserves an Unacceptable rating.

But when you examine the scores cumulatively, direct manufacturers have an unmistakable edge.

WORK DESKTOPS: BIG BLUE RISING

NO WORK PC MAKER ranks as Outstanding overall. Dell comes closest, thanks to its five-star rating for reliability—an improvement over our last survey. The reason? A dramatically lower rate of problems on arrival for Dell PCs. Just 5 percent of Dell work PC users in our survey said their system didn't work properly when they first turned it on—down from 11 percent in our last report.

Gateway and IBM join Dell in the Good overall bracket. In Gateway's case, getting callers' hold times under control boosted the company's service rating. In our last survey, 53 percent of Gateway work PC users reported short hold times; this time, 63 percent said they got through quickly.

Owners of PCs built by direct manufacturers report fewer problems, faster and more knowledgeable tech support, and higher satisfaction.

But IBM made the biggest strides among work PC vendors. Last time IBM received just a Fair overall rating for its work PCs. The advance to Good this time is due to users reporting a lower percentage of Big Blue PCs with problems on arrival. In addition, slightly fewer people said they encountered long hold times when trying to reach technical support.

Joel Moser, a chemical engineer from Midland, Michigan, is a happy IBM user. His PC is one of 35,000 IBM systems his company uses. "IBM has always been helpful and courteous; and most importantly, they solved any problems promptly," explains Moser. "The hardware has been reliable, except the monitor, which failed after about a year and a half. But it was replaced the next day."

According to Dr. Suheil Nassar, worldwide quality manager for IBM's Personal Systems Group, an internal initiative to improve the quality of IBM PCs has begun to pay dividends in the last 12 months. "We instituted a new and rigorous testing process to ensure that our [products] are the best of breed," he says.

Rigorous testing programs by PC manufacturers are nothing new, but IBM's seems to be working. In our survey, just 27 percent of IBM users reported a component failure as their most recent problem—giving IBM the lowest percentage among all work PC vendors.

To improve support, IBM handed over the diagnostics programs that the company uses during manufacturing to its support technicians. "This has led to an improvement in the time it takes to solve problems," says David Hume, the company's worldwide director of global operations for service and support.

READERS RATE

WORK PCs

WITH ITS FIVE-STAR reliability rating, Dell means dependable. Meanwhile, long hold times drop Micron down a peg.

	Reliability							Service		
	Percent of PCs with problems	Problems per year	Problems on arrival	Dead on arrival	Component failure	High satisfaction with reliability	Overall reliability score	Short hold time	Quick resolution	No resolution
★★★★ GOOD										
DELL Machines you can rely on; service ain't too shabby either.	★★★★★	★★★★★	★★★★	★★★★★	★★★	★★★★★	★★★★★	★★★	★★★★★	★★★★★
GATEWAY Solid desktops, customers get help in a hurry.	★★★★	★★★★	★★★★	★★★★★	★★★	★★★★	★★★★	★★★★	★★★★★	★★★★
IBM Solves problems fast, but phoneside manner needs work.	★★★★	★★★★	★★★★	★★★★★	★★★★	★★★	★★★★	★★★★★	★★★★★	★★★★★
★★★ FAIR										
COMPAQ Machines could be sturdier, service could be better.	★★★	★★★	★★★★	★★★★★	★★★	★★★	★★★	★★★	★★★★	★★★★
HEWLETT-PACKARD So-so systems, but quick with a fix.	★★★	★★★	★★★★	★★★★★	★★★★	★★★	★★★	★★★★	★★★★★	★★★
MICRON Four-star PCs; still, they leave you hanging on the telephone.	★★★★	★★★★	★★★	★★★	★★★	★★★★	★★★★	★	★★★★	★★★★

Listings within each rating tier (Good and Fair) are alphabetical. Five stars is the best possible rating; one star, the worst.

In fact, an impressive 84 percent of IBM users said the company solved their most recent problem within five days—the best score among work PC makers and a major upturn from the 71 percent who reported quick resolutions in our last survey.

No manufacturer of work PCs in our study earned a grade worse than Fair overall. But that's no consolation to Hewlett-Packard, which ranked as Good in our last study but now slips a notch. Its reliability rating has suffered because its problem rates exceed those of other vendors. Both the percentage of HP users reporting problems and HP's average number of problems per year are slightly worse than average for this group.

Compaq's troubles congregate on the service side. The company has stepped up its effort to solve problems quickly, as evidenced by the rise in the percentage of people who say their latest problem was solved in five days or less—63 percent last time, 79 percent this time. But it sinks below sea level on three other service measures. It received Poor scores in the categories of knowledgeable tech support, sincere effort by tech support, and high satisfaction with service.

HOME DESKTOPS: IT'S THE SERVICE, STUPID

WHEN IT COMES TO home PCs, Dell pulls off the only overall Outstanding rating. It accomplished this by shoring up ▶

Knowledgeable tech support	Sincere effort by tech support	High satisfaction with service	Overall service score
★★★★★	★★★★★	★★★★	★★★★
★★	★★★★	★★★	★★★★
★★	★★	★★★	★★★★
★★	★★	★★	★★★
★★★	★★★★	★★★	★★★★
★★★★	★★★	★★★	★★★

THE STAR SYSTEM

Stars awarded correspond to the companies' relative rankings, which are based on the raw scores in each of the 12 categories identified here. A rating of five stars indicates best performance.

	WORK PCs	HOME PCs	NOTEBOOKS
Percent of PCs with problems The percentage of PCs that have had at least one problem needing repair.	Five stars: 38.6% Four stars: 47.3 to 47.8% Three stars: 50.3 to 52.1%	Five stars: 43.5% Four stars: 51.6 to 55.6% Three stars: 59.1 to 61.7% Two stars: 66.4%	Five stars: 37.8% Four stars: 47.3% Three stars: 50.7 to 52.5% Two stars: 56.3 to 61%
Problems per year The average number of problems per PC per year of age, for the brand's systems.	Five stars: 0.98 Four stars: 1.0 to 1.2 Three stars: 1.5	Five stars: 0.6 Four stars: 0.8 to 1.3 Three stars: 1.5 to 1.6 Two stars: 1.8	Five stars: 0.7 Four stars: 0.9 to 1.2 Three stars: 1.4 to 1.6
Problems on arrival The percentage of PCs that did not work properly when they were first turned on.	Four stars: 5.3 to 7.2% Three stars: 8.8%	Five stars: 3.1% Four stars: 6 to 6.9% Three stars: 7.6 to 8.6% Two stars: 9.3 to 9.8% One star: 12%	Five stars: 2.5 to 2.7% Four stars: 4.6 to 6.9% Three stars: 8.4%
Dead on arrival The percentage of PCs that were nonfunctional when they were first turned on.	Five stars: 0 to 1.3% Three stars: 3.4%	Five stars: 0 to 1% Four stars: 1.6 to 2.3% Three stars: 2.7% Two stars: 3.9% One star: 4.6%	Five stars: 0 to 0.9% Four stars: 1.6 to 2.3%
Component failure The percentage of PCs whose latest problems involved a component attributable to the system's manufacturer.	Four stars: 27.3 to 29.5% Three stars: 34.4 to 40%	Five stars: 22.2% Four stars: 29.5 to 31.4% Three stars: 36.8 to 45.1% Two stars: 50.8% One star: 54.6 to 56%	Four stars: 40 to 42.6% Three stars: 50 to 51.8%
High satisfaction with reliability The percentage of respondents who indicated that they were "very satisfied" with their current PC's reliability.	Five stars: 80.7% Four stars: 74.6 to 71.9% Three stars: 66.9 to 64.2%	Five stars: 88.5 to 85.1% Four stars: 79.7 to 75.5% Three stars: 70.9 to 62.5% Two stars: 59.6 to 48.7%	Five stars: 84.5% Four stars: 74.5 to 72.9% Three stars: 64.9 to 59% Two stars: 55%
Short hold time The percentage of phone service recipients who waited on hold for 5 minutes or less.	Five stars: 76% Four stars: 67.3 to 62.6% Three stars: 58.9 to 55.6% One star: 40.4%	Five stars: 71.1% Four stars: 67.6 to 59.1% Three stars: 52.9 to 49% Two stars: 44.4%	Five stars: 78.1 to 76.4% Four stars: 71.2 to 67.1% Three stars: 62.5 to 55.8%
Quick resolution The percentage of service recipients whose most recent problem was resolved in five days or less.	Five stars: 84.2 to 80.2% Four stars: 78.9 to 74.5%	Five stars: 86.4 to 80.8% Four stars: 76.2 to 71.4% Three stars: 64.4 to 60.8% Two stars: 57.6 to 53.4%	Four stars: 75.4 to 71.7% Three stars: 65.3% Two stars: 58.5% One star: 46.9%
No resolution The percentage of service recipients whose most recent problem was never resolved.	Five stars: 0 to 1.7% Four stars: 3.6 to 3.8% Three stars: 6.9%	Five stars: 2.6 to 2.7% Four stars: 3.9 to 5.2% Three stars: 7.0 to 7.7% Two stars: 9.5 to 11.9% One star: 15.1%	Five stars: 2.7 to 3.7% Four stars: 5.7 to 6.3% Three stars: 8.0 to 9.1%
Knowledgeable tech support The percentage of service recipients rating the knowledge of the technician helping with their most recent problem as "excellent" or "good."	Five stars: 90.6% Four stars: 86.5% Three stars: 82.8% Two stars: 76.7 to 74.7%	Five stars: 89.7% Four stars: 88 to 85.7% Three stars: 77.8 to 77.6% Two stars: 75.3 to 74.5% One star: 68.4 to 63.9%	Four stars: 88.6 to 84.3% Three stars: 82.7 to 81.3% Two stars: 75.5 to 70.5%
Sincere effort by tech support The percentage of service recipients rating the sincere effort of the technician helping with their most recent problem as "excellent" or "good."	Five stars: 90.6% Four stars: 86.2 to 85.6% Three stars: 82.7% Two stars: 76.7 to 75.9%	Five stars: 94.8 to 90.5% Three stars: 81.8 to 77.6% Two stars: 70.8 to 68.9%	Five stars: 93.1 to 92.4% Four stars: 87.2% Three stars: 84.3 to 81.3% Two stars: 75.5 to 68.2%
High satisfaction with service The percentage of service recipients who indicated that they were "very satisfied" with the service provided for their most recent problem.	Four stars: 72.2% Three stars: 59.8 to 51.9% Two stars: 38%	Four stars: 79.3 to 73.2% Three stars: 57.1 to 52.4% Two stars: 48.3 to 42.9% One star: 37 to 29.7%	Four stars: 70 to 69% Three stars: 54.4% Two stars: 49.1 to 43.2%

A WORD ABOUT THE NUMBERS

PC World's Reliability and Service survey was conducted in conjunction with World Research of San Jose, California, and IDC Consulting, *PC World*'s sister company in Mountain View, California. Over the past 12 months, we developed a panel of verified *PC World* subscribers–totaling 48,218 as of December 1998–who reported on the 87,264 PCs (three years old or younger) that they use at work, at home, and on the road. A total of 9990 respondents participated in the final survey in December 1998 and January 1999. The information they provided–about their PC's reliability and their experiences, if any, in getting service from the system manufacturer or its authorized representative–forms the basis for the vendor rankings.

Using this data, a team of *PC World* editors and research experts analyzed the overall reliability and service performance of each manufacturer's home, work, and notebook PCs based on 12 measures. For a company to qualify for a system reliability rating, we required a minimum of 57 responses on the reliability measures, and to qualify for a service rating, 44 responses on the service measures. In each of 6 reliability and 6 service measures, we ranked every company from best to worst. We determined a company's overall ranking based on the sum of its reliability and service scores, as well as on the number of stars it earned in individual categories.

its service, which rated as just Fair in our last report. For one thing, the phone lines seem to be a lot less congested these days: The percentage of Dell users reporting a short hold time soared from 47 percent to 71 percent. And the share of people who said their latest problem went unresolved dropped from 10 percent to 4 percent.

A gaggle of other direct vendors are hot on Dell's heels. Among these pursuers is Gateway, whose home PC rating jumps from Fair to Good overall. Gateway's support scores have improved in several measures; notably, 66 percent of its home users reported short hold times (up from 59 percent in our last survey).

Compaq's service woes with work PCs carry over to its rating for home desktops. The proportion of home users who said they got quick resolution for their most recent problem dropped from 66 percent to 53 percent.

Quantex doesn't move up overall—it's still Good—but even so, the company collects a higher reliability score than last time. In this study, 8 percent of Quantex users said they had a problem when first turning on their new PC, down from 13 percent reported last fall.

Ensconced among the top direct ven-

READERS RATE HOME PCs

DELL IS ON ITS OWN at the top of the heap, while Acer's abominable service sets the standard for futility.

	Reliability							Service		
	Percent of PCs with problems	Problems per year	Problems on arrival	Dead on arrival	Component failure	High satisfaction with reliability	Overall reliability score	Short hold time	Quick resolution	No resolution
***** OUTSTANDING										
DELL Simply the best. Healthy machines, happy customers.	*****	****	****	*****	****	*****	****	*****	*****	****
**** GOOD										
CYBERMAX Sterling support makes up for lots of faulty parts.	**	****	***	*****	*	****	***	****	****	****
GATEWAY Quick to sort out PC woes.	***	****	**	****	***	****	***	****	*****	*****
IBM Respectable scores, but techies need to hit the textbooks.	***	****	****	*****	****	***	****	****	***	***
MICRON If it breaks, they will fix it.	****	*****	****	***	**	*****	****	****	****	*****
QUANTEX Despite component problems, owners are happy campers.	****	****	***	*****	*	*****	****	***	****	****
SONY Rock-solid systems; still, some problems never get solved.	****	****	*****	*****	*****	****	****	****	****	**
*** FAIR										
AST Improved reliability moves company up a notch.	***	****	*	****	***	**	***	**	***	**
COMPAQ Service marks slipping in most categories.	****	**	****	*****	***	**	***	***	**	**
HEWLETT-PACKARD Few problems at first, but service is spotty.	***	***	****	****	***	***	***	****	**	***
NEC Too many dead computers; support techs need help.	****	****	***	**	***	***	***	***	***	***
** POOR										
ACER Can service get any worse?	***	***	**	*****	***	**	***	**	**	*
PACKARD BELL Shaky systems, lousy service—a deadly combination.	**	***	***	*	***	**	**	***	**	**

Listings within each rating tier (Outstanding, Good, Fair, and Poor) are alphabetical. Five stars is the best possible rating; one star, the worst.

dors is Sony, which sells most of its PCs in computer stores but is starting to make waves with its new Sony VAIO Direct program. The electronics giant earns impressive scores for system reliability. In fact, Sony racks up the best reliability numbers of any home PC maker in our survey. A scant 3 percent of Sony respondents said they had a problem when they first set up their PCs; and just 22 percent said their latest problem was a component failure—the best such score in our entire study.

Unfortunately, Sony's service score descends from Good to Fair in our current report, preventing its otherwise stellar reliability scores from elevating the company to the R&S summit. Previously glowing reports of the knowledge and sincere effort of Sony's technicians have faded to merely Fair scores, and the percentage of people who said Sony hadn't solved their latest problem (almost 10 percent) is significantly worse than average.

PHOTOGRAPH: AMY ETRA

Knowledgeable tech support	Sincere effort by tech support	High satisfaction with service	Overall service score
★★★★★	★★★★★	★★★★	★★★★★
★★★★	★★★★★	★★★★	★★★★
★★★★	★★★★★	★★★★	★★★★
★★	★★★	★★★	★★★
★★★★★	★★★★★	★★★★	★★★★
★★★★	★★★★★	★★★★	★★★★
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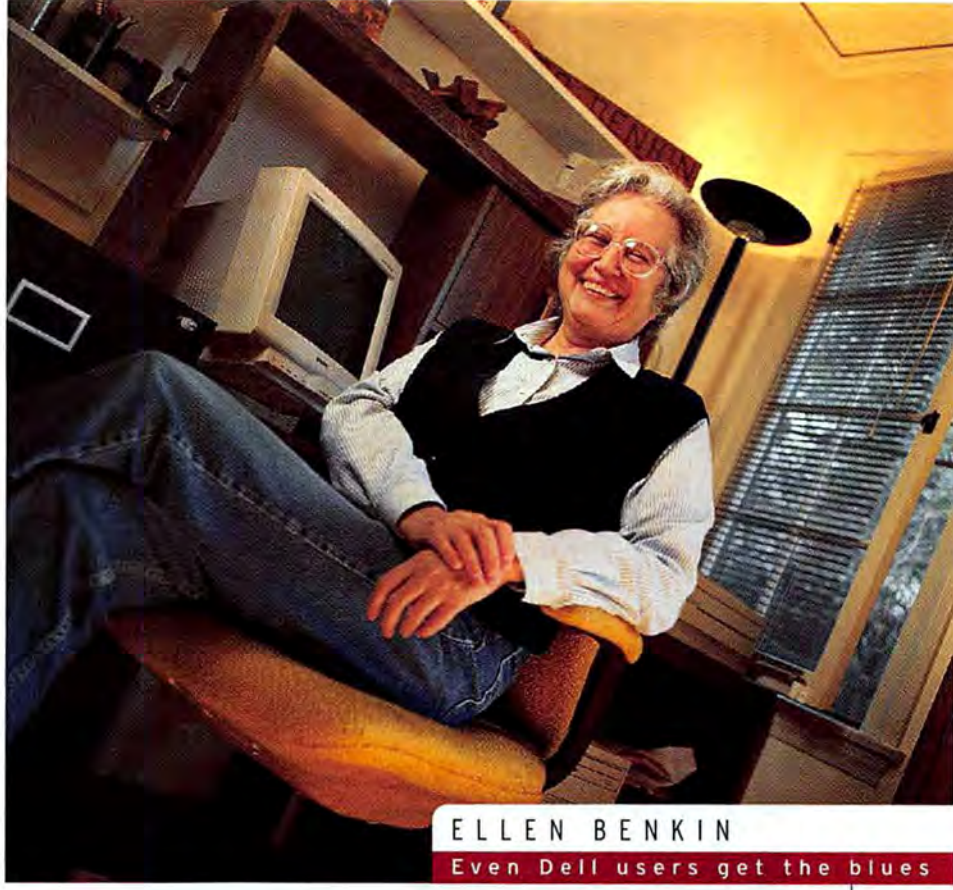
★	★★	★	★★



ELLEN BENKIN

Even Dell users get the blues

"I had problems with my Dell Dimension within a week. Dell's Web support didn't help, nor did phone support—and even an on-site technician couldn't fix my PC."

Sony isn't the only home PC vendor to suffer from less-than-stellar support. Compaq's service woes with work PCs are echoed in its home PCs rating. In our survey, the proportion of Compaq users who said they got a quick resolution to their most recent problem dropped from 66 percent in November 1998 to 53 percent now. And the percentage of users who said that their most recent problem was never resolved jumped from 6 percent to 11 percent.

Mike Zimmerman, director of customer service and support for Compaq's consumer products group, disputes that finding. "We increased our call center staffing resources by 50 percent from 1997 to 1998," he says. "Every week during 1998 we fielded a survey to almost 1000 customers, and our records indicate that the average speed of answers was 3 minutes or less." In *PC World*'s survey, however, Compaq's rating for short hold times was no better than Fair.

But hold times aren't Compaq's biggest problem. According to our survey respondents, the company's technicians aren't very knowledgeable. Only 67 percent of Compaq home PC users rated the knowledge level of Compaq's tech reps as Good or Excellent (the average for all home PC vendors was 77 percent). Maybe this rating reflects the fact that Compaq technicians have lots of ground to cover

Zimmerman points out some of Compaq's pioneering efforts in home PCs, such as FireWire, DSL support, and home networking features, but he says these new technologies have not adversely affected the quality of support.

Hey, things could be worse. At least Compaq isn't Acer or Packard Bell. Acer received a dismal Unacceptable rating for the company's overall service. Packard ▶

Mei Morin saves MasterCard up to $85 every time she places an online order using their new Microsoft-based corporate purchasing system.

By the way,
MasterCard employees place over 6,000 online orders every year.

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Other examples of Microsoft-based commerce solutions:

Office Depot increased sales by millions of dollars by enabling over 20,000 of their business customers to purchase goods with custom catalogs and pricing.

LA County's Web-based purchasing solution nets big savings from easier comparison-shopping, faster order cycles and less paperwork.

Visio reduced processing costs from $49 to $5.45 per requisition—saving $1 million in the first year alone.

In addition to saving money, MasterCard also slashed the time required to fill purchase orders from 4 days to less than 1½ days. Clarus Corporation, a Microsoft® Certified Solution Provider (MCSP), delivered these efficiencies with its E-Procurement package, powered by Windows NT® Server and the BackOffice® family. MasterCard chose a Microsoft-based solution because it integrated well with its existing information systems and suppliers and offered flexibility for future growth. Your company can realize similar benefits with a Microsoft-based corporate purchasing solution. To locate the right MCSP, or to get the free Digital Nervous System: Commerce Solutions CD, call 888-674-6686 or visit **www.microsoft.com/dns/**

Microsoft

Where do you want to go today?®

READERS RATE NOTEBOOK PCs

Toshiba, the granddaddy of notebook makers, slipped in both its reliability and its service ratings. Toshiba owners reported more problems per year than owners of other notebooks—except NEC.

Bell registered Poor scores for both its reliability and its service.

If there's a silver lining here, it's Acer's deliverance from the Unacceptable ranking that its home computer line received last November. A Fair score for reliability boosts Acer's previously abysmal overall reliability and service score to Poor.

NOTEBOOKS: THINGS FALL APART

NOTEBOOK MAKERS face a challenge when they design their products: Make it lighter, but make it durable. On the road, these portable PCs get knocked around, and their thin skins take a beating.

It's a challenge that PC manufacturers seemingly haven't mastered yet. On average, according to our survey, 50 percent of notebook owners reported a component failure as their most recent problem. That's compared to 37 percent of work PC owners and 40 percent of home PC owners. Even Dell users, the luckiest notebook users in our survey when it comes to working components, reported that 40 percent of their recent problems involved a part going south—a relatively good statistic for a notebook maker, but nothing to brag about.

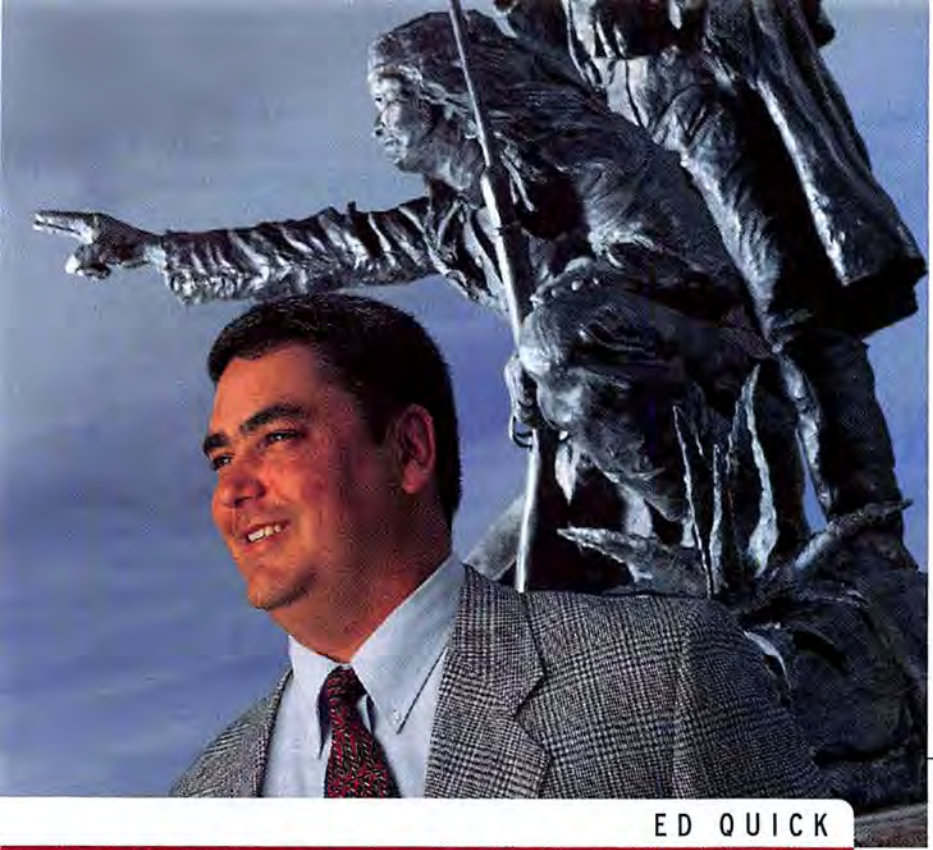
Notebooks' most frequently troubled component is the hard drive: 22 percent of respondents said that a faulty hard drive was at least part of the cause of their most recent problem. Ed Quick of Sierra Vista, Arizona, knows the drill. An engineering support contractor with Comarco, Quick has an otherwise fine relationship with his Compaq Armada notebook. "I use it all over the country, in some harsh field environments," Quick says. "It held up until the 18-month mark, when the hard drive failed." What was important to him was how well Compaq fixed the problem: "My extended warranty was through another company, but Compaq extended the original warranty to cover the new drive."

Randy Gingiss, a law professor from Vermillion, South Dakota,

FALL FROM GRACE? Portables pioneer Toshiba stumbles, due to problem-prone machines and unhappy customers.

	Reliability							Service		
	Percent of PCs with problems	Problems per year	Problems on arrival	Dead on arrival	Component failure	High satisfaction with reliability	Overall reliability score	Short hold time	Quick resolution	No resolution
★★★★ GOOD										
DELL Super-sturdy notebooks backed by stellar service.	★★★★★	★★★★	★★★★★	★★★★★	★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★★
GATEWAY No one responds faster.	★★★	★★★★	★★★★	★★★★	★★★	★★★★	★★★★	★★★★★	★★★★	★★★★★
IBM Durable machines, dependable support.	★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★★	★★★★	★★★★★
MICRON Near-perfect out of the box.	★★★	★★★★★	★★★★★	★★★★★	★★★	★★★★	★★★★	★★★	★★★★	★★★
★★★ FAIR										
COMPAQ Solves most problems... eventually.	★★	★★★★	★★★★	★★★★★	★★★	★★★	★★★	★★★★	★	★★★★
FUJITSU Moves up from Poor last time thanks to better reliability.	★★★★	★★★★	★★★	★★★★	★★★★	★★★	★★★★	★★★	★★	★★★
NEC Respectable scores; still, some customers are displeased.	★★	★★★	★★★★	★★★★★	★★★	★★	★★★	★★★★	★★★★	★★★★
TOSHIBA Problem rates are up; satisfaction is down.	★★	★★★	★★★★	★★★★★	★★★★	★★★	★★★	★★★★	★★★	★★★★★

Listings within each rating tier (Good and Fair) are alphabetical. Five stars is the best possible rating; one star, the worst.



ED QUICK

Armada notebook owner well-covered by Compaq

PHOTOGRAPH: REED RAHN

says he's very pleased with the remanufactured notebook he bought from Gateway's North Sioux City outlet. He's even forgiven the little mishap that forced him to make a second 60-mile trip to Sioux City. "The first notebook I bought was missing a hard drive, which I discovered when it wouldn't boot," says Gingiss.

Where notebooks are concerned, things inevitably fall apart. But users are far more forgiving if the company is there to fix the problems.

According to IBM notebook users, the ThinkPad maker understands that message. The company shows improvement on nearly every service measure since our last report. For instance, many more customers (78 percent versus 52 percent) reported that they got through quickly to IBM's technical support.

Three other notebook makers—Dell, Gateway, and Micron—join IBM as Good overall, thanks to high marks for service and support. In particular, the three direct manufacturers get high scores for sincere effort in fixing problems.

Unfortunately, Fujitsu is not a paragon of notebook service. Though Fujitsu notebook owners deemed the company's hold time and eventual problem resolution record Fair, those positive elements were not enough to raise the manufacturer's overall service rating above Poor this time.

The only notebook maker to go down a tier in our overall rankings was Toshiba, arguably the granddaddy of notebook PC makers. Both its reliability and its service ratings have slipped relative to those of its peers. Toshiba users in our survey reported 1.4 problems per year—more than any other notebook vendor except NEC—and the percentage of customers who said their most recent problem was solved quickly dropped slightly (65 percent this time versus 69 percent in our last report). In our two new measures—satisfaction with reliability and satisfaction with service—Toshiba didn't distinguish itself.

Dan Ludwick, Toshiba's director of services marketing, says his company's internal data paints a brighter picture. "We're seeing a continual drop in failure rates and better service all round," he reports. "Unlike some of our competitors, we manufacture a lot of our components—like disk drives and circuit boards. That way we always have control over the quality of the components."

> "My Compaq notebook's hard drive failed. Though my extended warranty was with another vendor, Compaq extended the original warranty to cover the new drive."

Ludwick's comments reflect a bright spot for Toshiba in our survey result: Just 41 percent of Toshiba respondents said their most recent problem was a component failure—the second-best score for a notebook vendor. But it's not enough to raise the company's overall reliability and service rating above Fair.

Knowledgeable tech support	Sincere effort by tech support	High satisfaction with service	Overall service score
★★★★	★★★★★	★★★★	★★★★
★★★★	★★★★★	★★★★	★★★★
★★★★	★★★	★★★	★★★★
★★★★	★★★★	★★★★	★★★★
★★	★★	★★	★★★
★★	★★	★★	★★
★★★	★★★	★★	★★★
★★★	★★★	★★	★★★

BUY IT AGAIN, ROD

WHATEVER TYPE of PC you're looking for—a desktop for the office or home, or a notebook for the road—several companies can deliver the reliability and service you need. And to buy from the best of them, you never have to leave your desk or your living room.

Purchasing direct has been good to Rod Teeple. He says he'd buy another Dell in a heartbeat—and he's not the only one. ▶

Regardless of the type of computer, Dell lays claim to the highest percentage of customers who say they'd buy another machine of the same brand—88 percent for both work and home desktops, and 90 percent for notebooks.

Micron customers could put their vendor on speed-dial, too—80 percent of its work PC user and 86 percent of its notebook users volunteered that they would buy another Micron machine.

When you've found a good thing, why change it? "I use my computer for my finances, investing, Web surfing, e-mail, and word processing," says Teeple. "It's a technological wonder, but I just want it to do the things I bought it for. Dell has made my computing life simpler." A simpler computing life? What a concept.

For more information about our research methodology, visit www.pcworld.com/may99/reliability.

Brad Grimes is a senior editor for PC World; *Senior Technical Editor Shane Rau and Associate Editor Aoife McEvoy also contributed to this article.* ■

OTHER COMPANIES TO WATCH

GAUGING THE QUALITY of a company's service isn't easy. If you don't gather enough data, a handful of unhappy users—or a few ecstatic ones—can seriously skew the results. That's why our service ratings require a minimum of 44 responses from users who've received technical support from a vendor. Unfortunately, four major manufacturers of work PCs and five notebook makers fell short of that minimum. While we were able to rate the reliability of these companies' PCs (see chart at right), without service scores we couldn't assign them a ranking in our overall charts.

NO NEWS IS GOOD NEWS?

WE'D LIKE TO THINK the reason we received so little feedback on these nine companies' service is their customers' infrequent need of tech support. And in some cases, that's probably true. Take Hewlett-Packard and NEC for instance: In this survey, NEC's corporate PC users reported the lowest average number of problems per year of any work PC manufacturer (just 0.7). Among notebook vendors, HP ranks second to Dell in users reporting high satisfaction with their machine's reliability (75 percent).

On the other hand, Acer, AST, and Packard Bell rate as merely fair in reliability among work PC vendors and lag behind all others on several reliability measures. For example, AST's work PC owners gave the company the lowest score in three critical measures: problems per year, problems on arrival, and recent component failures.

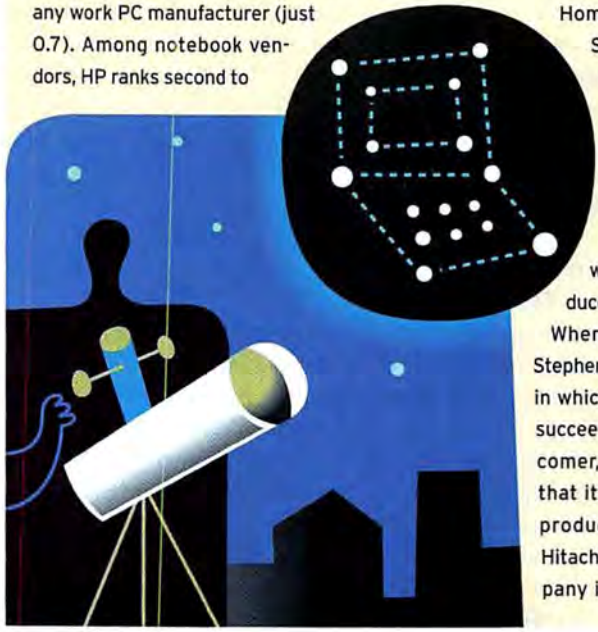
On the notebook side, two vendors—Acer and Hitachi—rate Fair for reliability, while two others—AST and WinBook—come out Poor. Acer, AST, and WinBook did particularly badly when it came to problems on arrival; all three received a score of Unacceptable on this measure.

BRAND RECOGNITION

ACCORDING TO Bruce Stephen, group vice president of worldwide PC research at IDC Consulting, both Acer and Packard Bell are better known for home desktops than work PCs (see "Readers Rate Home PCs" on page 160). Stephen notes that NEC has changed management teams and marketing strategy, and AST was bought by the founder of Packard Bell, Benny Alagem, who has begun to reintroduce AST to business buyers.

When it comes to notebooks, Stephen cites a cutthroat market in which many compete but few succeed. Hitachi, a relative newcomer, has already announced that it will move control of the products from Hitachi PC to Hitachi Data Systems. The company is shifting its focus from retail and SOHO customers to corporate customers. Meanwhile, acquisitions have wreaked havoc among other brands. Korean giant Samsung, which bought AST's notebook business in 1995, has cut back on marketing, and Acer, which bought Texas Instruments' successful notebook line in 1997, has all but smothered TI's brand recognition. HP continues to sell its well-built portables in small numbers, and notebooks-only manufacturer WinBook, which received high marks in past Reliability and Service surveys, is struggling to overcome poor reliability scores in our most recent study.

Though service may be a question mark for some vendors, one thing remains clear: The more reliable your PC is, the less you need worry about service in the first place.



READERS RATE WORK PCs

Overall reliability score [1]
**** GOOD
NEC
*** FAIR
Acer AST Packard Bell

READERS RATE NOTEBOOK PCs

Overall reliability score [1]
**** GOOD
Hewlett-Packard
*** FAIR
Acer Hitachi
** POOR
AST WinBook

[1] For a detailed breakdown of these companies' reliability scores across the six individual measures, see PC World Online (www.pcworld.com/may99/reliability).

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THE Skinny ON Ultraportables

BY CARLA THORNTON

PHOTOGRAPHS BY STAN MUSILEK

Ready to chuck that clunky notebook? Superslim portables and Windows CE devices can replace laptops—but not without compromises. ▶

Soon after a thief broke into the office of APRO, a trade association based in Austin, Texas, and took its only laptop computer—a 7-pound Dell Latitude—the staff discovered the silver lining in the loss.

"Only a couple of people ever used the notebook," says Julie Stephen Sherrier, APRO's director of communications. "Everyone complained about how it just seemed to get heavier and heavier on long trips." After the burglary, Sherrier bought a 4.7-pound Sony VAIO PCG-505GX, the first of an expanding class of light, superslim Pentium MMX–based portables designed for the road. "We don't miss the aching shoulders," says Sherrier. "Now everyone wants to carry the laptop."

Sherrier could have gone even smaller, opting for the Thumbelina of portables, a 2.5-pound Windows CE Pro handheld device—lighter but also less functional than the Sony. In the shoulder bags and on the airplane tray tables of mobile professionals like Sherrier, a war is being waged. The struggle, between superslim Windows 98 laptops and lightweight CE notebooks—called Handheld PC Pros (or H/PCs)—grows fiercer by the day.

SUPERSLIMS VERSUS HANDHELDS

THESE TWO classes of tote-alongs compete for your attention because they look a lot alike and are about the same size. But that's where the similarities end. Sony's VAIO 505GX, whose sleek lines and light weight captured the attention of the computing world when it was first released, was the catalyst that spawned competing versions from Dell, Toshiba, and other vendors. The superslims resemble standard portables, slightly shrunken, without the top-speed CPU, an internal media bay, or a built-in floppy drive. Priced around $2000, they cost a few hundred dollars more than would a similarly configured laptop because of their 1-inch thickness and low weight.

On the other side of the fence, the CE handhelds—from Hewlett-Packard, LG Electronics, NEC, and others—remind us of personal digital assistants on steroids. As a class, PDAs began as palm-size PCs without keyboards. The new generation tends to be bigger (about 9 inches wide, on average), more durable, and much faster than their PDA cousins. But a keyboard and a color display do not a laptop make: the limited uses of H/PCs render them only marginally better than PDAs.

In short, the superslims are real computers; the handhelds aren't quite there yet. The former come equipped with Pentium MMX processors that handle most standard business applications efficiently; the latter's low-power CPUs work only with feature-stripped pocket applications.

How the Features Stack Up

	Hewlett-Packard Jornada 820	LG Phenom Express Pro	NEC MobilePro 800	Sharp Mobilon Pro PV-5000 *	Vadem Clio
	HANDHELD PC PROFESSIONAL (WINDOWS CE PRO 3.0)				
In short [1]	The most laptoplike of H/PCs has trackpad and great keyboard. Long battery life, but slowest file transfers.	Smallest handheld PC is the least expensive; average performer; keyboard too small for touch typing.	A nice keyboard and display, but the MobilePro lacks some features and ran some tests slowly.	Fastest unit delivers above-average display quality and good battery life, but the keyboard isn't great.	Heavy, but it has a versatile folding screen that lets it function as a notebook or pen tablet. Poor keyboard.
Battery life (hr:min)	7:08	5:55	4:15	6:25	8:12
Keyboard and pointing device	**Outstanding.** Best keyboard among the H/PCs is also the largest. Uses trackpad.	**Average.** Fairly small keys make for troublesome touch typing. Uses stylus.	**Good.** The 9.1-inch wide keyboard is medium size for an H/PC. Uses stylus.	**Average.** Harder to type on narrow keys; stylus must be stowed behind screen.	**Poor.** Keyboard is awkwardly curved; no quick-launch keys. Uses stylus.
Display	**Outstanding.** No touchscreen makes this the sharpest of the H/PC displays.	**Average.** Though display is smallest of the H/PCs here (8.1 inches), it's easy to read.	**Good.** Second largest display is sharp, despite being a touchscreen.	**Outstanding.** Display's high color depth means images look more realistic.	**Poor.** Largest (9.5-inch) touchscreen display also looks fuzziest.
Performance	**Average.** Fast on Word and Excel tests, but transfers files the slowest.	**Average.** Transfers files faster than Jornada, but Word and Excel run slower.	**Poor.** Slowest at running applications, but fast with file transfers.	**Outstanding.** Substantially faster than all other H/PCs in every test.	**Poor.** Preproduction unit ran like the NEC, but handled file transfers slower.
Extras	PC Card slot, records voice memos, one USB port.	Built-in PC Card, parallel, and VGA video ports; external voice-memo button makes recording easy.	No PC Card slot, but has a VGA video port and USB connector.	PC Card slot and photo-editing software; $299 PC Card camera available.	PC Card slot; swingtop design; best software bundle among H/PC Pro systems includes a Find tool.
Price and contact information	$999; 800/443-1254; www.hp.com/jornada; product info no. 603	$699; 800/243-0000; www.lgphenom.com; product info no. 604	$999; 888/863-2669; www.nec-computers.com; product info no. 605	$899; 800/237-4277; www.sharp-usa.com; product info no. 606	$999; 800/468-2336; www.vadem.com; product info no. 607

* Our pick

[1] A complete chart with performance test results, our performance and battery testing methodology, and details about how we weigh laptops is located on PC World Online at www.pcworld.com/may99/ultraportables.

There are many issues to consider if you're trying to decide between the two classes of portables. Superslims have larger, clearer screens (with diagonal measurements of up to 11.4 inches) than handhelds, but handhelds turn in much superior battery life (from 4 to 8-plus hours). Superslims run normal Windows applications all by themselves; handhelds need a companion PC to compress and transfer files for use by the onboard Pocket Office applications. And superslims have far more storage space than do handhelds, which are currently limited to 32MB of data. But while superslims have hard drives and hook-ups for external CD-ROM and floppy drives, handhelds carry much lower price tags: The handhelds cost under a grand, less than half the price of the average superslim notebook.

Right now, **superslims are** real computers; **handhelds aren't** quite there yet.

OUR PICKS

WHAT CLASS OF product best serves frequent travelers? To answer this question, we took a close look at three superslims and five handhelds. (We also reviewed two mini-notebooks—the Toshiba Libretto 110CT and the MetroBook MB-200—see www.pcworld.com/may99/ultraportables.) We think the superslims offer better overall value, despite costing twice as much, because they can run any Windows 98 application and can use external media drives for expanded storage.

Among the three superslims we examined, Dell's $1999 Latitude LT impressed us the most. Equipped with a Pentium MMX-266 processor, Windows 95, a 4.3GB hard drive, an 11.4-inch active-matrix screen (the largest superslim display available), and management software, the Latitude LT was just a hair behind the top superslim performer. The 4.7-pound Latitude LT's 2-hour battery life is scarcely adequate, but you can add a $299 second battery (a pricey option that comes with eight cells, twice as many as are in the main battery). We found that this extends the useful battery life to more than 6 hours—great news for corporate users or others who spend a lot of time getting their work done on the road. That kind of battery life gives it about the same away-from-a-plug viability as you'd obtain from a handheld PC running Windows CE, even though the Latitude LT weighs a full pound more.

Dell Latitude LT *	Sony VAIO PCG-505FX	Toshiba Portégé 3015CT
SUPERSLIM LAPTOP (WINDOWS 98)		
This fast laptop ships only with the Windows 95 operating system, which corporate users like better.	VAIO 505GX was first model of this class; this version's battery life is the shortest here; lighter than the Dell.	Longest battery life and lowest weight among superslims, but performance is sluggish; no internal modem.
1:59	1:42	3:11
Good. 9.8-inch keyboard is about as wide as the Sony's but better. Uses trackpad.	Poor. Least-comfortable superslim; thumbs bump the trackpad while typing.	Good. Has widest key spacing, best for touch typing. Uses trackpad.
Outstanding. The largest (11.4-inch) superslim display also offers excellent quality.	Good. The 505FX's 10.4-inch screen is extremely sharp.	Good. Quality of the 10.4-inch screen matches that of the VAIO's screen.
Good. Snappy performance puts it a very close second behind the Sony.	Good. Fastest test scores, but beats Dell only by a hair.	Average. 19 percent slower than the Sony (which has same CPU) in every test.
Dual battery ($299) adds 4 workable hours. Ships with Windows 95 and LANDesk Client Manager software.	SOS tech support software, IEEE 1394 port. Programmable power button launches apps at startup.	No internal modem (unlike Sony and Dell), but has two PC Card slots (the others have only one).
$1999; 800/388-8542; www.dell.com	$1999; 800/476-6972; www.sony.com; product info no. 608	$1799; 800/867-4422; www.computers.toshiba.com; product info no. 609

For more information about all products in this table, select product info number 901 or visit www.pcworld.com/productinfo.

As long as they continue to make budget friendliness a selling point (currently, on average, they sell for half the price of a standard notebook), superslim portables will be unable to incorporate the high-end notebooks' leading technology—the latest notebook CPU, the largest hard drive, or the biggest screen.

Their closest relatives are thin portables, the next-heavier class of notebook, which measure about an inch and a half in thickness, have faster processors, and include an internal media or battery bay. NEC's $2899 Versa SX is a fairly representative example of a machine in this category. But superslims are lighter by a pound, cost $600 less (on average), and come close to matching the full-size, 11-inch-wide keyboard of thin portables. So if you're looking for a travel mate that can manage light tasks in Word and Excel, connect to the Internet, and keep up with your e-mail, the superslims rate as a better value than thin notebooks, too.

If your main concern is getting tote-along computing power at the lowest price, however, Handheld PC Pros are worth a look. As an inexpensive, featherweight PC accessory, Handheld PCs offer a reasonable platform for light word processing, e-mail, and Web surfing while you're on the road. Our favorite machine in this category is Sharp's Mobilon Pro PV-5000: Its outstanding screen quality, speedy performance, and good software bundle distinguish it from the others.

But the severe limitations of this class of portables make us hesitant to issue any of them an unqualified endorsement. The biggest hindrance is the perennially not-quite-ready-for-total-user-reliance Windows CE operating system and its host of limitations and conditions. For instance, CE units can't connect directly to most kinds of removable storage devices (such as floppy drives or CD-ROM drives); instead, you must link one to a host Windows 98 or NT machine over a serial cable to install software. And though you can save your documents onto flash memory cards, you'll also need access to either a real laptop or a desktop computer with a flash memory PC Card reader (rarely found on standard PCs) to copy the data. A superslim's your best bet while you wait for Windows CE to catch up. ▶

Superslims: Loaded With Features

THE THREE superslims available at the time of our tests—Dell's $1999 Latitude LT, Sony's $1999 VAIO PCG-505FX, and Toshiba's $1799 Portégé 3015CT—look virtually identical. Each weighs from 4 to 5 pounds (including AC adapter and external floppy or CD-ROM drive) and measures 1 inch thick with the screen closed.

TRADEOFFS FOR THINNESS

SUPERSLIMS ACHIEVE their tortilla-like dimensions by stripping built-in features to the minimum. The floppy drive and extra-cost CD-ROM drive come as external units. Parallel, serial, and PS/2 ports—standard equipment on full-size notebooks—have to be added via a separate port expander or a floppy drive with integrated ports. With a single speaker for handling the on-board audio and with screens that measure less than 12 inches across, their multimedia power won't blow you away.

Speed might prove to be the biggest stumbling block if you depend on a portable for heavy-duty work. The three PMMX-266 superslims we tested performed below par for machines in their CPU class. The Sony was the fastest, followed closely by the Dell, with the Toshiba lagging about 19 percent behind them. But even the VAIO still tested about 20 percent slower than standard laptops that cost approximately the same amount and use a Pentium II-233 processor.

OUR PICK:
Dell's Latitude LT
BEST USE:
Frequent travelers who use basic business apps.
TRADE-OFFS:
Pay a premium for small size; no internal drive bays; relatively slow CPU.

DELL'S DESIGN DIFFERENCE

ALTHOUGH THE units look similar, differences in screen size and design set the Dell apart from the others. Beyond Dell's large 11.4-inch active-matrix screen, the add-on equipment—including the floppy and CD-ROM drives—boasts a slightly more ▶

Windows CE Pro: Fast, Basic, and Flawed

IMAGINE A WORLD of limited choices: Instead of 70 cable channels, you get 3; no double-lattés, just Folgers. That's what Windows CE Pro is like: It cuts down your choices when you try to do work on the road.

Like its predecessors, Windows CE Pro offers the appearance of desktop Windows on adrenaline: applications open instantly, and menus snap to attention as soon as you click on them. But aside from this basic functionality, CE is still no replacement for Windows 95, 98, or NT.

NEW PROGRAMS

THE LATEST versions of Pocket Word, Excel, Internet Explorer, and Outlook improve somewhat on previous ones, but we still had some trouble completing tasks with them. You also get new programs with CE Pro, including Pocket Microsoft Access, InkWriter (a notepad applet), and an updated Sound Recorder.

The coolest new app for CE Pro, InkWriter, allows you to take notes by "writing" on the screen. But using InkWriter proved awkward on all but Vadem's Clio. You can close the Clio screen so that it faces up, away from the keyboard, and then treat it as a notepad-like pen tablet device. Sound Recorder, which records memos in the field, continues to suffer from poor audio quality.

SOFTWARE SNAGS

THOUGH CE PRO adds features to the stripped-down Pocket Office applets, some still lack basic functions. For example, Pocket Word and Pocket Excel can't tile multiple documents—instead you have to access each file individually from the taskbar. And Pocket Word can't count the words in documents, either.

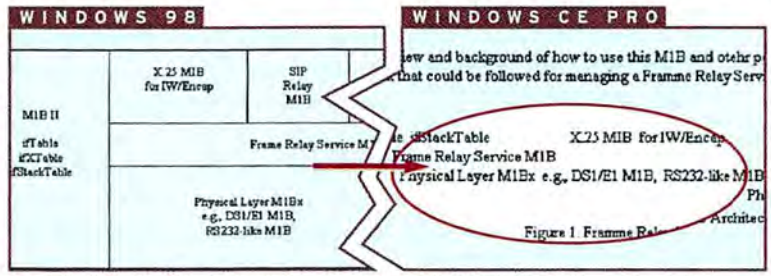
Microsoft touts Pocket PowerPoint as CE's killer app, but the program's too limited to customize presentations much—it can't show animations or slide transitions, so don't expect a lot of flashy presentation graphics.

The lite version of Windows Explorer can display only one folder and its contents at a time. Wondering which folder you put that important spreadsheet in? Then you'd better get organized, because there's no Find File tool.

One last gripe: In many dialog boxes, the small "OK" and "X" option buttons on the title bar can be confusing. Is "X" a Close box, a cancel (without saving) command, or a way of saying "no" and then saving your changes? In the final analysis it doesn't matter, since the icons are so small that you're as likely as not to hit the wrong button anyway.

Windows CE isn't a do-everything OS. But despite its limitations, this "Windows lite" is at times better than no Windows at all. Occasionally, a cup of Folgers suffices for the task at hand, even though deep down you'd prefer a cappuccino. If you can live with the plain cup of regular joe that is Windows CE, you could have the start of a fruitful Pocket relationship.

—Carla Thornton



FRACTURED FORMATTING: When Pocket Word for Windows CE Pro opened our Word 97 test document, it lost much of the formatting—including this table.

JOE BOTTOM LINE

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sophisticated design than what you see on the Sony VAIO or Toshiba Portégé.

Dell's external floppy drive unit includes built-in parallel, serial, and PS/2 ports, a nice convenience. The VAIO and Portégé require you to attach a separate port expander that adds the same connections. We preferred Dell's $299 CD-ROM drive, too. Unlike Sony's, which requires an AC adapter, Dell's drive can automatically switch to drawing power from the notebook's battery when you unplug the AC adapter from the drive. (Toshiba says that it will offer a CD-ROM drive for the Portégé 3015CT by May.)

Superslims get their **tortilla-like dimensions** by stripping built-in **features to the bone.**

THE MO' BETTA KEYBOARD

THE TOSHIBA'S TrackPoint-equipped keyboard has the edge over the others. All of them measure 9.8 inches wide, about 15 percent smaller than a full-size notebook's keyboard. But the Portégé's feels almost as comfortable as a regular notebook's, thanks to its near-standard key travel and spacing. And its eight-cell setup gives the Toshiba's battery a life that beats the competition's by more than an hour.

Toshiba's main departure from the norm is the absence of a built-in internal modem. But you get two PC Card slots on the Portégé—one more than Sony or Dell provides—so you still have a free slot, even with a PC Card modem in place.

The Portégé 3015CT and the VAIO PCG-505FX ship with Windows 98 and big bundles of home office software. The VAIO also has a good handwriting recognition program. But Sony's SOS software (which lets you talk to the technician trying to fix your laptop remotely) was a wash in our anonymous calls. We listened to Muzak for half an hour before deciding we'd rather drown than wait on hold.

On the other hand, Dell's Latitude ships only with Windows 95 (for now) because it's tailored for corporate users standardizing on one OS for a fleet of laptops.

VERY MEDIOCRE VAIO

WITHOUT A DOUBT, SONY'S superslim was a big disappointment. The VAIO's 102-minute battery life makes it the worst candidate for working in out-of-the-way locales—one of the chief attractions of superslims. And we found its keyboard to be the most uncomfortable of the three to type on, chiefly because molding around the touchpad tends to block the user's thumb from reaching the spacebar easily.

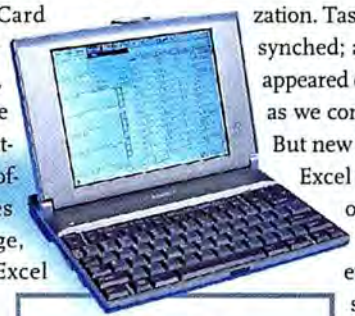
The IEEE 1394 port (a high-speed data connection tailored to multimedia) is potentially the most useful of the VAIO's extras; but few peripherals (save for certain Sony camcorders) have the necessary connectors. The VAIO's "programmable power key" didn't work on our unit.

By the time you read this, a new VAIO should be available. The PCG-505TX will be faster and lighter, according to Sony, and will feature a thinner, brighter display.

Handheld PC Pros: Not Quite Ready for the Road

ADVERTISED AS PC companions, handheld PCs—which include a keyboard, a relatively large screen, and Windows CE Pro 3.0—promise an easy, inexpensive way to take work along when you're away from your computer. And for very simple tasks, like writing a memo or checking your e-mail, they do just fine. But we were unimpressed with Windows CE. File conversion problems, poor file synchronization, and limited memory make complicated work nearly impossible.

We evaluated five H/PC Pro machines priced at under $1000 from Hewlett-Packard, LG Electronics, NEC, Sharp, and Vadem. A superslim knockoff like HP's $999 Jornada 820 provides notebooklike features at a bargain price, if your on-the-road needs don't go beyond contact, task, and appointment management; light e-mail; canned presentations; or work on simple documents. For those who need to take digital photographs and post them while out in the field, a machine like Sharp's Mobilon Pro PV-5000—which bundles image editing software and works with Sharp's $299 PC Card camera—might fill the bill. For all other users, though, a handheld device is likely to prove too limiting, especially if your out-of-the-office work involves numerous files or large, complicated Word or Excel documents.



OUR PICK:
Sharp's Mobilon Pro PV-5000
BEST USE:
Mobile professionals who need e-mail and Web access.
TRADE-OFFS:
Mediocre operating system; another PC required.

FILE CONVERSION BLUES

MOST HANDHELD users will regularly convert files with a standard PC, using the bundled Windows CE Services software. But beware: Some data is irrevocably lost in the conversion process. You can expect to lose macros, data filters, and graphs from spreadsheets. Our heavily formatted Word 97 test document also took a lot of work to repair after conversion: Tables lost their alignment, small caps morphed into lower case, and footers were deleted.

We also had trouble with file synchronization. Tasks and Contacts reliably synched; and the files we copied appeared on the handheld as soon as we connected the serial cable. But new and changed Word and Excel files—especially large ones—sometimes didn't transfer automatically, even when the handheld showed plenty of storage space to accommodate the document files.

NUTS AND BOLTS

TODAY, HANDHELDS come in several shapes and sizes. The smallest model reviewed here, LG's $699 Phenom Express Pro, weighs a ▶

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You've Got (Windows CE) E-Mail

WINDOWS CE promises easy access to the Internet from anywhere. I tested that assertion with the Vadem Clio and the LG Phenom Express Pro, using Windows CE's bundled Pocket Outlook e-mail software.

Outlook allows you to send and receive e-mail from standard POP3 or IMAP4 mail servers, but it doesn't work with proprietary systems like AOL or Lotus Notes. It performed as advertised, though I ran into a few glitches during setup.

BANDWIDTH BLUES

THE PROCESS of configuring a modem account in Windows CE wasn't exactly the same as the corresponding method in Windows 98. I had expected the Dial-Up Networking folder to be located somewhere near CE's desktop, but I unearthed the applet (called Remote Networking, by the way) living a lonely subterranean existence two levels deep in the Start menu.

After that, sending and receiving e-mail, including Word and Excel file attachments, posed no problem—so long as the attachments were sent from the desktop versions of Outlook or Qualcomm's Eudora. I couldn't open any file attachment sent from a Lotus Notes mailbox.

Wireless connectivity also worked. A Mobile Plus Cellular Modem and Metricom Ricochet modem connected effortlessly.

But only a select few Ethernet cards work with CE devices. I tried a Xircom CreditCard Ethernet 10/100 PC Card and got nowhere. CE Pro supports a few 10-mbps NICs, but most of the 100-mbps variety (like Xircom's) don't work at all. The Phenom ignored it completely; the Clio was courteous enough to tell me that it didn't recognize the card.

Despite a **minimal** set of **features,** CE's Internet tools **do the job**—slowly.

Windows CE slows down when a modem's active, and the Clio was more sluggish than most. Opening a 773KB spreadsheet (in the Clio's memory) took more than 4 minutes when its modem was active (compared to only 55 seconds when I was offline).

Staying online also wears out batteries quickly, and PC Card modems were especially deadly.

Pocket Internet Explorer did let me view most Web pages, but it lacked some features. For instance, I couldn't see animated graphics. The unintended benefit is that pages load a bit faster because IE doesn't include every crazy flashing banner ad.

All in all, Windows CE's feature-light Internet tools work. For doing light e-mail or quick checking of an online reference site, they'll get the job done.

–Stig Hackvän

mere 1.8 pounds, with an 8-inch-wide keyboard and an 8.2-inch touchscreen. The largest, Vadem's $999 Clio, is a jet-black, 3.2-pound system with a 9.4-inch touchscreen. The Clio's innovative "swingtop" design allows the screen to fold down over the keyboard so it faces upward, letting you use it as a pseudo-writing tablet.

In keeping with their size and purpose, handheld PCs offer fewer ports and connections than even the smallest standard laptop we looked at. Most handhelds provide at least one PC Card slot, an infrared data port, a USB port, a built-in modem, an internal microphone, and a speaker. Of the five models we obtained, Sharp's 2.7-pound Mobilon Pro PV-5000 is the most limited, lacking a microphone and a USB port.

Like the ones on superslims, most keyboards on handhelds approach the spacing and travel of a full notebook keyboard. But they also tend to be narrower, which moves some keys out of their familiar positions. The Jornada's keyboard felt the best to us, thanks to its 17mm pitch and 3mm travel, but we had to relearn some strokes. We found it difficult to type on the thicker-than-average Phenom Express Pro and on the Vadem Clio, whose keyboard curves in an arch, like a folding fan.

H/PC Pro displays are limited to dual-scan screens that normally top out at 9.4 diagonal inches, with 800 by 600 resolution and 256 colors. On the positive side, we found their image quality was equal or superior to that of most dual-scan notebooks—even on the H/PC Pro machines equipped with touchscreens, which often blur the display a bit.

online

LIBRETTO REPORT: Surf over to PC World Online for an analysis of Toshiba's Libretto 110CT, at www.pcworld.com/may99/ultraportables

SHARP'S EDGE

HANDHELD PCS TEND to run software very slowly. But Sharp's $899 Mobilon Pro PV-5000 was a real standout. The Mobilon's Indy 500–like performance numbers blazed past the other H/PCs that we tested, running applications and transferring files about 10 percent faster.

The Mobilon's sharp, large screen, bundled image editing software, and optional PC Card camera has a real target market: business users who need to capture images in the field. Sharp's image editing software lets you trim large digital images, to fit more images in limited storage space.

When you consider the Mobilon's full-size keyboard; bright, colorful display; extended battery life (over 6 hours); and bargain price—roughly $100 below the average—you may decide that it's the best deal of them all. If your requirements for weight, cost, and battery life aren't satisfied by some other small PC, a handheld may do. But until we see major improvements in Windows CE (see "Windows CE Pro: Fast, Basic, and Flawed," page 172), we suspect that these handheld devices may stumble as PC companions, even at attractive sub-$1000 prices.

Carla Thornton is a contributing editor for PC World. *Stig Hackvän is a freelance writer based in Middletown, California.* ■

Making Sense of SERVERS

To meet the dynamic needs of a growing business, nothing beats the power and scalability of real *server technology*

It's a fairly typical coming-of-age tale: Office gets computers, computers get networked, and collaboration begins. As the business starts to grow, so does the network and the demands being placed upon it. Eventually, a desktop PC is turned on its side and labeled "SERVER" with a Post-It note. Unfortunately, many businesses find out too late that these desktop systems simply weren't designed to offer the performance and reliability necessary to run an entire company.

In today's fast-paced business environment, businesses need to operate on Internet

Paul Mattingly found the solution to his company's growth challenges in a real server. **See page 3.**

BRIAN SMALE

time. The impact of server downtime or poor performance can be devastating to both internal productivity and customer support. When email crashes, or files can't be transferred, it's not a small problem any more. It's a crisis. With customers increasingly doing business over the Web, a stalled network is today's equivalent of a locked front door.

A real server is the foundation of a dependable network – helping you slash costs, boost profits and stay ahead of the competition.

Today's businesses clearly need more than a glorified PC at their core. What they need is a highly reliable machine that can easily grow as the business expands and provide the performance required to stay competitive. What they need is a real server.

Unlike desktop PCs, real servers are built from the ground-up to deliver the performance, reliability, scalability, manageability and serviceability that should be expected of a mission-critical center of business. A real server is the foundation of a dependable network — helping businesses slash costs, boost profits and stay ahead of the competition.

BROAD RANGE OF PERFORMANCE

A primary contributor to system performance is obviously the processor itself. Real servers powered by the Intel Pentium® III and Pentium® III Xeon™ processors are already available at speeds as high as 550MHz and cache sizes as large as 2MB. The Pentium® III processor offers better price/performance for entry level servers, while the Pentium® III Xeon™ processor offers higher performance and additional scalability for rapidly growing businesses. Performance-oriented systems also feature the Intel PRO/100+ and Intel PRO/1000 server adapters. Leading server manufacturers such as Somerset, N.J.-based Quantex Microsystems, Inc., use these premium components to deliver solutions that support the most demanding office productivity and Internet applications.

INCREASED RELIABILITY

Server downtime can be disastrous to any business. Unlike desktop PCs, real servers offer redundant power supplies, fans, hard drives and network connections to eliminate single points of failure and keep businessess up and running. In addition, real server hardware monitors critical system parameters such as processor temperature, power supply status, fan speed, and even the status of the operating system. These parameters can then be used to predict failures before they occur, allowing them to be repaired and thus avoiding unscheduled downtime. Real servers stay up and running with peerless efficiency, and that adds to any company's bottom line.

SCALABILITY

While most desktop computers only support a single processor and offer limited memory and peripheral expansion, real servers are built to grow or scale with a business and its budget. Quantex Microsystems already offers designs that can handle from two to eight Intel processors and up to 32GB of memory per server. These same systems come with additional drive bays, expansion slots and high performance connections to support more users, more customers and more data. Expandable, robust power supplies and carefully engineered cooling ensure that even a fully loaded system continues to operate reliably under the most strenuous load. These features allow businesses to maximize return on investment by building on existing systems instead of replacing them.

MANAGEABILITY

The advanced monitoring features that real servers offer mean nothing if you don't know about them. Combining real server hardware monitoring with server management software allows servers to be more effectively managed and kept in peak operating condition. Alarms and automatic outbound alerts can be generated based on various

Continued on page 4

REAL SERVERS = RELIABILITY

Quantex Microsystems's real servers have hot-swap drives that allow you to change or up-grade components on the fly while the system keeps on running.

THE BEST **LAID PLANS**

IN A BUSINESS where problems are solved at the drawing board, there is a real problem when the board can't handle the drawings.

That was the quandary facing Engineered Solutions, P.C., a company that specializes in preparing AutoCAD designs for mechanical, electrical and plumbing concerns. According to Paul Mattingly, president of the Fort Lee, N.J.-based company, newer CAD software programs and more-complicated designs were testing the limits of Engineered Solutions' 5-year-old computer technology.

"We had a 90 MHz single-processor Pentium, server, and a bunch of 486-based workstations," Mattingly says. "As the software got better, our design files got bigger. The machines we had just couldn't keep up."

The solution? A new dual-processor server from Quantex Microsystems, Inc., a supplier of hardware specially tailored for networking needs, featuring the latest processor from Intel Corp. According to Mattingly, the Quantex QX5000 server that he purchased last year delivers a level of performance, expandability and reliability his company never knew it needed. "Now we've got all the horsepower we need," says Mattingly of the QX5000 system, which is configured with dual Intel processors running at 450 Mhz.

Also standard in the QX5000 setup are five SCSI hot-swap drive bays, which allow for on-the-fly replacements of entire hard disks without disturbing the rest of the system. "With the redundancy Quantex built into the server, even with a hard disk failure, life goes on," Mattingly says.

Though server products are available from a wide range of vendors, Mattingly says Engineered Solutions picked Quantex as a supplier "because they give us the best bang for the buck." While Mattingly says he priced out other options, Quantex's use of quality, name-brand components such as Intel processors, combined with competitive pricing, won the deal.

"There are other chips, but for what we wanted, the Intel processor dual-configuration was perfect," Mattingly says. "Intel is a de facto standard. And we know there is an upgrade path we can depend on."

On the service side, Quantex's expertise is invaluable, Mattingly says, especially when dealing with complex operating systems like Windows NT.

"As a small business, we don't have the luxury of having a dedicated IT group," says Mattingly of his eight-man shop. "Windows NT is such a massive program, it has lots of nuances that are hard to figure out." Quantex's technical group, however, knows the ins and outs of NT, Mattingly says.

"Their technical people were great, they got us up and running on NT in short order," Mattingly says. "And they are always available to get problems resolved quickly."

To complete its overhaul, Engineered Solutions also purchased Intel-powered workstations from Quantex to give its engineers a blazing-fast platform to craft their drawings. It's easy to guess that Mattingly doesn't want to return to the old days of 486s and a single-processor server.

"The technology has changed a lot. In our initial setup, 90 MHz on the server was a lot of horsepower," Mattingly says. "But if we had to use that hardware now, someone would have to sit by the server every hour of the day, fearing death. It's safe to say we like having the latest and greatest stuff."

BRIAN SMALE

Engineered Solution's Paul Mattingly turned to Quantex Microsystems servers: "Now we've got all the horsepower we need."

THE INDUSTRY **VIEW**

INDUSTRY ANALYSTS draw sharp distinctions between real servers and PCs pressed into action as servers.

"Folks used to take a desktop machine, turn it on its side and call it a server," says Amir Ahari, senior analyst for PC systems at International Data Corp., in Framingham, Mass. "Some of them did it because they weren't well-educated on the options that were out there." What users need as they expand their operations is "something that's going to be reliable and available, and not always breaking down."

"Server products have come a long way from being just souped-up desktop PCs," says Amir Ahari. "They are designed from the bottom up to have expandability to handle more memory and multiple processors."

Ahari notes that other features such as the internal system bus — the gateway for processes that take place inside the computer — are much more robust in real server platforms than in general-purpose PCs. Plus, new chip designs, like the Intel Pentium® III and Pentium® III Xeon™ processors, add features such as expanded cache that let servers handle multiple tasks from multiple sources far more efficiently than standard desktop models.

And the new Streaming SIMD extensions for repetitive calculations allow the Pentium® III processor to "swallow a whole bunch of data at once," for increased performance. "It's a new breed of processor," Ahari observes.

"If a company opens its back office to a storefront, or to the Internet, they need a dedicated machine to handle the hits coming in," Ahari says. And since back-end or inventory programs are usually database-oriented, those hits can be requesting huge amounts of information. "Large Excel files take up a lot of resources," Ahari notes. "Multiply requests for those resources by a hundred new users, and regular PCs will freeze."

Some businesses may feel they can't afford server technology, but Ahari notes that because of the increasing cost of network downtime, a growing business can't afford *not* to have a real server.

Continued from page 2

system conditions to predict failures before they occur, avoiding unnecessary downtime. In the event of a critical hardware failure or operating system freeze-up, immediate notification can be delivered to a system administrator or service technician via the network or a pager to ensure that downtime is minimal. With remote access hardware and software, timely health monitoring, troubleshooting or rebooting a hung system can be only a network connection or phone call away. This means the system continues to run and deliver for the business. Try doing that with a desktop PC.

SERVICEABILITY

A business can't afford to close its doors while it mops floors or changes light bulbs. Similarly, today's business can't shut off its computer system while making routine repairs or upgrades. Real servers deliver this "always on" capability via hot-swappable components. Hot-swap drives and power supplies allow you to change or upgrade components on the fly, while the system keeps on ticking without missing a beat.

Given all these advanced features and functions, it isn't surprising that a common misconception among some business users is that real servers are too expensive. Fortunately, progressive server manufacturers such as Quantex Microsystems offer a range of options to meet specific business needs. Quantex offers affordable and scalable, build-to-order server solutions to address the current and future needs of every small- and mid-sized business. These systems feature the highest quality components, including Intel processors and Intel networking components.

Quantex Microsystems sells direct to small and mid-sized businesses. They have the experience, technology and expertise to translate the challenges and requirements of any business into custom-built solutions that are affordable and scalable. To survive in today's competitive environment, businesses need to be connected, they need an Internet presence, and they need to support e-commerce. The bottom line is, they need a real server from Quantex.

To view the online version of this special report, go to http://www.pcworld.com/advertiser_section/realserver/

QUANTEX

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Setting Up Shop ONLINE

Think it's easy to hawk your goods online?

We asked Web entrepreneurs for the fastest, easiest, and cheapest ways to do business on the Web.

ILLUSTRATIONS BY RANDALL ENOS

BY STEVE BASS

I used to wonder how anyone could earn money peddling their wares on the Web. Watching the phenomenal sales of heavy hitters such as Amazon.com and Music Blvd set me straight—e-commerce works. But does the formula spell success for small and medium-size businesses, too?

E-commerce solutions come in all flavors and sizes. Big companies often buy their own server and e-commerce software and run the whole thing themselves. But that can cost hundreds of thousands of dollars. For smaller companies or individuals who want to try their hand at business on the Web, there's a far easier and cheaper way.

A number of Web sites let you build an online store and run it with only a browser and a credit card. The benefits are obvious. You don't need a showroom—heck, you don't even need a real building to get started. Your store is open 24 hours a day, 365 days a year; you can update your catalog in a couple of clicks; and the information you can collect about potential customers is a retailer's dream come true.

But is it really that quick, easy, and affordable to set up shop on the Web? I went online to find out. I chose three electronic storefront services that provide everything you need to create and host a store on the Web: HipHip Software's Merchandizer E-Commerce System, Yahoo Store, and ICat Commerce Online.

I tested these services myself, setting up Bass-o-Matic International, a fictional store that sells rhino horns, semiautomatic weapons, and Furbies. I also contacted hundreds of real e-commerce store owners and asked what worked for them, what didn't, and what they would do differently if they were starting over. Here's what I learned.

Setting Your Sites

ALL THE SERVICES I used offer templates for creating and designing your site. So though I hired Web designer David Jung to critique my work and offer advice, you may not need a professional.

But you'll need to know how you want your store to look, or you'll waste a lot of time spinning your wheels. "Yahoo's [site] is helpful, but not without trial and error," says Peggy Poehler, owner of Twice As Nice (www.twiceasniceplus.com), a Yahoo store selling doll-making products. "We had to visit a lot of other stores to get ideas."

Fortunately, two of the three services I used let you test your design prowess by creating a site without any commitment. On Yahoo's free trial site, I created a tolerable—and thoroughly dull—site in under an hour. I simply agreed with the wizards, filled in the blanks, uploaded a few photos, and was done. Then I repeated essentially the same listless experiment on ICat, placing small photographs on my site.

But instead of tackling Merchandizer's hands-on demo, I signed up to create a real site. I used its setup wizard, filled in the blanks, and immediately felt lost. I was stumped, for instance, trying to view the site after making changes in the wizard. Unlike with Yahoo and ICat, I couldn't figure out what to do next without checking the online help. Still, the more I played with the Merchandizer site, the easier it was to use.

The pages that I designed with Yahoo looked best because the software actually creates GIFs—fast-loading graphics files—for buttons, bullets, and product titles. This achievement may not sound like a giant leap for e-kind, but graphical elements look better than plain text, and Yahoo keeps these graphics files small by reducing the number of colors.

Yahoo also creates thumbnail images of pictures you can upload on the fly. Even Jung, my Web designer, is impressed: "Yahoo generates these graphics far more quickly than a designer could," he says. "If I wanted to change the look of the buttons, I'd have to do each image separately, but Yahoo does them all within seconds."

BREAK THE MOLD

WHILE WIZARDS let you design a store relatively quickly, they may keep you from taking full advantage of online design's benefits. "Creating a basic site on the Yahoo store is so idiot-proof, a gerbil could do it," says Lewis Perdue, who runs The Wine Society of the World online (www.winesociety.com). "But there's a lot more to building and maintaining a site once you get rolling."

If you build your site on the backs of wizards, it may look like everyone else's. "The Yahoo Store can be set up in a fairly short period," says Sina Ghaboussi of YNJ Micro (www.ynjmicro.com), a multime-

Care and Feeding of Your E-Business

HOW MUCH does it cost to set up and run an electronic store with ICat, Merchandizer, or Yahoo? Electronic shopkeeping, while not free, is a lot cheaper than renting square footage and creating window displays. Here are the major first-year operating expenses for an e-store selling 50 products. Depending on how you choose to market your store, additional monthly costs could range from $30 to $70.

Setup and maintenance fees	$ 900
Domain name registration	**$ 70**
Designer charges for creating logo	$ 250
Scanner	**$ 150**
Photo imaging software	$ 70
Credit card authorization and processing fees [1]	**$ 600**
Total first-year cost	**$2040**

[1] Does not include one-time start-up fee or per-transaction charges.

"Once I cross-promoted my **Jazz and Blues Masters** site on my Web page, I started to see **sales grow** steadily."

POSTER BOY: Jeff Sedlik sells posters of blues and jazz artists from his store.

dia equipment store. "But you end up with cookie cutter sites. Look at everyone's menu bars—they all look the same."

So invest some time in spicing up your site's design. "Help your customers by keeping the opening pages clean and simple," recommends Jung. "Go shopping yourself, and see what you like. Focus on how easy—or difficult—it is to find what you want."

As you design your site, you may have to learn a little HTML—the code behind the scenes. "If you're familiar with HTML, you can be more creative with your site," says James Stephens, who runs Play Piano Now (www3.icat.com/store/music), which sells instructional books and tapes.

But, while all three e-commerce vendors let you add HTML code to your site, they seem to discourage all but advanced users from bothering with the code. ICat's help explains that you can bypass its choice of font style or size for your address listing by inserting an HTML code, but it doesn't say how. Yahoo offers more thorough advice, showing how to change text color and alignment. It also discusses more-advanced tricks but omits clear instructions. Merchandizer gives the clearest help, including advice on how to change buttons and use HTML codes for links, but it suggests that users unfamiliar with HTML avoid that section.

Two sites can help where the services don't: Dave's interactive HTML tutorial (www.davesite.com/webstation/html) and Webmonkey (www.hotwired.com/webmonkey/teachingtool). Dave's page walks you through basic HTML. Once you're hooked, Webmonkey instructs you in more interesting uses, with juicy articles like "Dynamic HTML: Making Stuff Zoom Around" and "What can <META> Do for You?" After you've visited those sites, grab a trial copy of NoteTab Pro, a $20 program for HTML editing that is great for newbies.

Once you've livened up your site with HTML-generated extras, it's time to master the art of the scan.

PICTURE PERFECT

WHEN ERICA CARLSON started setting up the nonprofit store Bountiful Harvest (st6.yahoo.com/bountifulharvest), the site looked fine right away. But getting good pictures of the product—jewelry made from African beads—was hard. Since scanned photos from a fixed-focus camera looked unimpressive, Carl- ▶

PHOTOGRAPH: ANN SUMMA

DRAWING A BEAD: Erica Carlson's site funds development in Nigeria.

> "Pictures taken with a **digital camera** were **way too dark** on the screen."

son tried taking pictures with a digital camera. "These produced sharper images," she says, "but they were still *way* too dark on the screen." Eventually she used Photoshop to modify the images.

Like Carlson, you'll want pictures on your site, so you'll need a scanner. If you plan to scan photos just for the Web, a $150 scanner is adequate. Choose a 30- or 24-bit model that can handle a resolution of 300 by 600 dots per inch; resolutions above 75 dpi don't noticeably affect the appearance of Web pictures. (See "A Scanner for All Reasons," April, www.pcworld.com/apr99/scanners.)

All three services accept scanned images in the same way. John Hadley, whose Frontline store sells industrial safety equipment, was delighted by Merchandizer's willingness to optimize his photos for him.

Even with such assistance, you should plan to become fairly proficient at using photo retouching software. You'll want to crop photos, fiddle with contrast, and add background. (For additional ideas, see "Picture Perfect," February, www.pcworld.com/feb99/photoedit.)

Service With a 8)

GETTING your site up and running in all its wizard- and HTML-generated glory is the easy part. The fun begins when customers appear. That means dealing with credit card transactions, taxes, and shipping charges.

In the land of cyberimmediacy, most customers want to pay with credit cards. To handle their orders, you'll need a merchant account with a bank. If you already have one, cool—use it. Unfortunately, most traditional banks want a DNA sample when the owner of a new e-commerce site asks for an account. Generally a bank insists on seeing your last few tax returns, demands that you have an account with the bank, and wants to visit your store. (Which could be difficult, since it might not exist in traditional terms.)

All this makes Merchandizer's offer of an e-commerce merchant account through CardService International *very* attractive. At press time opening a merchant account was free, and CardService was refunding Merchandizer's $149 site-setup fee. CardService charges $10 a month plus 2.15 percent of credit card sales and 20 cents per transaction. Besides the cost of the merchant account, you will have to pay for the actual processing and managing of credit card transactions. The cost of processing those orders offline, or online in real time through Authorize.Net, is approximately $35 per month.

At press time ICat also offered credit card processing through CardService, but its fees were higher, starting with a one-time $145 merchant application fee.

PHOTOGRAPH: ANN SUMMA

The company also charged $10 a month, 2.5 percent of sales, and 40 cents a transaction. Processing through CyberCash, which works like Authorize.Net to finalize payment, cost another $48 per month. At press time Yahoo was creating its own replacement for CyberCash.

There's no getting around it: Accepting credit cards will set you back at least $50 a month. But after enduring the hassles of making your site credit card–friendly, you'll find creating shipping and tax tables mercifully easy.

SHIPPING OUT

AT ICAT'S tax page, I browsed the listing of states, found California, entered it into the tax table, and was done. With Merchandizer the task was similar, but I had to know my tax rate. Yahoo let me apply tax rates by state and zip code—ideal for tracking different county and local rates.

Setting up the shipping process was easy too. ICat let me charge for shipping by order or item; I used Yahoo's Auto Wizard to create shipping tables based on the amount or weight of the order. With Merchandizer, I picked from the list of options and used shipping fees based on weight.

One nice touch: Merchandizer let me add a handling fee to the shipping charge. The company has also integrated United Parcel Service's online tracking system, so customers can pinpoint their orders' progress. You still have to schlep the package to a UPS drop-off center to ship it, unless you have an account with the company. Check out the UPS site (www.ups.com) for more information.

Once you've set the shipping and tax tables, the site takes care of itself. All three services provide "shopping carts" where customers can "place" purchases. When they are ready to check out, the site automatically totals the cost of the items in the cart, adds shipping and sales tax, and sends an e-mail acknowledgment.

If customers need to get in touch, they should be able to find your contact information on the site. To avoid the cost of a toll-free phone number, you could even use an online service called WebCallback. When a customer types their phone number and clicks a button on the screen, WebCallback's server connects your phone line with the customer's.

Once those curious customers start buying your wares, you'll discover one of the bonuses of online selling: reports that show you how the site is working.

All the services we tried include reporting tools to help you keep track of online sales, orders, and customers. They're all good, but some are better than others. For instance, Yahoo's reports yield tons of customer information. Among the most valuable are customer click trails and product search strings, which enable you to see what parts of the site interested your shoppers. Handy on-screen graphs reveal sales figures, page view statistics, and order activity. Yahoo also provides convenient access to statistics and to all the tools you'll need to manage your store from the same page.

Not to be outdone, Merchandizer offers plenty of sales, order tracking, ▶

How NOT to Succeed in E-Business

CUSTOMERS—who needs 'em? Always asking troublesome questions, demanding service, complaining. Phooey! Here's how to make sure your Web site will drive away even the hardiest consumer.

1 Put Customers to Work
Design your site so it's hard to use. Bury your contact information so finding you is difficult. And whatever you do, *don't* include a phone number.

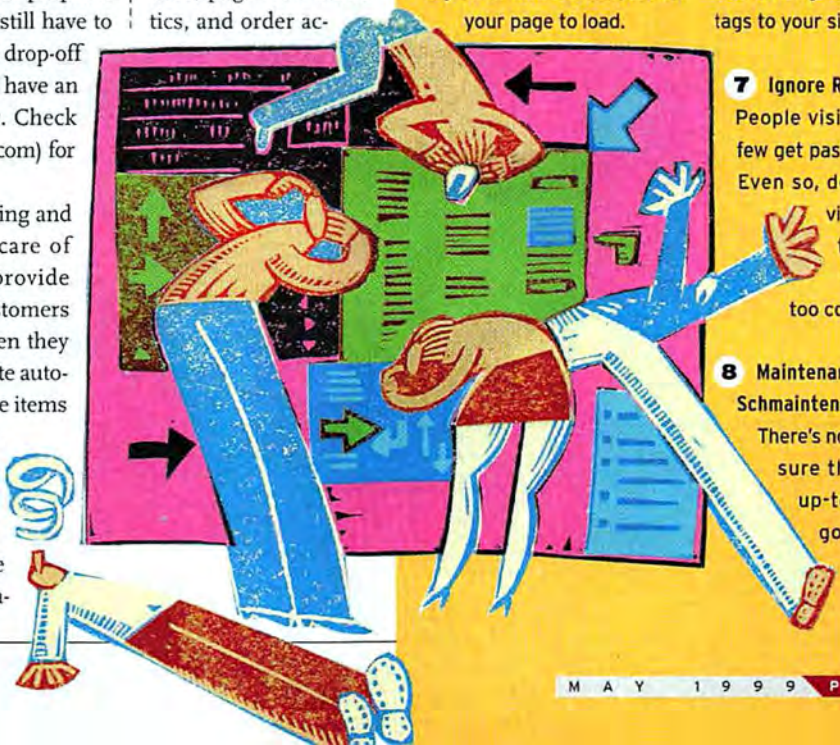
2 Use the Seat of Your Pants
E-commerce is unique, so don't bother developing a business plan. Instead, do whatever feels good, and don't worry about it.

3 Make Your Store Fancy
Add whirling GIFs, gyrating buttons, flashing banners, and 3D pictures. Punish customers who have slow modems by making them wait 20 minutes for your page to load.

4 Get Back to Buyers Later
Don't be concerned if you can't answer a question right away. In fact, checking e-mail more than once a week probably constitutes overkill.

5 Keep to Yourself
Forget about checking out the competition. Other sites don't offer anything of value, and goodness knows, your site's already perfect.

6 Minimize Marketing
You've plunked down your wares and opened your doors, so relax. Don't register with search engines or add metatags to your site.



7 Ignore Reports
People visit your site, but few get past the front page. Even so, don't track page views or click patterns. Most statistics are way too complex anyway.

8 Maintenance Schmaintenance
There's no reason to make sure that your site is up-to-date. You've got better things to do—like file for bankruptcy.

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and customer monitoring reports, too. The prospecting tools are standouts. For instance, you can e-mail site visitors who filled in the form but didn't purchase anything. And Merchandizer gives you a bird's-eye view of the number of people checking out your store, when they visited, and what pages they see.

ICat is less impressive in this regard. True, the service includes methods for tracking customers, items, and store and income activity, as well as ways to view customer lists and order summaries. But unlike Yahoo's graphical reports, ICat's reports are uninspiring—they simply list details about customers, orders, and other site activity.

After you view a report about, say, how many orders came in today, you'll probably want to examine the numbers more carefully. All three vendors provide ways to export the data. Yahoo shines at exporting orders, customer details, and statistical data. You can import and export into Microsoft Access, Excel, FoxPro, and Paradox. Even better, Yahoo exports data directly into Intuit's QuickBooks. Merchandizer imports and exports using Microsoft Access and Excel files. By the time you read this, it'll also be able to export directly into the contact manager GoldMine, a neat way to keep track of customers and stay in touch with them. ICat imports and exports data to Microsoft Excel.

Getting People in the Door

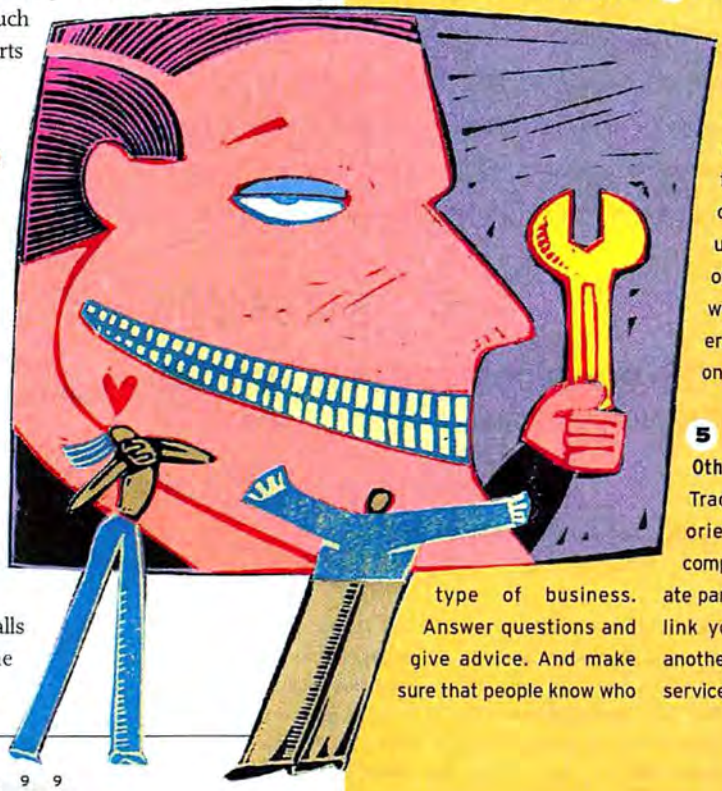
HOW WILL CUSTOMERS find your store? Yahoo and ICat give you a shingle in an electronic mall—a collection of e-commerce sites under the company umbrella. Yahoo calls its mall Yahoo Shopping; ICat's name is Shopping Mall. (At press time, Merchandizer lacked an e-mall, but its RealStores site should be open for business by the time you read this.)

Will customers flock to these malls and increase your business? The answer is an unequivocal maybe.

A few owners of online stores say they could not have succeeded without being listed in an e-mall. "Have we seen business increase? Yes, from only a handful of potential customers to more than 16,000—of whom 27 percent made a purchase—in just a few short months," says Poehler, whose Twice As Nice doll-making craft store is hosted on Yahoo's mall.

But not everyone is equally ecstatic. "Yahoo has done damn little," says Perdue, who is disappointed with the way that Yahoo has promoted his Wine Society site. Nevertheless, when I ask Perdue whether his company has sold much, he says, "Yep! I got over $6000 in orders from Japan alone in the first month."

You too might hit the jackpot if your site is spotlighted, becoming—hushed tones, please—*a featured store*. The services bestow this honor on the most captivating sites. But even that award doesn't guarantee increased sales. "I've been fortunate to be a featured site on Merchandizer's home page, but this doesn't generate sales," says Eric Stelljes, who sells lawn irrigation equipment at SprinklerSpot (www.sprinklerspot.com). ▶



Selling Yourself and Your Services Online

SELLING A SERVICE? Then you're selling something fundamentally intangible. And without a solid product to display, it's hard to show what you do. Don't fret, e-business can work for you, too.

1 Make Customers Welcome
Make your site a spot people will want to visit often. Create a page of *insider tips* that change weekly (fun stuff you can do with your electronic fly swatter; ten things your contractor won't tell you; five secrets travel agents use).

2 Get Online
Use the Web to capture business for yourself. Visit bulletin boards, stay on newsgroups, and join chats that involve your type of business. Answer questions and give advice. And make sure that people know who you are—stick your business name and Web address at the bottom of your e-mail.

3 Stay in Touch
Make sure that customers and and other visitors to your site have the option of signing up to receive occasional e-mail messages from you. Keep these bulletins short, pack them with useful tips, and report what's new on your page.

4 Contact a User Group
Are you a PC consultant? Do you create Web sites? Contact a user group in your area and set up a presentation. ("How to start an e-commerce site" is a natural topic.) To find a list of user groups, check out www.yahoo.com/Computers_and_Internet and click on *User groups*.

5 Cross Over to the Other Sites
Track down other service-oriented sites that don't compete with yours, and create partnerships. For example, link your carpentry site to another site's picture-framing service for an artful pairing.

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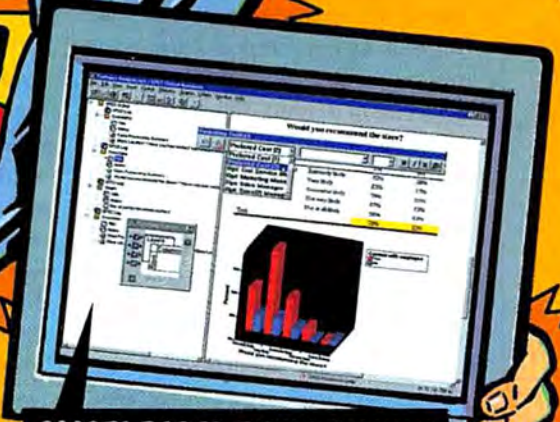

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LAWN RANGER: Eric Stelljes runs SprinklerSpot from his office in Okemos, Michigan.

Stelljes points out one drawback with his particular situation: Yahoo is much better known than Merchandizer, and it therefore attracts more shoppers.

So, while a cybershopping mall may draw customers in your direction, it should be just a part of your marketing plan. Nearly every online shop owner says marketing is crucial to running a successful site. Sticking a site online and hoping for the best just won't cut it.

GET THE WORD OUT

THE FIRST STEP in any good marketing plan: Register your domain name (it'll help if the name at least hints at what you sell). All three services will help you register the name. But you'll have to pay a $70 fee to Network Solutions (http://rs.internic.net), which does the actual registering.

Next: Increase your store's visibility by getting it indexed by the search engines. Perhaps the easiest approach is to include metatags on your store's opening page. Metatags are simply keywords that describe your site, invisible to users but not to search engines. When say, www.hotbot.com or www.google.com finds your page, it takes details from the metatag and adds the site to its searchable database. Adding metatags is fairly easy. With Yahoo, for example, just type the keyword into a field, and the service automatically inserts it on the page as a metatag. Both ICat and Merchandizer have metatag boxes you can fill out on your site's front page.

> "I've been fortunate to be a **featured site** on **Merchandizer's** home page."

Another strategy is to register with every possible search engine. Resign yourself to spending a weekend, forgo watching a couple of baseball games, and dig in. It's not difficult, just not much fun. To get included on AltaVista (www.altavista.com), for instance, click the *Add a Page* link and fill in your URL. Click *OK*, and your site is submitted. For a jump start, you can have Submit It (www.submit-it.com) and Net Creations PostMaster (www.netcreations.com/postmaster) register your site for you—free. Combined, these services will send your URL to more than 35 search engines. You'll also find a long list of search engines by clicking Yahoo's *Searching the Web* at www.yahoo.com/Computers_and_Internet/Internet/World_Wide_Web.

Which search engines generate the most leads? "We get *lots* more traffic and business from AltaVista and InfoSeek than from Yahoo, which has been a total disappointment," says Perdue of the Wine Society. He complains that Yahoo doesn't pitch his store proactively and grouses that the service didn't automatically add his site to its search engine.

Another problem can stem from the way the page is configured. Most search engines tend to ignore *dynamically* generated pages. That's because the content of dynamic pages changes frequently—think of a form that's completed by the customer or the contents of a shopping cart—and search engines treat the pages like moving targets. For search engines, it's best to have a *static* page. Yahoo uses static Web pages throughout. Both ICat and Merchandizer's first pages are static, and the rest are dynamic. ▶

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Many people promote their online store on another Web page they operate. Photographer Jeff Sedlik says that as a Web novice, he got "$1500 in sales in the first week alone" from his ICat Jazz and Blues Masters e-commerce site (www.jazzandbluesmasters.com). To help attract customers to his store, he purchased a Web designing program, built a home page on weekends, and linked the page to ICat's free store. "Once I cross-promoted my site on my Web page, I saw sales grow steadily," says Sedlik.

If you already have a home page spotlighting your company, ICat can integrate e-commerce features into it. The service's Commerce Cart provides a shopping cart; sales and customer reports; order confirmation; and payment, shipping, and tax settings. Commerce Cart lets you customize the shopping component to look just like your home page. The annual cost is about $200 for a catalog of 10 items, $400 for 50 items.

Getting Help When You Need It

THOUGH SETTING UP shop can be relatively painless, you'll probably need assistance at some point along the way. Luckily all three services provide guidance, mainly in the form of online help.

Yahoo's user guide is comprehensive, but it's the most awkward of the three: It omits screen-capture examples of pages, and there's no index; finding specific information was nearly impossible for me. And the guide is not downloadable. My advice? Open a second browser to view the manual while editing.

ICat's tutorial is incomplete and less detailed than Yahoo's. And to use it while editing, I had to view it on a small, pop-up browser that wasn't resizable. I had to spend time navigating up and down with scroll sliders. The tutorial is viewable as an Adobe PDF file, handy for printing. ICat also offers a hodgepodge of generic and moderately useful help on its home page. For instance, 'Get Advice from the Experts' has a wealth of valuable ideas. But finding out whether my ICat store could accept credit cards was nearly impossible because the advice was hidden under the unlikely sounding link 'Improve Your Business'.

The help desk star is Merchandizer. Its manual provides a neatly organized page with answers to frequently asked questions, such as how to retrieve orders, how to apply for a credit card merchant account, and how to add HTML pages to a site. You can view the manual on screen as an Adobe PDF file, and in addition you can download it.

Yahoo offers e-mail help, but some are not happy with how it works. "Yahoo's documentation is not great, and the help desk is hit-or-miss," says Elizabeth Molloy, owner of the Folk Art & Lore gift site (www.folkartlore.com). And Marilyn Lombardo, who owns Absolute Ties Online (st3.yahoo.com/tiebar2), says, "Yahoo is a little slow responding to technical questions—and in cyberspace, a couple of days seems like centuries."

Selling on the Web can make your life **easier.**

You might even say **it's good business.**

But sometimes the longed-for personal touch materializes. Merchandizer's hands-on approach delighted many users. "They gave me help with graphic design early on," says Lee Leitner, owner of Earth Smarts, which sells gift cards, fountains, chimes, and garden ornaments (www.earthsmarts.com). "I've called at 10 p.m. or on a Saturday and found someone to talk to," he adds.

Yet more evidence that selling on the Web can make your life easier. You might even say it's good business.

online *Learn to avoid the pitfalls of e-commerce on PC World Online at www.pcworld.com/may99/ecommerce.* PC World *Contributing Editor Steve Bass writes the monthly* Home Office *column. He is a licensed marriage and family therapist and president of the Pasadena IBM Users Group. See page 12 for contact information. Web designer and freelance writer David Jung contributed to this story. You can reach him on the Web at davidj@vb2java.com.* ■

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◆ Merchandizer, HipHip Software, 800/636-6343, 305/819-8111, sales@merchandizer.com, www.merchandizer.com
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◆ NoteTab Pro $20. Fookes Software, support@notetab.com, www.notetab.com
PRODUCT INFO NO. 710

◆ United Parcel Service, 800/742-5877, www.ups.com
PRODUCT INFO NO. 7611

◆ WebCallback, 17 cents per minute, $10 monthly minimum. GlobalPhone, 800/705-5033, www.webcallback.com
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◆ Yahoo Store, Yahoo, 408/616-3801, info@yahoo.com, http://store.yahoo.com
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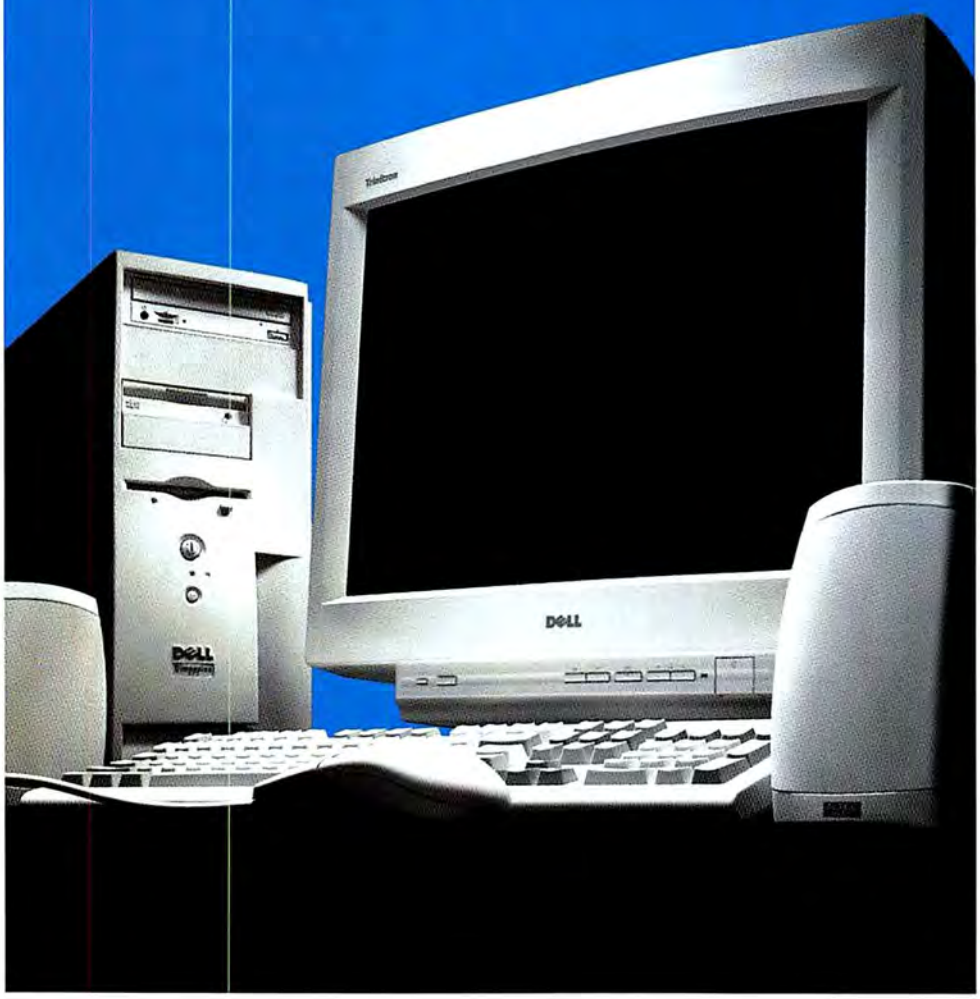

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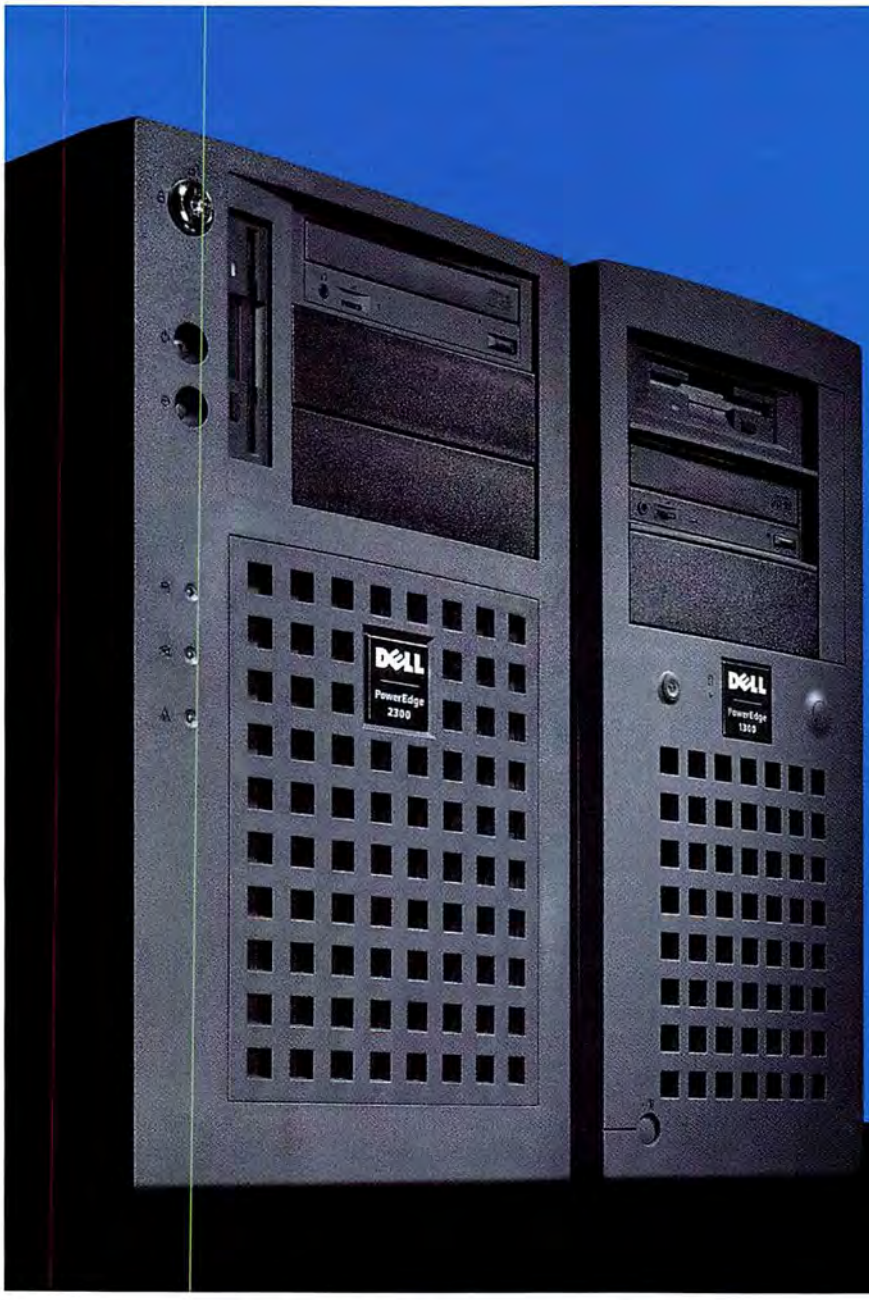

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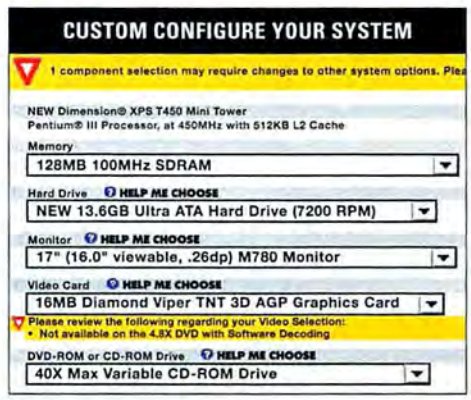

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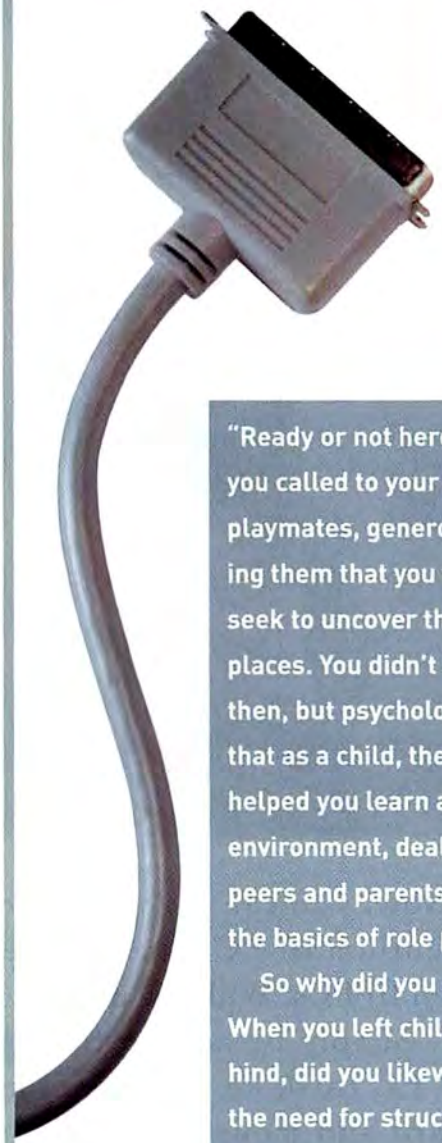

"Ready or not here I come," you called to your hidden playmates, generously warning them that you would soon seek to uncover their hiding places. You didn't know it then, but psychologists say that as a child, these games helped you learn about your environment, deal with your peers and parents plus learn the basics of role playing.

So why did you stop? When you left childhood behind, did you likewise leave the need for structured play behind too?

Dr. John Latz, psychiatrist. Below: Maxell Corp.'s Half Life 3-D game.

ROGER HALL

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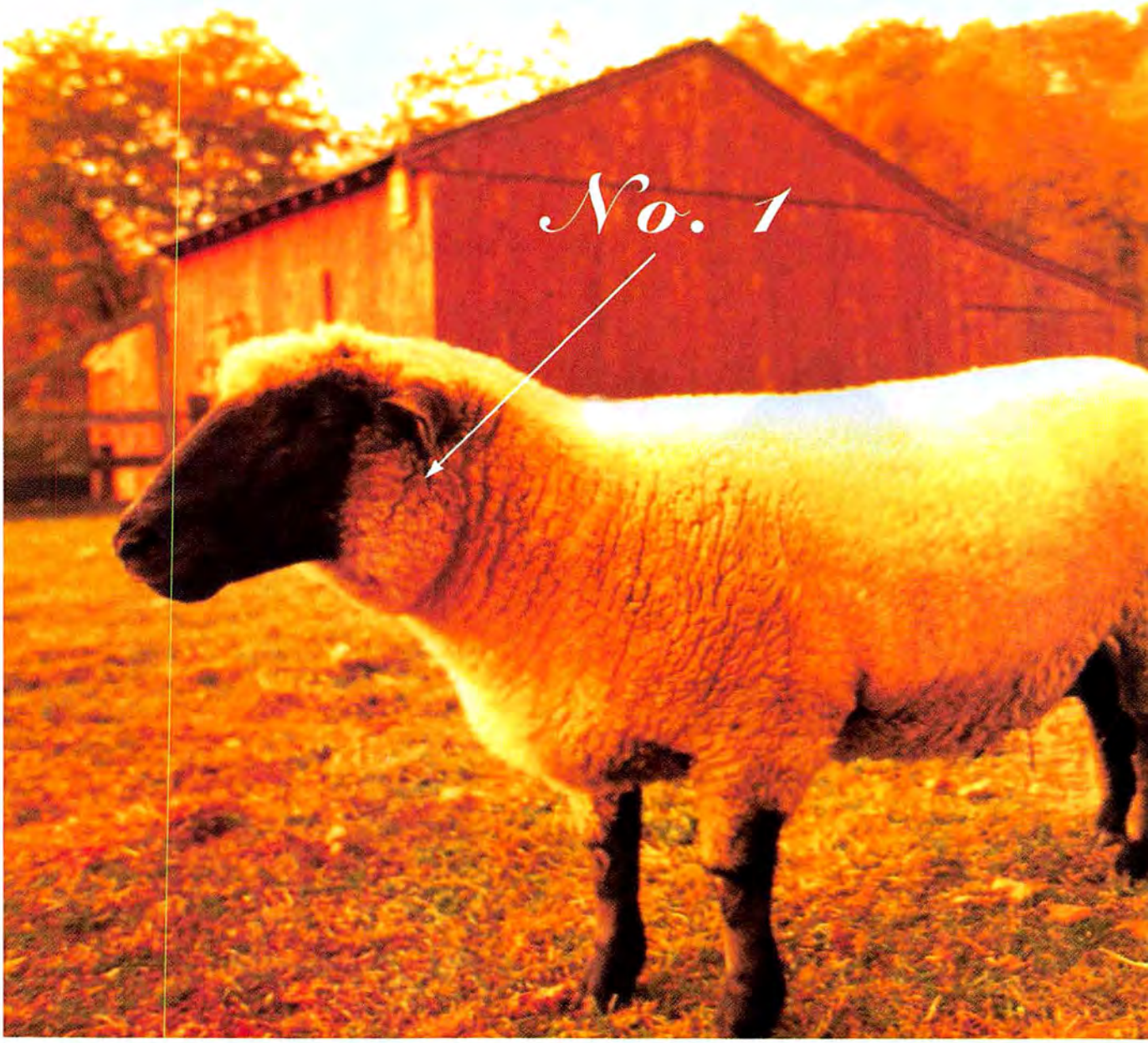

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"I think the answer is 'no,' we do not outgrow the need to play and for games," says John Latz, MD, a psychiatrist in Mooresville, N.C. "As adults, we all still need some kind of recreation."

So, over the years, we exchanged tag for touch football, jump rope for aerobics and playing house for paying for a house. Ironically, that progression is reversing itself. Today, high performance hardware, software and peripherals allow you to rekindle the child to return to the world of secret hiding places, make believe dangers and foster "executive stress reduction."

"Pardon me," you protest, "but I fail to see how getting devoured by aliens can reduce my stress level." Point taken. You could expect that quiet time entertainment such as solitaire, or thought-provoking games such as Flight Simulator, could divert your mind from workaday activities and reduce everyday tension. However, even the most stimulating games can reduce stress.

Maxell Corp. of America's Half Life allows you to save your place and completed levels on external media.

"Games are a form of New Age meditation. They can relax because you don't think of much else besides playing the game. This is especially true when playing intense games," says William Beacher, an Irvington, N.Y. psychologist.

"As adults, we all still need some kind of recreation." —John Latz

Games enable people to shift their brains into neutral for a few minutes or hours. Craig Willis, President of Epic PC in Mesa, Arizona, spends his days and many of his nights assembling, configuring and fixing computers. Why, then, does he choose to decompress with his PC? "Playing around with the computer helps me unwind. I just flat-out enjoy it," he says.

Willis primarily uses his computer to access the Internet for information about his hobbies, sports, and the outdoors. "I regularly surf ESPN, MSNBC, Sportsline and Fastball.com. *Backpacker* magazine is my site of choice. It lets me escape into the wilderness without ever leaving the office."

SURROGATE THRILLS

Computer games let everyone escape from the routines of everyday life. When they deliver the vicarious thrill of climbing an ice-covered summit, shooting slobbering aliens or piloting a commercial jet, they enable us to transform the ordinary into extraordinary.

"Everyday, you expend most of your waking hours trying to meet, or avoid, the expectations other people set for you," says James Textile, developer of the game Therapy. "Games lets you evade this responsibility by defining your role. Games give you an arbitrary alter ego into which you can escape for an hour and a half." For most of us, every day has moments when you have to put the work on hold to help restore your energy and creativity.

Sales figures attest to the need to change gears and escape into fantasy. According to market research firm International Data Corp., in Framingham, Mass., 30% of more than $6 billion in purchases of consumer software products was spent on home entertainment and educational software.

But for all their benefits, games have acquired a reputation as a timewaster in the corporate world. Whether you see game playing as the digital equivalent of schmoozing at the water cooler or a productivity booster depends on how you personally react to stress.

What kind of digital diversions work for you? On one end of the spectrum you can opt for a product like Microsoft's SideWinder, a game controller that simulates the pulse pounding experience of driving an Indy racer. Or, for total relaxation, you can use Mind Gear, Inc.'s visual biofeedback device that features programmable syncopated flashing lights. If music soothes your stressed soul, then Diamond Multimedia's palm-sized MP3 solid-state player delivers up to six hours of pleasant listening to audio

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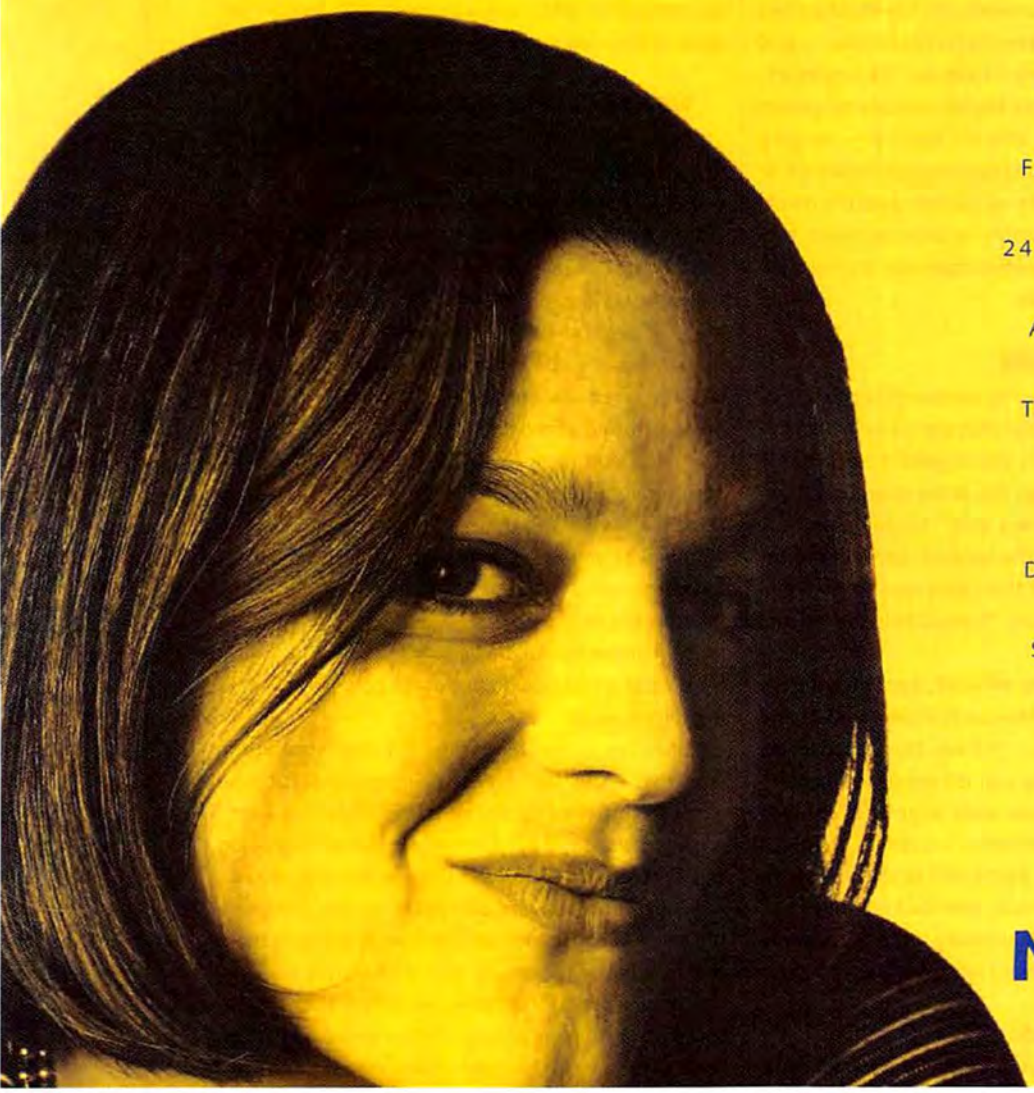

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Internet role-playing games offer a fast escape from the daily business pressures for Daryl F. Mallett, CEO of Blue Fire Technologies. "I'm sitting here pounding away at the keyboard one minute, just another guy in a suit, and the next I can jump online and become "Blu," the courageous wolf cub. It's quite the kick."

"You can discover more about a person in an hour of play than in a year of conversation."—Plato

Mallett's current favorite game is Werewolf: The Apocalypse. "But I also unwind with CD-ROM games like Morpheus or SkyBase, Descent, Doom — and anything else I can get my hands on," he confesses.

But don't assume that Mallet's choice of games reveals a secret insight into his psyche — ranging from a love of salmon to scratching his back on a fir tree. "A person's choice of games doesn't reveal much about their personality. In extreme cases, perhaps it might, but more often than not it's not a reliable sign," says Dr. Latz.

AT YOUR FINGERTIPS

An advantage to PC play versus other forms of rest and relaxation is that PCs are as near as your fingertips. "The benefit is that it gives me downtime from work, but also keeps me at the computer to remind me I need to get back at it," Mallett says.

That's why some of the hardest working professionals have discovered the sanity-saving power of play. And as Beacher notes, "It could help them avoid job burnout."

"My computer, in my off-time, becomes an entertainment unit," says Marcus P. Zillman, M.S. and founder of BotSpot, Inc. "I have connected every plug-and-play device you can dream of to my computer because I never ever want to go to a Web site and not be able to download or access its content."

Zillman summarizes the benefit to users this way: "a little PC play allows me to unwind and not use as much brain power, thus allowing a quick recharge to my batteries ... and then I am off again."

MORE THAN GAMES

Even if games aren't your fancy, you can still make the most of your personal computer during idle time. Shannon Talbott, a product manager at Microsoft Corp. in Seattle, uses her PC to keep pace with her extended family.

"I have friends all around the world, so I keep my laptop with me. I make notes to send to them and ask what's going on in their lives," she says. "I love the idea that I can instantly send a message to Russia, England or Finland." In addition to e-mail, Talbott sends photographs. "I use my digital camera with ICQ or NetMeeting so I can both write to and see the people I miss."

The arrival of lightweight and lower cost digital video and still image cameras simplify acquiring and sending photos. For example, Canon's new Elura digital camcorder offers users three ways to capture images: still, video and progressive scan.

WE'RE NOT IN KANSAS ANYMORE, TOTO.

Twenty years have passed since Atari revealed the first video game system at the 1979 New York Toy Fair. ColecoVision soon followed Atari's lead with its own video games. While neither of these two pioneers still exist, their beneficiaries, Nintendo and Sega, rode the game wave to unimagined heights. To a large degree, video games owe their success to the common human desire to be in control and to participate, especially when it's convenient, safe and affordable.

"Television is passive, computer games are interactive," says Beacher. "Either way, you're still interacting with a machine, it's true, but its the games that are more stimulating than what a classic couch potato gets from watching television."

Likewise, computer games got their start in the late 70s. From humble as uninspired text-based games, controlled by simple commands ('go west', 'pick up sword'), they have evolved into an explosion of 3-D color and sound multimedia extravaganzas.

Critics of video and computer games condemn the genre because they deviate from the original goal of game playing — to interact with others and foster self-discovery. That, then, would partially explain the skyrocketing popularity of Internet-based games. Such sites, say psychologists, satisfy the human need for community and help remove the isolation factor.

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In these cyber gaming rooms, opponents can play online versions of such cerebral card and board games, such as bridge and chess, as well as joining a death dealing anti terrorism team. Usually the forces of evil sites enjoy the greatest popularity. Battle.net, an online game service operated by Irvine, Texas-based Blizzard Entertainment, Inc. claims 2.1 million users. On a recent weekend, nearly 500,000 gamers of all ages spent more than 2 million hours on battle.net.

So, when someone asks "What's your game?" you can offer any of a dozen different responses, including the one that may best describe that secret part of you that you thought you left behind long ago: "I may have to grow older, but I don't ever have to grow up."✣

BIG GAME HUNTERS

When you bought your PC, did you buy it to work at home, balance the checkbook and surf the Web? Or to protect Earth from aliens?

Perhaps all of the above. The multimedia capabilities of the desktop computer, fueled by advanced video accelerator boards, Pentium III CPUs and 3-D graphic software enable PCs to deliver stunning graphics, room-filling audio and dynamic performance that were once available only in dedicated video-game machines.

THE NEED FOR SPEED

Game playing makes the most strenuous demands on all of a computer's components, so the best performing systems are those designed from the motherboard on up as a game machine. One leading vendor, Allentown, Penn.-based CyberMax Computer, Inc., maker of the Enthusiast computer series, empowers purchasers to maximize their game-playing experience by equipping the machines with such sense-stimulating peripherals as DVD drives, 3-Dfx Voodoo graphic accelerators, Aureal's 3-D sound cards, Microsoft's Sidewinder joysticks and 19" hi-resolution monitors to produce a multimedia-rich environment. To keep all those high-energy components in sync, CyberMax offers toll-free 24-hour, lifetime tech support.

High performance machines demand high performance graphic components. For machines such as CyberMax's Enthusiast series, delivering Wow! quality graphics required establishing a new graphics standard. Working with the Intel Corp., in Santa Clara, Calif., Number Nine Visual Technology Corp., in Lexington, Mass., will soon double the performance of today's graphic subsystems with its new SR9, a AGP 4X graphics accelerator board. Number Nine's dual analog/digital SR9 accelerator delivers one gigabyte per second peak bandwidth and drives both analog monitors and the increasingly popular flat screen, LCD monitors.

In addition to hot accelerators, newer games, especially "3-D shooters" such as Half Life, Quake II and Tomb Raider often require multimegabyte disk storage, even at their most economical setting. In addition, as you save your place in the games, storage requirements soar even higher. One solution, from Maxell Corp. of America, is to save completed levels

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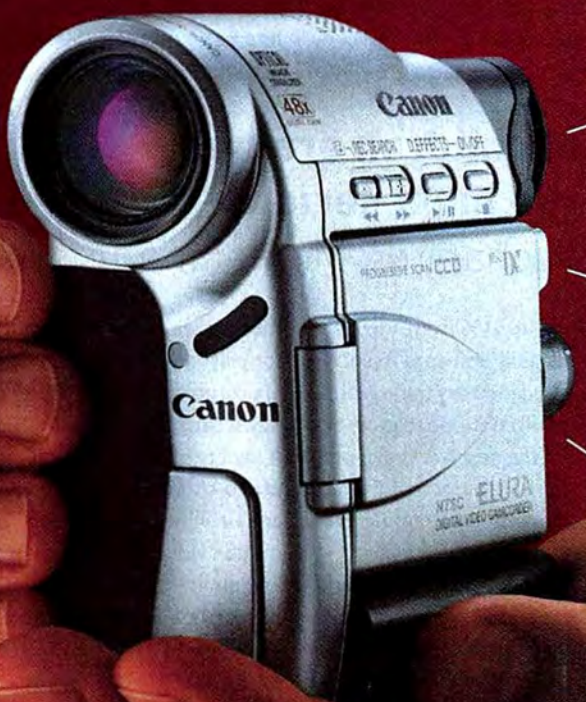

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on external media. Maxell's LS-120 SuperDisk diskettes store up to 120 MB of data, 83 times as much as the venerable 1.44 MB 3-in. predecessor. In addition to making the diskettes, Maxell, based in Fair Lawn, N.J., offers two lightweight, external models of the LS-120 drive: a low profile PCMCIA version and a parallel port version. As an added bonus, SuperDisk drives read from and write to standard 1.44 MB 3-in. disks.

CHANGING TIMES

Most people will agree that the video game revolution officially began 27 years ago with the release of "Pong." From that modest 25 cents per play beginning, and progressing through the first Atari consoles, game hardware and software sales grew into a $5.5 billion market by 1998, up 25% from 1997, according to the Interactive Digital Software Association, a Los Angeles, Calif.-based industry trade group. Analysts project the market will continue to grow between 20% to 25% in each of the next five years, providing plenty of incentive for hardware manufacturers and software vendors to continue creating ever more sophisticated games.

"The games of children are not games, but the most serious actions." —Michael de Montaigne

Just as the characteristics of computer games and hardware are changing, so are its players. Previously a male dominated domain, females now comprise 40% of computer game users and 30% of video console game users, according to the Interactive Digital Software Association, In 1998, females purchased half of all electronic game software.

One of many reasons the number of female game players has increased is because game playing is no longer a solitary endeavor — that is, "man vs. machine." An unproved assertion by some psychologists who thought that a person's socialization skills might suffer as a result of computer game playing. The rising popularity of game playing communities on the Internet has helped minimize that concern. These ever-expanding services provide a ready-made online social environment where players can meet with their peers, create and join ongoing gaming sessions. They can, if they choose to, indulge in a genteel competitiveness like cribbage or chess or pound their newfound friends into virtual oblivion.

CANON ELURA

Either way, performance counts. MindSpring Enterprises, Inc., in Atlanta, Ga., best known for their award winning and affordable electronic-commerce hosting services, now offers 56K modem speeds through expanded support of the V90 protocol. For gamers who demand higher speeds, MindSpring offers 64K and 128K ISDN access. Usage plans start at a modest $6.95 per month. And, if you aspire to opening your own gaming site, MindSpring can design and host your Web site.

As an entertainment medium, computers extend beyond game playing. For example, They can include acquiring high-resolution moving and still digital images. When using the PC for playback and editing, Canon's Elura digital camera complements the higher processing speeds of today's computers with multimedia enhanced CPUs. A variety of special digital effects add interest to the photo shoot as does the Elura's 2.5-in. multiple image viewfinder/viewscreen. Capable of producing full motion video (60 frames per second), the Elura's image quality surpasses the images produced by the best analog cameras by 20%.

While 3-D graphics, full motion video and related special effects receive most of the attention, gamers can expect an explosion in 3-D audio effects that will add even more realism to game playing. New technology provides a "surround-sound" environment that supports directional sound, echo and reverb. This means that you can tell the direction the sounds come from. So when the alien starts slobbering, as it stealthily slithers from behind the sofa, as you quietly balance your checkbook some evening, you'll know which way to run.✣

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A monthly update of the best desktop PCs, notebooks, printers, graphics boards, and modems

PC WORLD

TOP 100

POWER AND BUDGET PCs

Luxury Lures, Economy Sells

218 Power Desktops

228 Budget Desktops

236 Notebooks

242 Home PCs

245 Printers

249 Graphics Boards

251 Modems

ECONOMY: Gateway's $1250 E-1200 366 (above). LUXURY: Micron's $2899 Millennia 500 Max (right).

Edited by Bryan Hastings and Michelle Campanale

PHOTOGRAPH: MARC SIMON ICONS: JEFFREY PELO

WHAT A DIFFERENCE A FEW YEARS MAKE. When we started the monthly Top 20 roundup in 1994, a top-of-the-line desktop PC could cost more than the down payment on a house—a few systems on our chart sold for over $6000! Now, thanks in part to greater competition in the CPU market, you can buy a fast, well-stocked PC for a quarter of that price.

That said, not all new computers are cheap. You can get an Axis Systems Metropolis NX5-333C for $1144. But a Premio Apollo BX 500 sets you back $2900, and similar powerhouses from Gateway and Micron cost only a buck less. Why the hefty price tags? Extra speed and features. Still, prices have dropped so steadily that we're once again lowering the price ceiling for our *Top 20 Budget Desktops*, this time from $2000 to $1800. (See "PC Prices Keep Falling," next page, for a history of Top 20 PC price drops.)

BEST BUY GATEWAY FOR $1250

AS A RESULT of the reduced maximum price allowed, the average price of a Top 20 Budget system plunged $204 this month to $1445. The new number-five system, Gateway's E-1200 366 sells for only $1250, making it one of the least expensive Best Buy PCs ever. Despite the lower prices, this month's lineup matches April's for speed and configuration, and includes exceptionally well-stocked multimedia systems like CyberMax's $1499 Enthusiast KII-400R (which comes with a 19-inch monitor, 16MB graphics card, and a DVD-ROM drive).

We also saw encouraging changes on the power systems. Now that cheaper PCs qualify, the average price dipped by $67—yet the average performance score rose slightly, from 220 to 227.

In both charts, PC prices and performance bunch at the top and the bottom. PCs based on the most common processor on the Budget chart, the Celeron-366, sell for an average price of only $1328, score 184 on PC WorldBench 98, and carry solid basic configurations: 64MB of RAM, 6GB to 10GB hard drives, 17-inch monitors, 4MB or 8MB graphics cards, and CD-ROM drives. The Pentium II-400 and -450 systems at the top end of the scale cost $1689 on average but deliver about 10 percent more speed and include higher-end features such as 128MB of RAM, 8GB to 13GB hard drives, 19-inch monitors, 16MB graphics cards, and DVD-ROM drives. The bottom line? Many users will be quite content with Celeron-366–level performance; but if you want all the machine you can get for your budget dollar, a Pentium II-400 or Pentium II-450 system is a better choice.

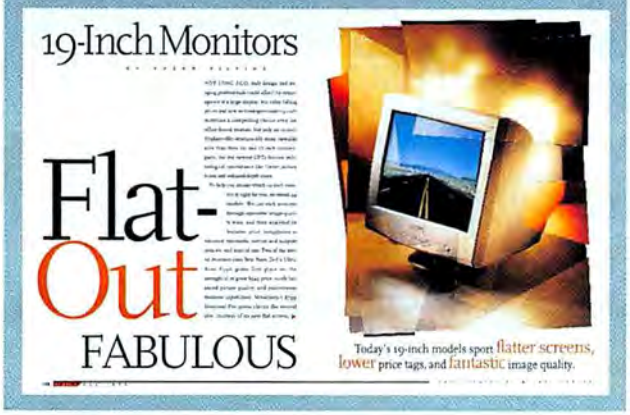
The power chart is equally sharply divided, but between PIII-500 and PII-450 systems. The PIII-500s have much better features, typically packing 128MB of RAM, 14GB to 22GB hard drives, 16MB graphics cards, 19-inch monitors, and DVD-ROM drives. The PII-450s are likelier to stop at 17-inch monitors and CD-ROM drives. Performance is another story: PIII-500 PCs run just 7 percent faster than a typical PII-450 machine. Yet on average PIII-500 PCs cost $2702—$542 more than the average PII-450 system. Intel tends to levy a hefty premium on new chips, and the Pentium III is no exception.

HOME IS WHERE THE NETWORK IS: Compaq's Presario 5600I lets you use phone lines to network with other PCs.

NEW R&S RATINGS

THE RESULTS FROM our latest Reliability and Service reader survey are in. Less favorable reports dropped Micron's business-PC support rating from good to fair, while both Dell and Gateway improved. Dell users continue to give the company high marks for support, and they report being even happier with their PCs' reliability. The accolades help propel Dell PCs into the top two spots on the Power chart, while Gateway's improved support ratings (from fair to good) make its GP6-400 system an even better budget deal (for the complete story, see "PC Reliability and Service: The Best Are a Phone Call Away," page 155).

HEY, 19: Averaging well over a grand a year ago, 19-inch monitors now sell for as little as $449. See our roundup (page 136) for details.



Another Gateway change: The company has replaced its consumer-oriented G-series line of PCs with its new Essential, Performance, and Select lines.

HIGHER SPEEDS, BIGGER SIZES

THE CELERON-400 CPU reaches the *Top 10 Home PCs* chart this month. Dell's $1507 Dimension V400c takes second place with fine performance, features, and company reliability. The V400c scored 190 on our PC WorldBench 98 test suite, delivering performance typical of a PII-400 PC. A Pentium III-500 debutante, the Compaq Presario 5600i-450, places fifth on the power half of the chart. It costs $2358 and is terrific if you want to network PCs in your home. It comes with Diamond Multimedia's Homefree network card, which lets you network with other PCs carrying the same card, using just a telephone line. The 5600i-450 has a high-speed DSL adapter for lightning-fast Internet connections, and USB and FireWire ports sit in the PC's front panel—letting you attach devices such as digital cameras more easily.

On the monitor front, 19-inch models are nudging 17-inchers off their PC pedestals. Over half the power systems and one-fifth of the budget computers on the chart feature the bigger screens. So our latest monitor roundup (see "Flat Out Fabulous," page 136) focuses on 19-inch displays. Many current models have flatter tubes (producing crisper, less distorted images) and slightly shallower cases (making them easier to fit into a cramped work area). Dell's UltraScan P990 takes first place with fine image quality at a good price of $549.

HAYES DOWN FOR THE COUNT

MODEM PRICES are reasonably stable this month, but months of keen competition have taken a toll. After 20 years in business, modem pioneer Hayes declared Chapter 11 bankruptcy in October and started liquidating its assets. The company is not currently providing technical support, but it is trying to set up support through other suppliers. Check Hayes's Web site at www.hayes.com for updates.

Bryan Hastings is a senior associate editor and Michelle Campanale an associate editor for PC World. *Senior Associate Editors Vince Bielski and Karen Silver, Associate Editor Aoife McEvoy, Staff Editors Grace Aquino and Mick Lockey, Editorial Assistant Kalai Murugesan, and freelance writer JoAnne Robb contributed to the* Top 100. *Testing was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Nancy Miller, and Mike Salayko of the PC World Test Center. See page 12 for contact information.*

PC Prices Keep Falling

IN FIVE YEARS of Top 20 roundups, power PC prices have dropped by a third; budget PCs by 29 percent.

SOURCE: *PC WORLD*'S TOP 20 DESKTOP CHARTS, 1994–1999.

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, printers, monitors, graphics boards, and modems that we've tested. System charts are divided by price. Power desktops cost $1800 or more; power notebooks cost $2300 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 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. Point your browser to PC World Online (www.pcworld.com/top400) to explore our Top 400, which provides comprehensive reviews and ratings for products in 16 different categories. You'll also find reviews not available in print.

PC WORLD

TOP 20 POWER DESKTOPS

	SYSTEM	Last month	Month tested	Street price (2/15/99)	CPU	Comments
1	Dell OptiPlex GX1p 450 800/388-8542 www.dell.com	1	Mar 99	$2399	Pentium II-450	$50 off corporate system with speed, management features, and 14.4GB hard disk.
2	Dell Dimension XPS T500 800/388-8542 www.dell.com	4	Apr 99	$2816	Pentium III-500	Fast, pricey SOHO PC has 4.8X DVD-ROM drive; Dell's PC reliability is now top-notch.
3	Gateway E-4200 500 800/315-2536 www.gateway.com	3	Apr 99	$2899	Pentium III-500	Expensive corporate PC features terrific speed and manageability.
4	Micron Millennia Max 500 888/546-0501 www.micronpc.com	2	Apr 99	$2899	Pentium III-500	Pricey but fast, and features include a 22GB hard disk and 6X DVD-ROM drive.
5	CyberMax Enthusiast 500 800/345-8926 www.cybermaxpc.com	n/a	NEW	$2399	Pentium III-500	Very fast PC costs hundreds less than its peers; case cover is bulky.
6	Quantex QP6/500 SM-4x SE 800/896-4898 www.quantex.com	n/a	NEW	$2549	Pentium III-500	Win 98 system has some design quirks, but it's rich on performance and features.
7	Micron Millennia 450 Max 888/634-8799 www.micronpc.com	n/a	Nov 98	$1997	Pentium II-450	All-around good SOHO PC is affordable and includes a 6X DVD-ROM drive.
8	Quantex QP6/450 SB-4 800/896-4898 www.quantex.com	5	Mar 99	$2199	Pentium II-450	Small-business system with network card sheds $100; good performance on NT.
9	Sys Performance AX-500P3 800/613-9963 www.sys.com	n/a	NEW	$2479	Pentium III-500	Fastest NT 4.0 PC we've seen, but Sys gets only a tepid rating for support quality.
10	Micro Express MicroFlex-450A 800/989-9900 www.microexpress.net	n/a	Apr 99	$1899	Pentium II-450	Well-designed small-business system has excellent components and nice speed.
11	MidWest Micro WKP-450 800/728-8582 www.mwmicro.com	6	Apr 99	$2249	Pentium II-450	$250 price drop on nicely appointed network-ready workstation with LS-120 drive.
12	CompUSA American Pro 500 888/226-6772 www.compusa.com	11	Apr 99	$2699	Pentium III-500	High-quality sound, 19-inch monitor, and $195 off speedy business PC.
13	Gateway E-4200 450 800/315-2536 www.gateway.com	8	Feb 99	$2429	Pentium II-450	Managed PC with strong warranty and support, network card; slow for a PII-450.
14	Premio Apollo BX 500 800/677-6477 www.premiopc.com	n/a	NEW	$2900	Pentium III-500	Pricey PC has skimpy multimedia but boasts great speed.
15	Sys Performance Pro 450 800/613-9963 www.sys.com	16	Dec 98	$2099	Pentium II-450	Hefty $300 price cut on well-stocked general business PC with LS-120 drive.
16	Acma ZPower 7450 PII-450 800/786-6888 www.acma.com	14	Mar 99	$2498	Pentium II-450	$100 off quick PC with network card and DVD-ROM drive; limited expandability.
17	Compaq Deskpro EN 6500X 800/345-1518 www.compaq.com	n/a	NEW	$2869	Pentium III-500	Very fast but expensive machine; features are a mixed bag.
18	HP Vectra VL Series 8+ 800/752-0900 www.hp.com/vectra	n/a	NEW	$2664	Pentium III-500	Speedy Windows 98 workstation is hurt by limited phone support hours.
19	Polywell Poly 8450B5 800/999-1278 www.polywell.com	n/a	Jan 99	$1999	Pentium II-450	Good all-around PC is affordable, but readers give support a lackluster rating.
20	IDot.com Entrepreneur 4 888/388-4368 www.idot.com	10	Apr 99	$2499	Pentium II-450	Small-business PC offers a 4.8X DVD-ROM drive but has limited expandability.

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" on page 217.

[2] For more information about all of the products listed in this table, select product info number 905 or visit www.pcworld.com/productinfo.

AS MORE PENTIUM III-500 SYSTEMS give Pentium II-450s a run for their money, this month's chart splits evenly between the two processor types. Four of the five Best Buys run the faster CPU, and six of the eight new PIII-500 systems we evaluated this month make the chart—including the number five Best Buy, the CyberMax Enthusiast 500, priced at just $2399. But our top Best Buy, Dell's OptiPlex GX1p 450, is a fast PII-450–based corporate desktop that also sells for $2399 and is backed by Dell's terrific system reliability. On average, PII-450s run only 7 percent slower than their PIII-500 counterparts, yet they sell for at least $400 less. Still, for pure power, nothing can touch the PIII-500s.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Performance [1]	Features and design	Vendor's system reliability	Price	Vendor's support quality/policies	Product info number [2]
93	257/Win NT 4.0	good	very good	outstanding	average	good/outstanding	–
93	234/Win 98	outstanding	very good	outstanding	expensive	good/good	–
92	235/Win 98	outstanding	outstanding	good	expensive	good/outstanding	646
90	237/Win 98	outstanding	outstanding	good	expensive	fair/good	647
87	236/Win 98	outstanding	very good	fair [3]	average	good [4]/good	648
84	235/Win 98	outstanding	very good	good [3]	average	good [4]/good	649
83	218/Win 98	good	good	good	inexpensive	fair/good	650
83	250/Win NT 4.0	good	outstanding	good [3]	average	good [4]/good	651
82	287/Win NT 4.0	outstanding	very good	[3]	average	fair [4]/good	652
82	221/Win 98	very good	good	[3]	very inexpensive	fair [4]/outstanding	653
81	248/Win NT 4.0	good	very good	[3]	average	good [4]/outstanding	654
79	230/Win 98	outstanding	very good	[3]	expensive	fair [4]/good	655
78	204/Win 98	satisfactory	outstanding	good	average	good/outstanding	656
78	233/Win 98	outstanding	very good	[3]	expensive	good [4]/fair	657
76	222/Win 98	very good	good	[3]	inexpensive	fair [4]/good	658
76	218/Win 98	good	very good	[3]	average	good [4]/good	659
76	232/Win 98	outstanding	satisfactory	fair	expensive	fair/good	660
76	237/Win 98	outstanding	good	fair	expensive	good/fair	661
75	224/Win 98	very good	good	[3]	inexpensive	fair [4]/fair	662
75	216/Win 98	good	outstanding	[3]	average	fair [4]/good	663
Scorecard weightings ▶		Performance 25 percent	Features 25 percent	Reliability 15 percent	Price 15 percent	Quality/policies 10 percent each	

[3] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs.

[4] Due to insufficient data from the reliability and service survey for the vendor's work PCs, this rating is derived from anonymous support-quality calls, from survey scores for the vendor's home PCs, or from both.

This Month's Best Buys

1 DELL OPTIPLEX GX1P 450

PRO: Good performance, outstanding system reliability and support policies

CON: Few open drive bays

The corporate-centric Dell OptiPlex GX1p 450 debuted in the top spot in March and remains there this month thanks to a $50 price drop and an improved reliability rating. Dell left few stones unturned in developing this top-notch PC, which sells for only $2399.

Running on Windows NT 4.0, the GX1p 450 earned a PC WorldBench 98 score of 257; only Sys Technologies' Sys Performance AX-500P3 scored higher. To maximize future expandability, the GX1p 450 employs a backplane design, with the motherboard mounted in an expansion-slot circuit board. Thanks to this design and the extrawide case of the midsize tower, this OptiPlex can handle up to seven add-in expansion cards, and it ships with a phenomenal six open slots (three PCI, two ISA, and one shared ISA/PCI).

Besides bundling a 3Com Fast EtherLink XL card with the system, Dell treats IS pros to its own proprietary Open Manage Client Administrator. The GX1p 450 relies on PCI graphics technology, using STB's NVidia TNT adapter in tandem with Dell's high-quality D1028L 17-inch monitor.

Dell OptiPlex GX1p 450

We have only one relatively minor complaint to register about the design: Even though the system comes with plenty of expansion slots, it has only two open drive bays; people who plan to run multiple peripherals may find themselves handcuffed by this limitation. In every other respect, however, the GX1p 450 excels.

2 DELL DIMENSION XPS T500

PRO: 4.8X DVD-ROM drive and hardware decoder card, excellent system reliability, good support

CON: Expensive

If you're looking for a feature-rich, multimedia-capable system for your growing business, the $2816 Dell Dimension XPS T500 may give you a good excuse to splurge. This thin, gray midsize tower comes amply equipped for the office, with a little extra for after-hours fun. The XPS T500, with its fast Pentium III-500 CPU, earned a PC WorldBench score of 234, just a couple of ticks behind the fastest Win 98 units on the chart, Micron's Millennia Max 500 and HP's Vectra VL Series 8+. The model's price remains unchanged from last month, but *PC World* readers who participated in our latest Reliability and Service survey upgraded Dell's system reliability rating from good to outstanding, and this result bumps the XPS T500 up a couple of notches. ▶

Dell Dimension XPS T500

PHOTOGRAPHS: KEN SMITH

TOP 20 POWER DESKTOPS

STANDARD FEATURES

	SYSTEM [1]	CPU	Operating system	RAM (MB)	Second-ary cache (KB)	Hard drive (GB)	Graphics adapter (AGP unless noted)	Video RAM (MB/type)	Monitor tube/ viewable diag-onal (inches)	56-kbps modem protocol
1	Dell OptiPlex GX1p 450*	Pentium II-450	Windows NT 4.0	128	512	14.4	STB NVidia TNT (PCI)	16/SDRAM	17/15.9	not included
2	Dell Dimension XPS T500*	Pentium III-500	Windows 98	128	512	22	STB NVidia TNT 3D	16/SDRAM	17/15.9	V.90
3	Gateway E-4200 500*	Pentium III-500	Windows 98	128	512	22	ATI Rage 128	16/SDRAM	19/18	not included
4	Micron Millennia Max 500 *	Pentium III-500	Windows 98	128	512	22	Diamond Viper V550	16/SDRAM	19/17.9	V.90
5	CyberMax Enthusiast 500*	Pentium III-500	Windows 98	128	512	13.6	STB Velocity 4400	16/SDRAM	19/17.9	V.90
6	Quantex QP6/500 SM-4x SE	Pentium III-500	Windows 98	128	512	13	STB Velocity 4400	16/SDRAM	19/17.9	V.90
7	Micron Millennia 450 Max	Pentium II-450	Windows 98	64	512	14.4	Diamond Viper V550	16/SGRAM	17/15.9	V.90
8	Quantex QP6/450 SB-4	Pentium II-450	Windows NT 4.0	128	512	16.8	Number Nine Revolution IV	32/SDRAM	19/18	not included
9	Sys Performance AX-500P3	Pentium III-500	Windows NT 4.0	128	512	10.1	Matrox Millennium G200	8/SGRAM	19/17.9	not included
10	Micro Express MicroFlex-450A	Pentium II-450	Windows 98	128	512	9.6	Creative Blaster RIVA TNT	16/SDRAM	19/17.9	V.90
11	MidWest Micro WKP-450	Pentium II-450	Windows NT 4.0	128	512	12.7	STB Velocity 4400	16/SDRAM	19/18	not included
12	CompUSA American Pro 500	Pentium III-500	Windows 98	128	512	14.4	STB Velocity 4400	16/SDRAM	19/17.6	V.90
13	Gateway E-4200 450	Pentium II-450	Windows 98	128	512	10	ATI Rage Pro Turbo	8/SGRAM	19/18	not included
14	Premio Apollo BX 500	Pentium III-500	Windows 98	128	512	14.4	Diamond Viper V550 (OEM)	16/SDRAM	19/18	V.90
15	Sys Performance Pro 450	Pentium II-450	Windows 98	128	512	10.1	Matrox Millennium G200	8/SGRAM	17/15.8	V.90
16	Acma ZPower 7450 PII-450	Pentium II-450	Windows 98	128	512	14.4	Number Nine Revolution IV	16/SDRAM	17/16.1	V.90
17	Compaq Deskpro EN 6500X	Pentium III-500	Windows 98	128	512	14.4	STB Velocity 4400	16/SDRAM	17/15.9	not included
18	HP Vectra VL Series 8+	Pentium III-500	Windows 98	128	512	18.2	Matrox Millennium G200	8/SGRAM	17/16	not included
19	Polywell Poly 8450B5	Pentium II-450	Windows 98	128	512	10	Matrox Millennium G200	8/SGRAM	17/16	V.90
20	IDot.com Entrepreneur 4	Pentium II-450	Windows 98	128	512	16	Creative Blaster RIVA TNT	16/SDRAM	17/16	V.90

* Best Buy

[1] Configuration as tested. Vendor may have since changed components.

[2] *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.

[3] Five years on CPU and main RAM, three years on other parts.

Color-coded, labeled, and icon-marked ports—plus a good array of peripheral manuals and an illustrated, foldout setup guide—help you get up and running fast. And the XPS T500's sturdy, easy-open case and tidy interior make accessing main memory a cinch when you're ready to add more. The solid Dell QuietKey keyboard felt very comfortable to type on.

The system includes a CineMaster hardware DVD decoder card with a 4.8X DVD-ROM drive for smooth video playback, and the giant 22GB hard disk and Iomega Zip drive would give even a vat of macaroni plenty of elbowroom. Meanwhile, the Altec Lansing ACS295 speaker-subwoofer system, teamed with the high-quality Turtle Beach Montego II PCI Audio card, delivers full-bodied sound.

3 GATEWAY E-4200 500

PRO: Great speed, good mix of features

CON: Expensive

Priced at $2899, Gateway's PIII-500 entry, the E-4200 500, ties with Micron's Millennia Max 500 for most expensive Best Buy power system and is only a dollar short of the most expensive PC on the chart. Nonetheless, this tall, wide midsize tower has much to recommend it. In fact, it's one of our top choices for use in a multimedia-equipped business workstation.

In addition to packing such corporate accoutrements as an ethernet card and DMI management software, the E-4200 500 delivers top performance and an excellent audiovisual experience. This unit's PC WorldBench 98 score of 235 puts it in a virtual dead heat with the other three Best Buys running Windows 98. The system's ATI Rage 128 graphics card helps the 19-inch Gateway monitor display images vividly, and the Altec Lansing GCS100 speakers and subwoofer offer rich sound. As usual, Gateway supplies excellent documentation, and the company's record for system reliability remains strong.

More price-conscious PC users should consider Gateway's E-4200 Pentium III-450. This model costs $200 less than the 500 ($2699), contains an equally large hard drive (22GB), and chalked up a creditable PC WorldBench 98 score of 220.

Gateway E-4200 500

		EXPANDABILITY				CUSTOMER SUPPORT			
CD/DVD-ROM drive speed	Sound board	Case style [2]	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
17X-40X	integrated Crystal PnP	midtower	384	2	1/1	6	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Turtle Beach Montego II PCI	midtower	768	2	2/1	2	3/1	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
13X-32X	Creative Ensoniq AudioPCI	midtower	384	2	3/2	2	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
6X DVD-ROM	Sound Blaster Live Value	midtower	384	2	2/1	3	varies [3]/1	24	Sat, Sun	BBS, CIS, WWW
4.8X DVD-ROM	Aztech PCI 338-A3D	midtower	384	1	3/3	4	3/1	24	Sat, Sun	BBS, WWW
4.8X DVD-ROM	Sound Blaster Audio PCI 64V	midtower	384	1	2/2	4	3/1	24	Sat, Sun	BBS, WWW
6X DVD-ROM	integrated Crystal PnP	midtower	384	1	3/1	4	varies [3]/1	24	Sat, Sun	BBS, CIS, WWW
17X-40X	Creative Ensoniq AudioPCI	midtower	768	1	3/3	4	3/1	24	Sat, Sun	BBS, WWW
14X-40X	Sound Blaster AWE64	midtower	1024	3	3/2	4	varies [4]/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Sound Blaster PCI128	midtower	384	1	3/0	3	4/4	24	Sat, Sun	WWW
17X-40X	Sound Blaster PCI128	midtower	768	2	3/1	3	varies [3]/3	24	Sat, Sun	BBS, WWW
5X DVD-ROM	Sound Blaster Live	midtower	768	2	2/1	3	varies [5]/1	24	Sat, Sun	WWW
13X-32X	Sound Blaster Audio PCI 64V	midtower	384	2	3/2	3	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
14X-32X	Sound Blaster Live	midtower	1024	3	3/2	4	3/3	9	none	BBS, WWW
17X-40X	Sound Blaster AWE64	midtower	1024	3	3/2	4	varies [4]/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Sound Blaster Live	midtower	384	2	1/0	1	3/1	24	Sat, Sun	BBS, WWW
14X-40X	integrated ES1869	desktop	384	2	1/0	3	3/1	24	Sat, Sun	AOL, BBS, CIS, WWW
4.8X DVD-ROM	Aztech AZT2320	minitower	768	2	2/1	4	3/1 [6]	11	none	AOL, BBS, CIS, WWW
2X DVD-ROM	Aztech PCI 338-A3D	midtower	1024	3	3/1	3	3/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Turtle Beach Montego II PCI	midtower	1024	3	2/0	3	varies [3]/1	24	Sat, Sun	WWW

[4] Six years on CPU and main RAM; three years on other parts.

[5] One year on monitor, three years on other parts.

[6] Tech support is free for one year, then $99 per year. On-site service is free for 90 days.

4 MICRON MILLENNIA MAX 500

PRO: Blazing speed; multimedia components include a 6X DVD-ROM drive; good manual

CON: Pricey; downgraded support-quality rating

If you plan on wringing every last ounce of performance out of your next PC, check out Micron's Millennia Max 500. It sells for a hefty $2899, but it ties HP's Vectra VL Series 8+ as the fastest Windows 98 PC on the chart and has a wagonload of features, including a Zip drive; a crisp, bright 19-inch monitor; and one of the first 6X DVD-ROM drives we've seen. However, it slips two notches this month because survey respondents lowered their rating of Micron's support quality from good to fair.

Micron Millennia Max 500

We were impressed by the Max 500's multimedia capabilities. Our unit shipped with the Diamond Viper V550, a recent contender among Accelerated Graphics Port cards on our *Top 10 Graphics Boards* list. The Monsoon MM-1000's big subwoofer (which all by itself approaches the size of a compact stereo system) and a pair of satellite speakers produce rich high and low tones.

Micron includes thorough documentation and offers solid warranties covering labor for one year and parts for three years (main RAM and CPU are covered for five years).

If you're looking for a lower-cost system, consider the $2699 Millennia 450 Max. Except for the marginally slower processor and a smaller hard drive (14.4GB), the 450 Max is identical to its marquee sibling. The 450 Max's PC WorldBench 98 score of 219 is only 8 percent slower than the Max 500's 237, and it sells for $200 less than the PIII-500 unit.

5 CYBERMAX ENTHUSIAST 500

PRO: Terrific performance, competitive price, attractive features

CON: Case cover is tricky to get on and off

CyberMax's latest and speediest small-office/home-office entry, the Enthusiast 500, debuts at number five. This $2399 midsize tower charged to a third-place finish in test-suite performance among the Windows 98 systems on the chart and is priced exceptionally well for a full-featured PIII-500 PC.

Its 236 score on PC WorldBench 98 puts the Enthusiast only a point below our two fastest Windows 98 PCs, Micron's Millennia Max 500 and HP's Vectra VL Series 8+. The bottom line: No one will be able to detect a whit of speed difference among these three PCs. The Enthusiast offers so much power that, even with several applications running in the background—and without a dedicated MPEG decoder board—DVD movie images appear both vibrant and silky smooth. We played *Twister* at full-screen size with no problem. And the included speakers—a pair of Altec Lansing Digital Power Cubes and subwoofer—gave the movie's fancy tornado effects that "I think we're back in Kansas again, Toto" audio realism.

CyberMax Enthusiast 500

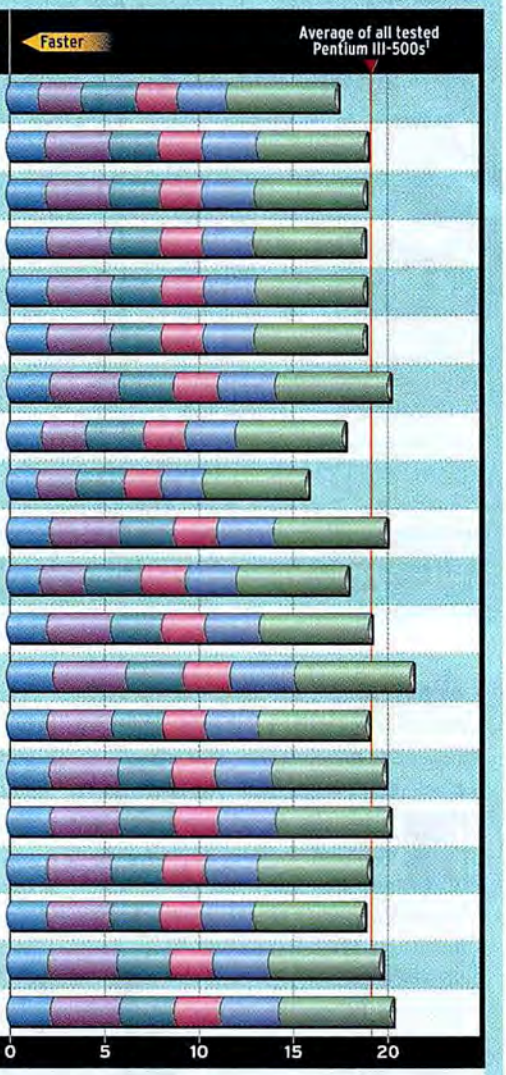
CyberMax also supplies a generous software bundle, including Corel's WordPerfect Suite 8 and such useful home and reference titles as Compton's World Atlas and Compton's Encyclopedia.

We had to fiddle a bit with the Enthusiast 500's case cover to remove it, but the system's interior layout looked good, providing easy access to memory slots and sensibly organized cabling. CyberMax includes clear documentation with the PC and, like most companies in the Top 20, backs its systems with a long parts warranty and around-the-clock support. ▶

TOP 20 POWER DESKTOPS

TEST REPORT

	SYSTEM	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	PC WorldBench 98 score
1	Dell OptiPlex GX1p 450*	Pentium II-450	Win NT 4.0	128	512	257
2	Dell Dimension XPS T500*	Pentium III-500	Win 98	128	512	234
3	Gateway E-4200 500*	Pentium III-500	Win 98	128	512	235
4	Micron Millennia Max 500*	Pentium III-500	Win 98	128	512	237
5	CyberMax Enthusiast 500*	Pentium III-500	Win 98	128	512	236
6	Quantex QP6/500 SM-4x SE	Pentium III-500	Win 98	128	512	235
7	Micron Millennia 450 Max	Pentium II-450	Win 98	64	512	218
8	Quantex QP6/450 SB-4	Pentium II-450	Win NT 4.0	128	512	250
9	Sys Performance AX-500P3	Pentium III-500	Win NT 4.0	128	512	287
10	Micro Express MicroFlex-450A	Pentium II-450	Win 98	128	512	221
11	MidWest Micro WKP-450	Pentium II-450	Win NT 4.0	128	512	248
12	CompUSA American Pro 500	Pentium III-500	Win 98	128	512	230
13	Gateway E-4200 450	Pentium II-450	Win 98	128	512	204
14	Premio Apollo BX 500	Pentium III-500	Win 98	128	512	233
15	Sys Performance Pro 450	Pentium II-450	Win 98	128	512	222
16	Acma ZPower 7450 PII-450	Pentium II-450	Win 98	128	512	218
17	Compaq Deskpro EN 6500X	Pentium III-500	Win 98	128	512	232
18	HP Vectra VL Series 8+	Pentium III-500	Win 98	128	512	237
19	Polywell Poly 8450B5	Pentium II-450	Win 98	128	512	224
20	IDot.com Entrepreneur 4	Pentium II-450	Win 98	128	512	216



*Best Buy

TEST PC WORLD 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 Windows 95, Windows 98, 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). †Under Windows 98 with 128MB of RAM; also includes systems tested in this and previous months that do not currently rank among the Top 20 systems.

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New This Month

The following systems made our Power Desktops chart for the first time this month. For brief reviews of previously tested machines on the chart, visit PC World Online (www.pcworld.com/top400).

6 QUANTEX QP6/500 SM-4X SE

PRO: Terrific performance on a nicely loaded PC
CON: Cover is a bit difficult to slide on and off

Quantex could benefit from a quick lesson in how to give its computers simple, recognizable names—the QP6/500 SM-4x SE is just the latest entry in the company's already extensive list of tortured alphabet-soup monikers. Nonetheless, the computer maker has an admirable habit of offering good deals on powerful small-business desktop PCs. This $2549 PIII-500 system is no exception: It comes equipped with just about everything a small workgroup or a home office might need, from top-notch performance to an attractive array of multimedia features to a well-rounded software bundle.

QP6/500 SM-4x SE

The SM-4x SE achieved a blistering PC WorldBench 98 score of 235, which lands it in the same advanced league with the fastest Windows 98 computers on the chart. The 19-inch monitor displays crisp images and has easy-to-adjust controls, the Altec Lansing ADA305 speaker system fills the room with rich sound, and the 4.8X DVD-ROM drive delivers flawless video playback. The unit's 13GB hard drive is capacious, even for users who work with bulky multimedia files. And Quantex crowns the package with a healthy dollop of bundled software, including Microsoft Office Small Business Edition, Microsoft Money, and Compton's Home Library among the titles.

We do have a few design quibbles, however. The PC's connectors come labeled with stickers that may peel and fall off, leaving inexperienced users to puzzle over what goes where; the keyboard clacks noisily; and removing or replacing the case cover requires finesse. But once inside the PC, we found well-organized cabling and unobstructed access to the memory and expansion slots.

Quantex includes well-written, sensibly organized documentation, including an illustrated, foldout setup guide. The vendor backs its PCs with a three-year parts warranty and one year of labor coverage—standard terms for a top-tier system.

9 SYS PERFORMANCE AX-500P3

PRO: Extremely fast; good features; big, easy-to-use monitor; lots of room to add components
CON: Support and documentation not the best

Every office has people who crave PC power. Whether they're scuttling through overgrown, formula-choked spreadsheets, rendering complex graphics, or performing any other task that soaks up processor time, this NT 4.0 workstation can handle the job. With a PC WorldBench 98 score of 287, this $2479 system outruns every other NT PC we've tested, and it comes well configured. Unfortunately, lackluster vendor support quality kept it from reaching the Best Buy promised land.

Sys Technology outfitted its Performance AX-500P3 for an active corporate life. The PC comes network ready, with a preinstalled ethernet card. Spreadsheet and database wranglers will appreciate the unit's crisp and spacious 19-inch monitor with exceptionally intuitive image controls. And if you frequently install programs, you can't go wrong with the supplied 14X–40X CD-ROM drive—unless you truly need DVD. The 10.1GB hard disk, while not huge by today's standards, offers plenty of storage space for most users.

Sys Performance AX-500P3

The Logitech mouse feels looser than the Microsoft IntelliMouse that comes with most PCs, and it lacks a finger-wheel for convenient document scrolling. But the keyboard felt solid and made little noise when we typed on it. The only components that don't make sense are the Altec Lansing ACS295 speakers and subwoofer. Sure, they sound great; but most cubicle dwellers can't crank 'em up, so why bother? Sys should supply headphones instead and trim the PC's cost.

The AX-500P3 looks good under the hood. The case of this midsize tower feels a bit flexy, but the interior layout is pristine, and the four free slots and five free drive bays offer plenty of upgrade room.

One nice touch: Sys stuck a toll-free support number label on the PC's case. The company stumbles a bit, however, in actually supplying the support. It backs its products with a long five-year labor warranty and around-the-clock support hours, but the company reps' advice rated as only fair. Finally, this PC's documentation—consisting of separate manuals for the motherboard and peripherals—will leave even some IS people at a loss.

14 PREMIO APOLLO BX 500

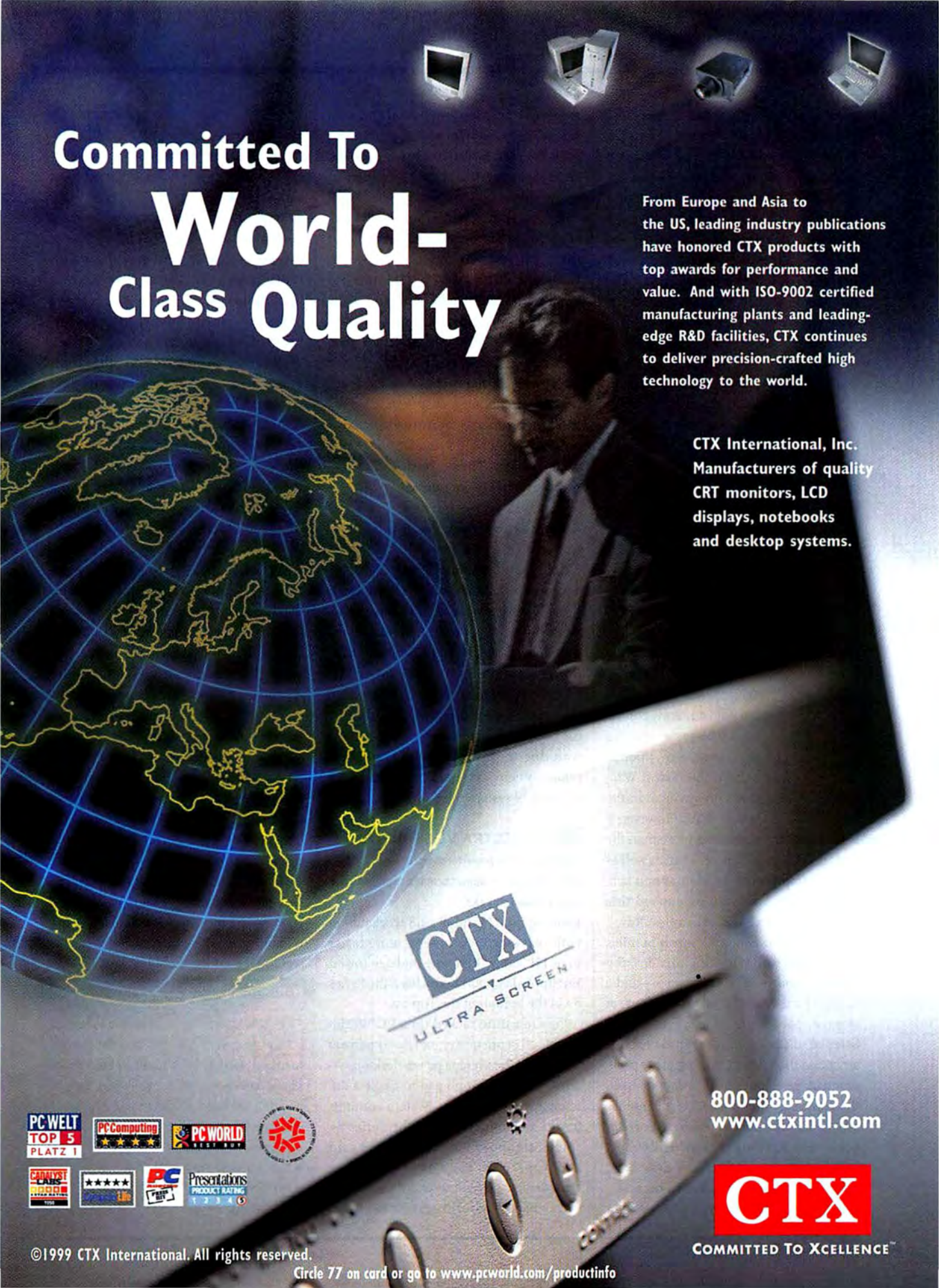
PRO: Great performance, good support quality
CON: Priciest computer on our chart, support hours too short, limited multimedia

If you want a fast, well-appointed PC for your home office, you will like Premio's new midsize tower. But brace yourself for sticker shock: The $2900 Apollo BX 500 costs $243 more than the average chartmaking machine this month. That demerit, compounded by thin multimedia and truncated support hours (the shortest for any ranked system), left this PC lower on the chart than its power numbers alone would warrant.

Premio Apollo BX 500

The Apollo scored 233 in our PC WorldBench tests—just a few points shy of the top Windows 98 systems we've tested and indistinguishable from them in day-to-day use. The 14.4GB hard drive can accommodate months or years of most users' files, and the 19-inch Princeton EO900 monitor displays crisp images, especially in Excel. The monitor's easy-to-use controls permit numerous adjustments, including zooming in and out of screen images. The keyboard is quiet and comfortable.

Premio also scores points for design and documentation. The PC's case lifts off in seconds to reveal a tidy interior with unfettered access to open slots and bays. The profusely illustrated manuals are easy to follow. And Premio goes the extra ▶



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mile on productivity software, bundling Microsoft Office Professional (which, unlike the Small Business Edition that ships with most competing PIII-500 systems, includes the popular Access database program). But if you want to use your PC for fun as well as work, we advise you to pass on the Apollo. Its accompanying Premio 636A speakers yield tinny, flat sound, and you get a 14X–32X CD-ROM drive instead of a DVD-ROM drive.

Premio backs its systems with a generous three-year parts and labor warranty. Tech-support reps got on the line with us in less than a minute during our anonymous calls and answered almost all of our questions accurately. But Premio's reps are available only 9 hours per weekday—easily the least-generous support hours of any PC maker on the chart.

17 COMPAQ DESKPRO EN 6500X

PRO: Very fast, good design

CON: Pricey; weak features, support, and manuals

Compaq's Deskpro EN 6500X targets IS managers looking for a brand-name Pentium III-500 system. This $2869 workstation chalked up a 232 score on our PC WorldBench 98 tests—on par with similarly configured PIII-500s—putting the 6500X only 5 points behind the fastest Windows 98 systems on the power chart. However, it costs $212 more than the average PIII-500 PC here. That, as well as minor compromises in features and substandard documentation, caused this Deskpro to fall well short of a Best Buy.

Deskpro EN 6500X

On the positive side, Compaq bundles an ethernet card—making this desktop ready for your local area network—and a 14.4GB hard drive that sets aside plenty of storage space for most users. But we've listened to clock radios that produce better sound than this PC's integrated speakers manage to put out. Though we liked the keyboard's quiet, solid feel, the mouse lacks a handy finger-wheel for on-screen document scrolling. And whereas most PCs include at least three free drive bays, the Deskpro EN 6500X offers only one.

For the most part, the 6500X's design is fine. By pressing two buttons on each side of the PC, system administrators can open the case. It also has a case lock and an intruder alert; and the clean interior allows easy access to memory, processor, and peripheral slots. Our one complaint: Upgrading drives takes longer than it should. If you want to replace your CD-ROM drive with a DVD-ROM unit, for example, you'll first have to unplug all the cords and remove the hard disk.

In the area of documentation, Compaq disappoints: You get only a foldout setup guide and a smattering of component manuals. With our test system, Compaq included a Windows 95 manual instead of one for Windows 98, the OS that came with the unit. These shortcomings aren't major hurdles for sharp IS people, but they needlessly complicate matters for do-it-yourselfers.

HP Vectra VL Series 8+

Compaq offers competitive after-sale policies, including a three-year parts warranty and around-the-clock phone support, but our survey respondents gave Compaq's support quality only a tepid rating. In our own anonymous calls to tech support, most hold times lasted a scant few minutes, but we did encounter one horrendous 43-minute wait due to problems with Compaq's phone system. Our readers also rated the company's system reliability as only fair.

18 HP VECTRA VL SERIES 8+

PRO: Extremely powerful shortcut keys

CON: Restrictive support policies, high price, reliability judged only fair

Looking for a Windows 98 workstation with real kick? We've seen none faster than HP's new PIII-500 midsize tower. But limited support hours keep the Series 8+ at the bottom of the Top 20.

This machine racked up a PC WorldBench 98 score of 237, nearly 10 percent faster than the average power desktop system—a large enough gap to make a difference for many users. System administrators will appreciate that the Series 8+ comes equipped with an ethernet card and Top Tools, HP's DMI-compliant remote management software. (Such software enables administrators to check, from their own PCs, the vital stats of PCs attached to the network.) HP doesn't supply any business applications, however.

The Series 8+'s features will meet most office needs, and then some. The video system—a 17-inch monitor and an 8MB graphics card—is basic, but HP includes a cavernous 18.2GB hard disk and a 4.8X DVD-ROM drive that delivers smooth, bright video playback. This Vectra is one of the few systems we've seen whose keyboard offers one-button access to e-mail, Web browsing, and several other commonly used applications, though it clacks rather loudly and requires a firm touch.

Getting inside the PC couldn't be easier. All we had to do was unlock the case and flip a couple of levers to lift the cover. We had to woggle the case, however, to get it to seat correctly when replacing it. We found a generally clean, well-designed interior, including a heat-dissipation hood that connects the processor to the back of the machine. HP applies the same high level of thoughtfulness to documentation and support. Besides a well-written printed user guide, the company includes thorough online ergonomics information, to help you avoid repetitive strain injuries.

The one big area where HP skimps is on support policies. Technicians answer the phones just 11 hours per day, weekdays only, and provide free support for only the first year. Fortunately, we were usually able to reach reps right away, and we found their advice consistently helpful. Our readers give HP's support quality a good rating; they were less bullish on the reliability of HP's systems, however, assigning it a rating of only fair.

BEYOND THE TOP 20

online

We also evaluated the following systems, but they didn't score high enough to reach the *Top 20 Power Desktops* chart. For write-ups, visit PC World Online (www.pcworld.com/t20pcs).

- **Compaq Prosignia Desktop 330**
- **NEC PowerMate 8100**
- **Netis Starburst 7450**
- **NexTrend NexStar-5184**
- **Polywell Poly PIII-450 B2**

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Portable VPL-X1000U / VPL-S900U

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VPL-X2000U

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VPL-X1000U / VPL-S900U
1000 / 900 ANSI lumens
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LCD Micro Lens Array

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SONY

PC WORLD

TOP 20 BUDGET DESKTOPS

	SYSTEM	Last month	Month tested	Street price (2/15/99)	CPU	Comments
1	Dell Dimension V350 800/388-8542 www.dell.com	2	Mar 99	$1505	Pentium II-350	Excellent small PC, terrific reliability rating for company's PCs in our latest R&S survey.
2	Gateway GP6-400 800/315-2536 www.gateway.com	3	Mar 99	$1799	Pentium II-400	Quick, expandable small-business PC has network card, sharp monitor, and Zip drive.
3	Micro Express MicroFlex C400B 800/989-9900 www.microexpress.net	n/a	Jan 99	$1399	Pentium II-400	System offers plenty of RAM and a DVD-ROM drive, but the monitor is mediocre.
4	Sys TaskMaster Z366C 800/613-9963 www.sys.com	10	Apr 99	$1299	Celeron-366	$100 less this month on PC with great expandability and good support policies.
5	Gateway E-1200 366 800/315-2536 www.gateway.com	n/a	(NEW)	$1250	Celeron-366	Exceptionally affordable and manageable workstation lacks features and speed.
6	CyberMax Enthusiast KII-400R 800/345-8926 www.cybermaxpc.com	7	Apr 99	$1499	AMD K6-2-400	Low-priced business PC stocked with 19-inch monitor, Zip drive, DVD-ROM drive.
7	Axis Systems Orion 100C DVD 800/378-9014 www.axissys.com	6	Apr 99	$1748	Pentium II-450	Recent multimedia offering boasts great performance; good price for PII-450 PC.
8	IDot.com 366LXA 888/388-4368 www.idot.com	n/a	(NEW)	$1198	Celeron-366	Basic PC sells for a great price, but it's shy on support quality and features.
9	CyberMax Enthusiast PII-450 800/345-8926 www.cybermaxpc.com	n/a	(NEW)	$1799	Pentium II-450	Fast SOHO PC with a big monitor, but it's a little pricey.
10	Xi Computer 333A MTower SP 800/432-0486 www.xicomputer.com	11	Mar 99	$1349	Celeron-333	Computer is fast for its processor class; good price and management features.
11	CompUSA American Pro 366 888/226-6772 www.compusa.com	17	Apr 99	$1499	Celeron-366	Model from small-office line dropped $193, features good sound and Zip drive.
12	MidWest Micro Office Pro 350 800/728-8582 www.mwmicro.com	13	Feb 99	$1469	Pentium II-350	Average-price PC benefits from DVD-ROM drive and strong warranty.
13	Sys TaskMaster 350K2 800/613-9963 www.sys.com	n/a	Jan 99	$1399	AMD K6-2-350	Company cuts $160 off speedy, expandable PC equipped with 40X CD-ROM drive.
14	Quantex QP6/400 M-2x 800/896-4898 www.quantex.com	n/a	Feb 99	$1699	Pentium II-400	Zip drive added and $150 lopped off price of SOHO system; monitor picture just mediocre.
15	Micro Express MicroFlex-4A 800/989-9900 www.microexpress.net	15	Apr 99	$1499	AMD K6-2-400	Small-office PC comes with 19-inch monitor, 9.6GB hard disk and 4.8X DVD-ROM drive.
16	HP Vectra VE Series 8 800/752-0900 www.hp.com/vectra	n/a	(NEW)	$1424	Celeron-366	A little short on features and support hours, but this corporate PC performs well.
17	Compaq Prosignia Desktop 310 800/345-1518 www.compaq.com	18	Apr 99	$1349	Celeron-366	$50 off already competitive price on rather underwhelming offering.
18	Micron Millennia C366 888/546-0501 www.micronpc.com	14	Apr 99	$1279	Celeron-366	Affordable computer with solid reliability reputation falls short on features.
19	Axis Systems Metropolis NX5-333C 800/378-9014 www.axissys.com	20	Mar 99	$1144	Celeron-333	Price is low, but speed is lackluster, and features like the 4.3GB hard disk are thin.
20	Racer 2000RS 800/843-8458 www.racerpc.com	n/a	Oct 98	$1299	Pentium II-350	Inexpensive PC has unimpressive features and performance.

Best Buy

See features chart, page 230; test report, page 232.

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" on page 217.

[2] For more information about all of the products listed in this table, select product info number 906 or visit www.pcworld.com/productinfo.

INTEL STEALS MARKET SHARE FROM ITSELF as PCs based on high-end Celeron chips emerge as an excellent choice for budget-system shoppers, pushing past some PCs based on mid-range Pentium IIs. This month, three of the four new chart-makers use the Celeron-366, and small wonder. On average, the Celeron-366 PCs run only 9 percent slower than PII-400–based PCs, yet the average price—$1297—is 21 percent below that of the PII-400s. Despite Intel's plethora of processors, AMD-based PCs hang in there. Three of the systems on the budget chart use an AMD-K6 processor, including CyberMax's Enthusiast KII-400R, an excellent multimedia PC that almost nabbed a Best Buy.

SCORECARD

★ Overall rating	PC WorldBench 98/operating system	Features and design	Price	Performance [1]	Vendor's system reliability	Vendor's support quality/policies	Product info number [2]
82	179/Win 98	satisfactory	average	satisfactory	outstanding	good/good	–
81	203/Win 98	good	expensive	very good	good	good/outstanding	664
79	204/Win 98	satisfactory	inexpensive	very good	[3]	fair [4]/outstanding	665
79	193/Win 98	good	inexpensive	very good	[3]	fair [4]/good	666
79	177/Win 98	satisfactory	very inexpensive	satisfactory	good	good/outstanding	667
78	187/Win 98	very good	average	good	fair [3]	good [4]/good	668
78	210/Win 98	good	expensive	outstanding	[3]	good [4]/outstanding	669
78	185/Win 98	satisfactory	very inexpensive	good	[3]	fair [4]/good	670
77	205/Win 98	very good	expensive	very good	fair [3]	good [4]/good	671
77	182/Win 98	good	inexpensive	good	[3]	good [4]/good	672
75	188/Win 98	good	average	good	[3]	fair [4]/good	673
74	181/Win 98	good	average	good	[3]	good [4]/outstanding	674
74	181/Win 98	good	inexpensive	good	[3]	fair [4]/good	675
74	199/Win 98	good	expensive	very good	[3]	fair [4]/good	676
74	183/Win 98	good	average	good	good [3]	good [4]/outstanding	677
74	188/Win 98	satisfactory	average	good	fair	good/fair	678
71	170/Win 98	satisfactory	inexpensive	satisfactory	fair	fair/good	679
71	186/Win 98	limited	inexpensive	good	good	fair/good	680
70	198/Win NT 4.0	satisfactory	very inexpensive	satisfactory	[3]	good [4]/outstanding	681
67	174/Win 98	satisfactory	inexpensive	satisfactory	[3]	fair [4]/outstanding	682
Scorecard weightings ▶		Features 25 percent	Price 22 percent	Performance 18 percent	Reliability 15 percent	Quality/policies 10 percent each	

[3] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs.

[4] Due to insufficient data from the Reliability and Service survey for the vendor's work PCs, this rating is derived from anonymous support quality calls, from survey scores for the vendor's home PCs, or from both.

This Month's Best Buys

1 DELL DIMENSION V350

PRO: Top reliability ratings, well-designed, good support, easy to set up

CON: So-so monitor and speakers

If you're looking for an affordable and reliable PC for your small business and don't need a lot of extras, check out the V350. It's affordable ($1505), performs adequately, and packs all the essentials. Best of all, respondents in our latest survey upgraded Dell's system reliability to our highest rating, bumping the V350 to the top spot.

The Dimension V350 scored 179 on our PC WorldBench 98 test suite, typical for a budget desktop, and the system includes a 14X–40X CD-ROM and a serviceable 17-inch Dell 1000HS monitor that displays images clearly at resolutions up to 1024 by 768 pixels. Above that, images appear a bit fuzzy. The Harman/Kardon HK195 speakers offer crisp, if somewhat light, sound.

Rather than providing separate cards for graphics and sound, Dell integrates those functions into chips on the motherboard, freeing expansion slots. And the V350 pairs ATI's increasingly popular 3D Rage Pro graphics chip set with the superior Yamaha XG MIDI sound system for a robust audio-video combo. Color-coded ports and connectors simplify setup. Backing the system is Dell's highly rated reliability and good tech support, including around-the-clock toll-free telephone assistance.

Dell Dimension V350

2 GATEWAY GP6-400

PRO: Fast, lots of features, thorough documentation, good reliability and support

CON: Pricey for a budget system

Once exclusive to corporations, networked PCs are entering small and home offices; and the GP6-400 fits in well there. Though relatively expensive at $1799, it delivers—especially since readers have upgraded Gateway's support quality rating from fair to good.

The GP6-400 scored near the average for PII-400–based systems in our PC WorldBench 98 tests. It sports a 3Com Fast EtherLink adapter, a three-year warranty on parts and labor, and strong support policies. The GP6-400 is simple to upgrade, too. We easily opened the system's case by hand-turning two thumbscrews; inside were four expansion slots (one shared ISA/PCI, three PCI) and four open drive bays, even with the included Zip drive in place. Though the GP6-400's Ensoniq 3D Blaster Banshee graphics adapter can't support resolutions as high as the ATI 3D Rage Pro can handle, its top setting of 1280 by 1024 looks respectable on Gateway's 17-inch EV700 monitor. ▶

Gateway GP6-400

TOP 20 BUDGET DESKTOPS — STANDARD FEATURES

	SYSTEM [1]	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	Hard drive (GB)	Graphics adapter (AGP)	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	56-kbps modem protocol
1	Dell Dimension V350*	Pentium II-350	Windows 98	64	512	8.4	integrated ATI 3D Rage Pro	8/SDRAM	17/15.9	V.90
2	Gateway GP6-400*	Pentium II-400	Windows 98	64	512	10.1	Ensoniq 3D Blaster Banshee	16/SGRAM	17/16	not included
3	Micro Express MicroFlex C400B*	Pentium II-400	Windows 98	128	512	10	ATI Xpert@Work	8/WRAM	17/16.1	V.90
4	Sys TaskMaster Z366C*	Celeron-366	Windows 98	64	128	6.4	Eon Lilith Banshee	16/SGRAM	17/15.7	V.90
5	Gateway E-1200 366*	Celeron-366	Windows 98	64	128	7	integrated ATI 3D Rage IIC	4/SGRAM	17/15.8	not included
6	CyberMax Enthusiast KII-400R	AMD K6-2-400	Windows 98	64	512	10	STB Velocity 4400	16/SDRAM	19/18	V.90
7	Axis Systems Orion 100C DVD	Pentium II-450	Windows 98	128	512	8.4	Intel740	8/SDRAM	17/15.8	V.90
8	IDot.com 366LXA	Celeron-366	Windows 98	64	128	6.4	Card Expert Intel740	8/SDRAM	17/16	V.90
9	CyberMax Enthusiast PII-450	Pentium II-450	Windows 98	128	512	13.6	Number Nine Revolution IV	16/SDRAM	19/17.9	V.90
10	Xi Computer 333A MTower SP	Celeron-333	Windows 98	64	128	14	Matrox Millennium G200	8/SGRAM	17/16	V.90
11	CompUSA American Pro 366	Celeron-366	Windows 98	64	128	13.5	STB Velocity 4400	16/SDRAM	17/15.6	V.90
12	MidWest Micro Office Pro 350	Pentium II-350	Windows 98	64	512	6.4	ATI Xpert@Play98	8/SGRAM	17/15.8	V.90
13	Sys TaskMaster 350K2	AMD K6-2-350	Windows 98	64	512	10.1	Matrox Millennium G200	8/SGRAM	17/15.8	V.90
14	Quantex QP6/400 M-2x	Pentium II-400	Windows 98	64	512	8.4	Diamond Fire GL 1000 Pro	8/SGRAM	19/17.9	V.90
15	Micro Express MicroFlex-4A	AMD K6-2-400	Windows 98	64	1024	9.6	Diamond Monster Fusion	16/SGRAM	19/17.9	V.90
16	HP Vectra VE Series 8	Celeron-366	Windows 98	64	128	4.3	Matrox Productiva G100	4/SGRAM	17/16	not included
17	Compaq Prosignia Desktop 310	Celeron-366	Windows 98	64	128	10	Diamond Viper V330	4/SGRAM	17/16	V.90
18	Micron Millennia C366	Celeron-366	Windows 98	64	128	8	integrated NVidia RIVA 128zx	8/SGRAM	17/15.9	V.90
19	Axis Systems Metropolis NX5-333C	Celeron-333	Windows NT 4.0	64	128	4.3	Intel740	8/SDRAM	17/15.7	not included
20	Racer 2000RS	Pentium II-350	Windows 98	64	512	6.5	integrated	4/SGRAM	17/15.8	V.90

* Best Buy [1] Configuration as tested. Vendor may have since changed components. [2] *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. [3] Six years on CPU and main RAM, three years on other parts.

The GP6-400 has an ample 10.1GB hard drive and a software bundle of McAfee AntiVirus and Microsoft's Office 97 Small Business Edition with Bookshelf—resources any small business will welcome.

3 MICRO EXPRESS MICROFLEX C400B

PRO: Very affordable, nimble performer, excellent support policies

CON: Mediocre monitor, outdated documentation, no business software

Since January, when it first arrived on our chart, we've praised Micro Express's C400B as an affordable small-business system with strong multimedia components. Now a $100 price cut to $1399 vaults this PII-400–based midsize tower back into the Best Buy ranks and makes it the least-expensive PC ever to score over 200 on PC WorldBench 98. You typically have to pay $1600 to $1700 for this level of performance.

What kept the C400B from rising even higher? A few features drawbacks. First, you have to pay extra for productivity programs such as Microsoft Office; and second, the display on the 17-inch Impression 7 Plus monitor had fuzziness in the corners that we couldn't tune out. In addition, the seriously outdated owner's guide contains nary a word about Windows 98, and we had to struggle a bit to remove and replace the PC's three-sided case cover—an issue for people who intend to add new peripherals regularly.

MicroFlex C400B

Even so, the good far outweighs the bad. Once we got the cover off, we found plenty of room to move around inside, and adequate space to accommodate new devices. Also, the C400B has some terrific features for such a low-priced system, especially in the multimedia category. The Altec Lansing PowerCube speakers, when used with the bundled subwoofer, deliver surprisingly rich audio for their compact size (just 5 cubic inches), and this PC is one of only six on the chart to come with a 4.8X DVD-ROM drive.

Micro Express backs the MicroFlex C400B with an exceptionally long four-year warranty on parts and labor and provides free phone support around the clock.

		EXPANDABILITY					CUSTOMER SUPPORT			
CD/DVD-ROM drive speed	Sound board	Case style [2]	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
14X-40X	integrated	midtower	384	2	3/1	3	3/1	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
13X-32X	integrated Sound Blaster Audio	midtower	384	2	2/2	4	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Sound Blaster PCI128	midtower	384	1	3/0	4	4/4	24	Sat, Sun	WWW
14X-32X	Sound Blaster AWE64	midtower	1024	3	3/2	4	varies [3]/5	24	Sat, Sun	WWW
13X-32X	integrated Crystal Audio	compact	256	1	1/1	2	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
4.8X DVD-ROM	Aureal A3D 64V	midtower	256	1	2/3	3	3/1	24	Sat, Sun	BBS, WWW
4.8X DVD-ROM	Sound Blaster PCI128	midtower	384	2	3/0	4	3/3	24	Sat, Sun	WWW
17X-40X	Aztech PCI 338A-3D	midtower	384	2	3/0	4	varies [4]/1	24	Sat, Sun	WWW
20X-40X	Sound Blaster AWE64	midtower	384	1	3/3	4	3/1	24	Sat, Sun	BBS, WWW
20X-40X	Creative Ensoniq AudioPCI	midtower	768	2	3/2	4	3/3	24	Sat, Sun	WWW
17X-40X	Sound Blaster Live!	midtower	768	2	2/1	3	varies [3]/1	24	Sat, Sun	WWW
4.8X DVD-ROM	Sound Blaster AWE64D	midtower	768	2	3/1	4	varies [4]/3	24	Sat, Sun	BBS, WWW
17X-40X	Sound Blaster AWE64	midtower	768	2	3/2	4	varies [3]/5	24	Sat, Sun	WWW
4.8X DVD-ROM	Creative Audio PCI 64V	minitower	384	1	2/3	3	3/1	24	Sat, Sun	BBS, WWW
4.8X DVD-ROM	Sound Blaster PCI128	midtower	384	4	3/0	3	4/4	24	Sat, Sun	WWW
13X-32X	OEM Aztech AZT 2320	minitower	384	2	2/1	4	3/1	11 [6]	none	AOL, BBS, CIS, WWW
14X-32X	Compaq Premiere Labs	midtower	256	1	1/1	3	3/1	24	Sat, Sun	AOL, BBS, CIS, Prodigy, WWW
17X-40X	integrated ESS Maestro2 PCI	minitower	256	1	1/0	2	varies [4]/1	24	Sat, Sun	BBS, CIS, WWW
14X-32X	Creative Ensoniq AudioPCI	midtower	384	2	3/0	4	3/3	24	Sat, Sun	WWW
16X-36X	Aztech PCI 338A-3D	midtower	384	2	3/1	4	3/3	24	Sat, Sun	WWW

[4] Five years on CPU and main RAM, three years on other parts. [5] One year on monitor, three years on other parts. [6] Not toll-free.

4 SYS TASKMASTER Z-366C

PRO: Fast, great price

CON: No software, lackluster support quality

Put the TaskMaster Z-366C on your short list of candidates if you want a speedy small-business computer at an extremely low price. A recent $100 reduction drops the TaskMaster Z-366C's price to $1299, making this the fastest sub-$1300 Windows 98 computer we've charted. In fact, most people would be unable to detect any performance difference between this Celeron-366–based midsize tower and the PII-400 PCs on the chart, which cost, on average, several hundred dollars more. On the other hand, the $1299 price doesn't include any applications software, such as Microsoft Office.

Even so, we found the Z-366C an impressive deal. It's not lavishly appointed, but you get everything you need for basic business tasks, including a 6.4GB hard drive, a V.90 56-kbps modem, a 14X–32X CD-ROM drive, and a 17-inch monitor. While colors appeared a bit washed out on our display, the video system comes with 16MB of video memory—twice what you usually find on systems in this price range—providing some real oomph for 3D tasks. The bundled Altec Lansing ACS295 speakers and subwoofer deliver full, rich audio. To get inside the TaskMaster, you'll need a screwdriver to remove two small screws; but once they're out of the way, the case slides off smoothly and quickly to reveal a tidy interior.

Sys TaskMaster Z-366C

Our biggest beef: the paucity of good technical assistance. The bundled manuals aren't much help, especially for people new to PCs, so you may need to turn to the company's phone-based support. But though Sys offers users nonstop toll-free support and free on-site service for the first year, reps are available only 9 hours per day after that. On top of that, Sys's support quality rates as only fair. In our anonymous calls to the service department, we had to leave messages for callbacks about half the time. When we spoke to reps, they fielded the easy questions quite well but tended to pass the buck on the tougher questions, asserting that the problems were "software issues."

5 GATEWAY E-1200 366

PRO: Very inexpensive, easy to manage and use

CON: So-so performance, smallish hard drive

If you manage lots of PCs, check out Gateway's latest compact desktop—a Celeron-366 system that emphasizes ease of use and service. Better yet, it sells for just $1250—a great price for any PC, much less a LAN-ready model equipped with an ethernet adapter.

But make sure your office has modest computing needs. With a PC WorldBench 98 score of 177, the E-1200 is slow, even for its processor class, and some of its features are merely adequate. The 7GB hard drive seems stingy these days; and while most budget systems now offer 8MB or 16MB of video RAM, the integrated ATI 3D Rage IIC on this PC has just 4MB. Still, if your workgroup mostly writes memos and works in simple database and spreadsheet applications, the E-1200 is ideal.

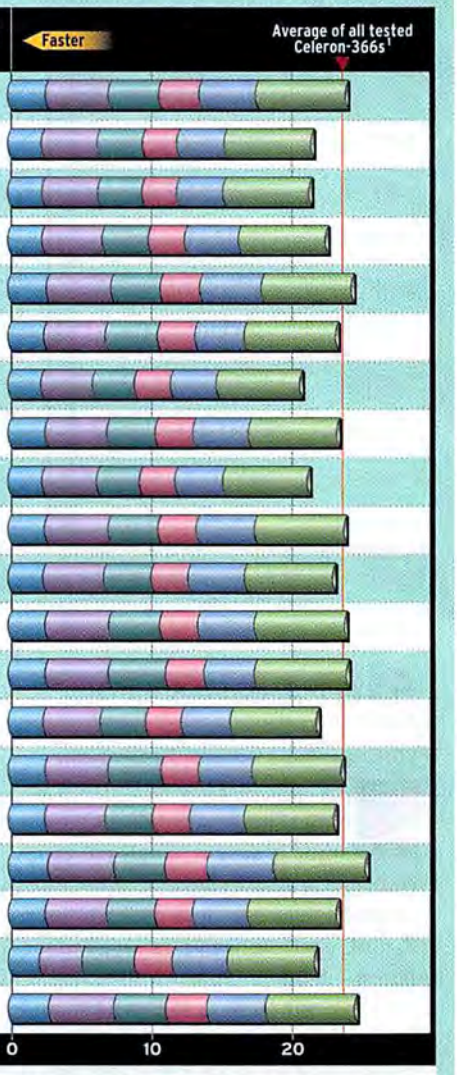
Gateway E-1200 366

You can get inside the system in moments—just give a hand-turnable screw a few twists, and press two buttons to release the cover. Inside waits a clean and tidy layout. All ports on the back of the system are labeled and color-coded. The system's documentation exceeded our expectations as well. Along with an illustrated, fold-out setup guide, Gateway includes a clearly written system manual, a ▶

TOP 20 BUDGET DESKTOPS

TEST REPORT

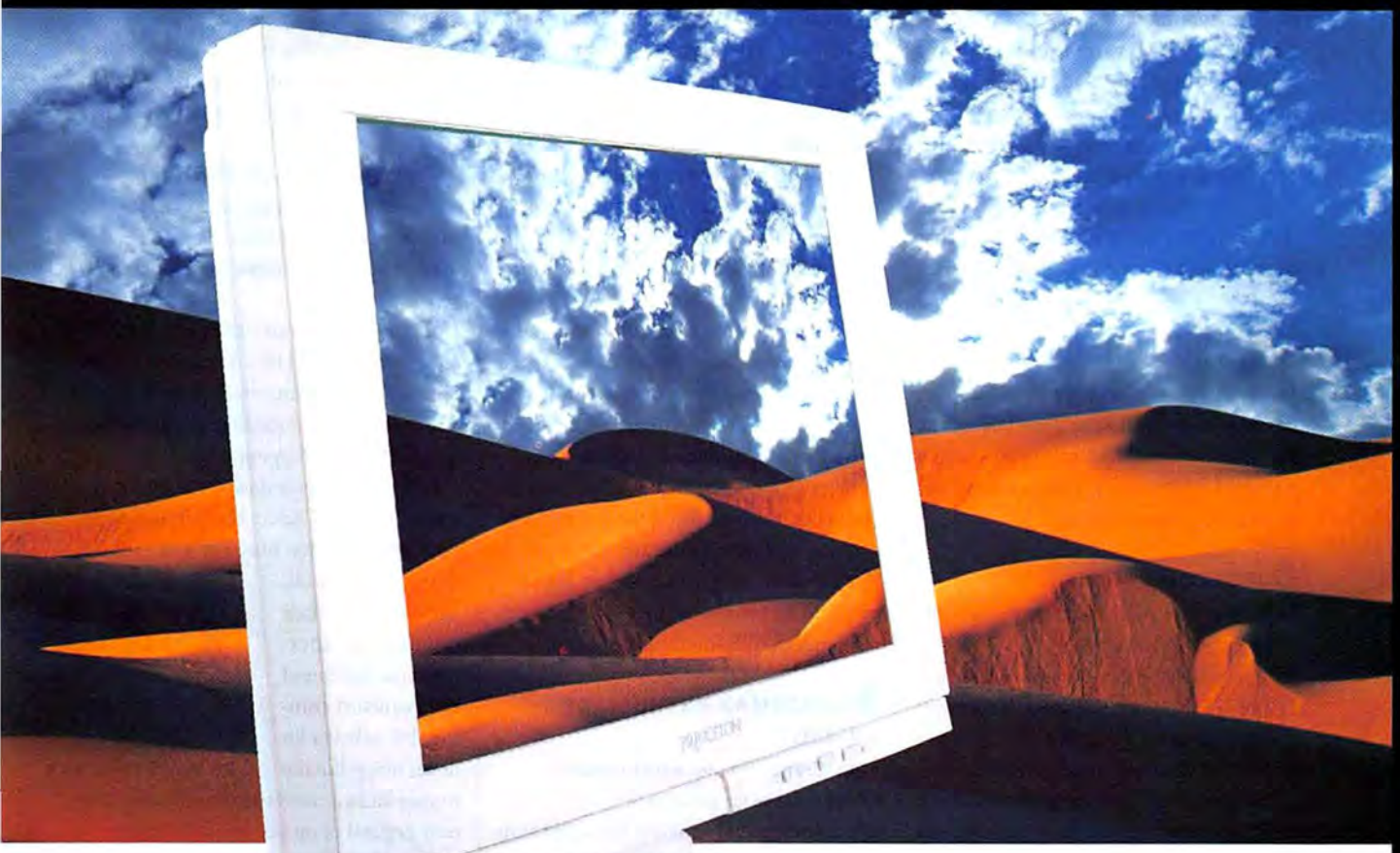
	SYSTEM	CPU	Operating system	RAM (MB)	Level 2 cache (KB)	PC WorldBench 98 score
1	Dell Dimension V350*	Pentium II-350	Win 98	64	512	179
2	Gateway GP6-400*	Pentium II-400	Win 98	64	512	203
3	Micro Express MicroFlex C400B*	Pentium II-400	Win 98	128	512	204
4	Sys TaskMaster Z-366C*	Celeron-366	Win 98	64	128	193
5	Gateway E-1200 366*	Celeron-366	Win 98	64	128	177
6	CyberMax Enthusiast KII-400R	AMD K6-2-400	Win 98	64	512	187
7	Axis Systems Orion 100C DVD	Pentium II-450	Win 98	128	512	210
8	IDot.com 366LXA	Celeron-366	Win 98	64	128	185
9	CyberMax Enthusiast PII-450	Pentium II-450	Win 98	128	512	205
10	Xi Computer 333 MTower SP	Celeron-333	Win 98	64	128	182
11	CompUSA American Pro 366	Celeron-366	Win 98	64	128	188
12	MidWest Micro Office Pro 350	Pentium II-350	Win 98	64	512	181
13	Sys TaskMaster 350K2	AMD K6-2-350	Win 98	64	512	181
14	Quantex QP6/400 M-2x	Pentium II-400	Win 98	64	512	199
15	Micro Express MicroFlex-4A	AMD K6-2-400	Win 98	64	1024	183
16	HP Vectra VE Series 8	Celeron-366	Win 98	64	128	188
17	Compaq Prosignia Desktop 310	Celeron-366	Win 98	64	128	170
18	Micron Millennia C366	Celeron-366	Win 98	64	128	186
19	Axis Systems Metropolis NX5-333C	Celeron-333	Win NT 4.0	64	128	198
20	Racer 2000RS	Pentium II-350	Win 98	64	512	174



*Best Buy

TEST PC WORLD 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 Windows 95, Windows 98, 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). [1]Under Windows 98 with 64MB of RAM; also includes systems tested in this and previous months that do not currently rank among the Top 20 systems.

DIGITAL IS BETTER... NOW IT'S BIGGER!



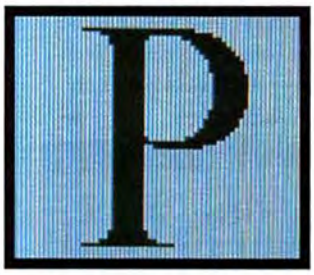
DPP500 11/98

MVP PCComputing Finalist

DP500 2/99

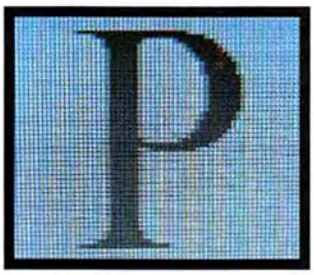
WINLIST Windows Magazine 1999

PRINCETON DPP550™



(Unretouched photo) Crisp geometry, noise-free, sharp edges, clear fonts, pixel perfect

LEADING COMPETITOR'S ANALOG



(Unretouched photo) Distorted image, analog noise, blurred images, muddy text, lost data

INTRODUCING PRINCETON'S DPP800, 18.1" Direct Digital Flat Panel, the newest and largest addition to the Princeton award winning Digital Flat Panel Series. Princeton brought you DPP500, the world's first Direct Digital Flat Panel and as PC Magazine's John Dvorak put it. **"The images on these displays is beyond comprehension. You'll want one the second you see it."** Well, wait until you feast your eyes on the DPP800. It is just as amazing, only bigger. Bigger is better. Princeton's superior flat panel series is available in a variety of viewable sizes from 14" to 18.1", with prices starting as low as $799*. Call now and get the digital display for the next millennium today.

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troubleshooting guide, and a booklet for new users. If you can't find the answer you need there, try Gateway's support line. In our anonymous calls, reps answered within 5 minutes and responded courteously and accurately to all our questions—even the tricky ones. Gateway backs its PCs with a three-year parts and labor warranty and around-the-clock support.

New This Month

The following systems made our Budget Desktops chart for the first time this month. For brief reviews of all previously tested machines on the chart, visit our Web page (www.pcworld.com/top400).

8 IDOT.COM 366LXA

PRO: Bargain-basement price; strong documentation and support policies

CON: Weak multimedia, undistinguished service

Priced below 17 other PCs on the budget chart, IDot.com's $1198 midsize tower works fine for word processing, light-duty spreadsheet and database work, and other basic jobs. But slightly spare features and subpar support experiences prevent it from arriving in Best Buy territory.

IDot.com 366LXA

The 366LXA's case design is admirable. After you hand-loosen two screws and press a couple of buttons, the cover pops off. Just as well, because you may want to upgrade from the 6.4GB hard drive or 17X–40X CD-ROM drive some day. IDot.com took the questionable design path of making the top of the case bowed instead of flat; as a result, objects placed on it tend to slide off easily.

Text and colors on the 17-inch monitor appear slightly fuzzy and washed out, the 8MB graphics card can't deliver high-resolution images in true color, and the Altec Lansing ACS43W speakers sound a tad anemic. If you stick to business, though, you'll probably be quite satisfied with this system.

The 366LXA is equipped with Microsoft's Natural Keyboard. Once we adapted to the keys' arc-shaped configuration (which supposedly mimics ergonomically correct hand positioning), we found the keyboard quite comfortable to type on.

IDot.com provides excellent documentation, including a handy foldout setup guide and a well-written manual. Alas, the system's low price includes zero software, so solo users must buy their own.

IDot.com offers nonstop phone support; but in our anonymous calls, we had to wait for up to 14 minutes to speak with a technical representative and often received less-than-thorough responses. In answer to a question about our modem connection, for example, the rep said that nothing was wrong with the computer or the modem, asserting instead that the problem was with our ISP—and failing to offer any troubleshooting assistance.

9 CYBERMAX ENTHUSIAST PII-450

PRO: Very nice features and performance

CON: Expensive for its category

On a budget and looking for a fast, full SOHO system? CyberMax's Enthusiast PII-450 makes a good pitch for your business. The $1799 midsize tower may seem expensive for a budget system, but it performs well and packs some great features, including a large monitor and lots of software. It doesn't ascend any higher because it costs more than the $1400 to $1500 systems we now see so often on the chart.

For the price, the Enthusiast delivers solid performance and features. Though it runs more like a PII-400 (with a PC WorldBench 98 score of 205), this PII-450 machine ranks as the second-fastest PC on the budget chart. And it carries a big 19-inch monitor and a roomy 13.6GB hard disk—numbers few other chart makers can match. We also found the monitor's controls easy to use. The software bundle includes Compton's Home Library, Corel WordPerfect Suite 8, and Blockbuster's Guide to Movies. You'll probably want to replace the flimsy keyboard, however.

Enthusiast PII-450

The Enthusiast PII-450 includes comprehensive documentation and an easy-to-follow system manual. CyberMax backs this PC with a three-year parts and one-year labor warranty, and you can call support any time.

16 HP VECTRA VE SERIES 8

PRO: Fast for its price, good support, rock-solid chassis, great documentation

CON: Small hard drive, subpar video system, noisy keyboard

If the people in your office play musical cubes, they need HP's $1424 Vectra VE Series 8. This minitower is built like a tank, so it tolerates jostling. It's also quick for a Celeron-366 system.

To hold the price down, HP keeps the specs on this PC basic: The Series 8 packs only 4MB of video memory and a 4.3GB hard drive, and images on its 17-inch monitor are unexceptional. We found the keyboard comfortable, albeit a little bit noisy, but the mouse lacks a convenient scroll wheel for easy perusal of on-screen documents.

HP Vectra VE Series 8

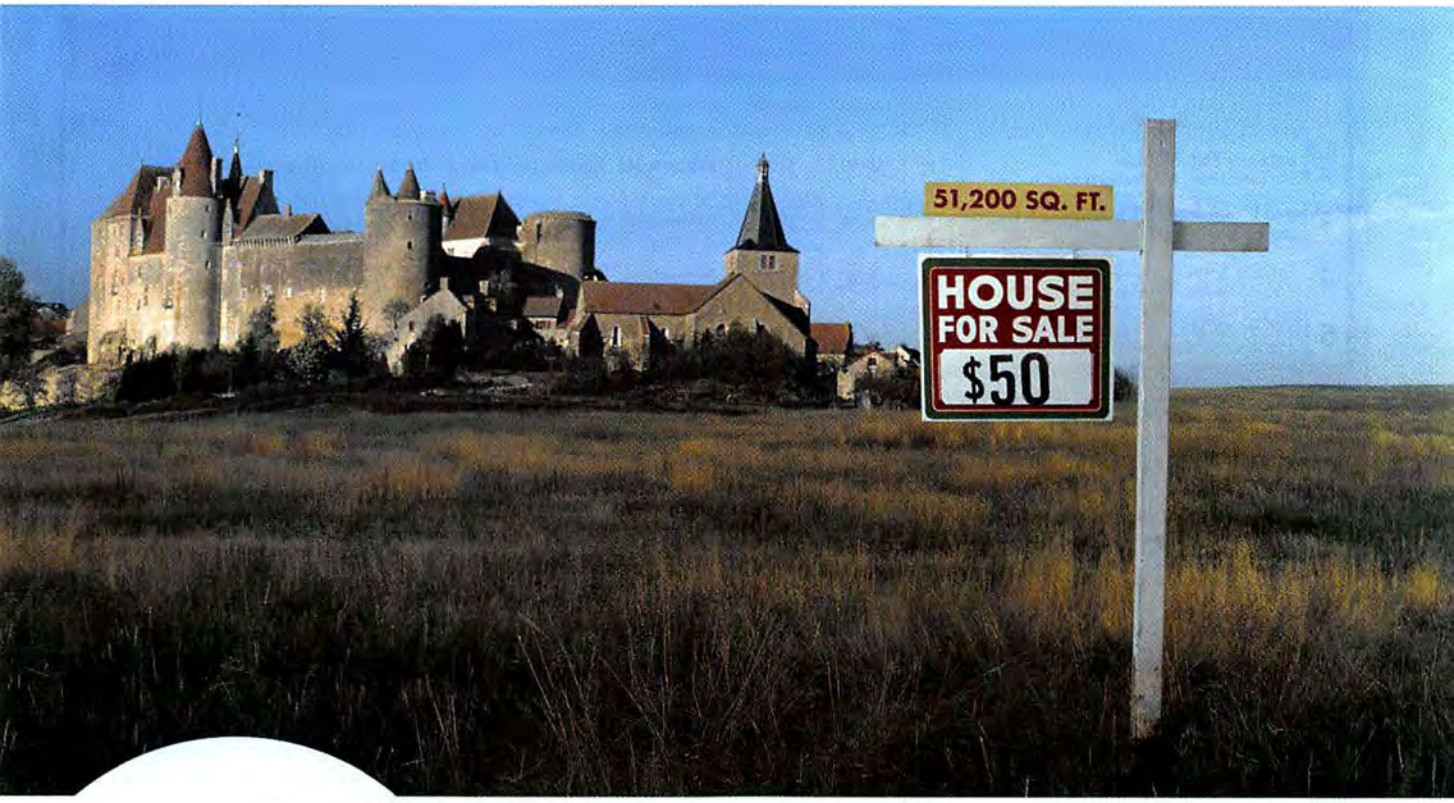
These limitations aside, the Series 8 is nicely designed. The exterior has a clean, simple look, and the minitower chassis occupies minimal cube space. Though removing and reseating its wraparound case take a little finagling, you'll find easy access to slots and bays once you're inside. Like most corporate systems, this one carries no software except the operating system, but the Series 8 does come LAN-ready with an ethernet adapter, and its well-written manuals have lots of illustrations. HP's support policies could be better, even for a corporate system: Tech lines stay open 11 hours, weekdays only, and the call is on your nickel. ▶

BEYOND THE TOP 20

online

We evaluated the following systems along with the others, but they didn't score high enough to reach the *Top 20 Budget Desktops* chart. For write-ups, visit PC World Online (www.pcworld.com/t20pcs).

- **IBM PC 300GL Small Business Series**
- **Kingdom Pinnacle 400 DVD**
- **Polywell Poly AG5/400**



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Big space at a small price. Unbelievable? Not with the OnStream 30GB and 50GB digital storage solutions. You've watched the cost of servers continue to decline. That's good. And you'd think the cost of effective backup solutions would follow. But they haven't. Until now. Introducing the OnStream 30GB and 50GB Digital Tape Drives that cost only a fraction of what you're used to paying. But don't let the low price fool you. With our breakthrough technology, Advanced Digital Recording (ADR™), we've combined a collection of more than 47 patented technology innovations that deliver an unprecedented blend of reliability, performance, capacity, convenience, and affordability. And, you'll be able to backup most servers on a single cartridge. Now that's smart. To learn more about OnStream and our reliable workgroup backup solutions, call 1-800-759-4621 ext. 209 or visit ***www.onstream.com/performance***

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PC WORLD

TOP 10 NOTEBOOK PCs

	POWER NOTEBOOK	Last month	Month tested	Street price (2/12/99)	CPU	Comments
1	Dell Latitude CPi A366XT 800/388-8542 www.dell.com	n/a	NEW	$3248	Pentium II-366	This thin laptop for corporate users has a great keyboard but no modem.
2	Gateway Solo 5150LS 800/315-2536 www.gateway.com	1	Apr 99	$3134	Pentium II-366	Desktop replacement sports a big 14.1-inch screen and a DVD-ROM drive.
3	Dell Inspiron 7000 A366LT 800/388-8542 www.dell.com	3	Apr 99	$3549	Pentium II-366	Very heavy notebook with 15-inch screen and DVD-ROM drive offers great speed.
4	Toshiba Satellite 4080XCDT 800/867-4422 www.toshiba.com	n/a	NEW	$3199	Pentium II-366	Very good audio and large 14.1-inch screen distinguish this multimedia unit.
5	NEC Versa SX 888/863-2669 www.nec-computers.com	4	Dec 98	$2899	Pentium II-300	$200 off thin, very light model; ideal for travel, except battery life is poor.
	BUDGET NOTEBOOK					
1	Gateway Solo 2500SE 800/315-2536 www.gateway.com	2	Apr 99	$1874	Celeron-266	$100 off elevates notebook with outstanding 5-plus hours of battery life.
2	Dell Inspiron 3500 C300XT 800/388-8542 www.dell.com	1	Apr 99	$2229	Celeron-300	Very fast notebook is light enough for travel; vendor's system reliability is tops.
3	HP OmniBook XE 800/322-4772 www.hp.com	n/a	NEW	$1899	Pentium II-266PE	Laptop offers good battery life and speed for an affordable price.
4	Toshiba Satellite 4015CDS 800/867-4422 www.toshiba.com	3	Feb 99	$1399	Pentium II-266	$200 price cut on inexpensive notebook that boasts good battery life.
5	AMS Tech Roadster 15CTA 800/886-2671 www.amstech.com	5	Jan 99	$1295	AMD K6-2-300	Cheapest notebook on the chart has bright screen and three-year warranty.

Best Buy

See features chart, page 238.

n/a = not applicable

[1] Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

[2] For more about products here, select the number on the product information card or visit www.pcworld.com/productinfo.

A SLIGHTLY FASTER CHIP HERE. A price drop there. And so goes the Top 10 shoving match between Dell and Gateway. Recently the two big direct sellers have taken turns claiming Best Buys with closely matched power and budget notebooks.

This month, Dell grabs the top spot on the power side of the chart with the new CPi A366XT, the latest model in its corporate-oriented Latitude line. The A366XT runs a hair slower than Gateway's Solo 5150LS, another notebook equipped with Intel's fastest mobile CPU; but Dell's notebook weighs less, and the vendor offers slightly more generous support.

Meanwhile, Gateway outsteps Dell on the budget chart. The Gateway Solo 2500SE, a Celeron-266–equipped notebook trumped in April by a Celeron-300–based Dell, pulls in front this month thanks to a $100 price reduction. Gateway now offers one year of Net access (up to 150 hours per month) for $75 via the vendor's ISP.

Besides Dell's Latitude CPi A366XT, two other new notebooks make our latest list—the mobile PII-366–equipped Toshiba Satellite 4080XCDT and the value-line HP OmniBook XE. This month's chart missers read like a Who's Who in Large Laptops: Five of the seven also-rans weigh 9 pounds or more, sinking their Top 10 chances while increasing their viability as small boat anchors. The worst offender: the ProStar 8280, a PII-366 block of ballast that is 14.4 inches wide and weighs almost 12 pounds with AC adapter.

PIXEL PROBLEMS

IF YOU'VE ever bought a new notebook only to discover one or more pinpricks of light marring the screen, you're not alone. *PC World* reader Joe DeBell wrote to us describing a bad pixel in his new WinBook XL2's screen and his fight to get a replacement. WinBook reps told him that a notebook must have more than 5 bad pixels clustered in one spot or 12 scattered over the screen before it would qualify as defective. After much prodding, WinBook finally agreed to exchange DeBell's notebook for another—which also had a bad pixel. DeBell sent that unit back, too, and then bought a Compaq laptop.

WinBook's reaction to DeBell's situation is not unusual. Most buyers find even one bad pixel unacceptable, but most vendors won't consider an exchange until a screen's faulty pixels exceed a threshold number. The less clout a company wields with its screen supplier, the worse its bad-pixel policy tends to be. Quantex, for instance, requires that a screen have ten or more problem pixels before it will discuss a return. Other companies such as Toshiba say they will replace any notebook that has five or more imperfections.

But as DeBell's experience shows, per-

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]	Product info number [2]
86	184/very good	expensive	outstanding	good	good/good	2:15/satisfactory	light	–
86	186/very good	average	good	very good	good/fair	2:50/good	average	618
82	191/outstanding	expensive	outstanding	very good	good/fair	3:24/good	unacceptable	–
82	184/very good	average	fair	very good	fair/fair	2:35/satisfactory	average	619
81	157/good	average	fair	very good	fair/best	1:25/poor	very light	620
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	
87	149/very good	average	good	very good	good/fair	5:06/outstanding	heavy	621
87	160/outstanding	expensive	outstanding	very good	good/good	2:45/satisfactory	light	–
84	154/very good	average	good	very good	good [3]/poor	3:01/good	average	622
84	130/good	inexpensive	fair	good	fair/fair	3:06/good	average	623
82	122/satisfactory	very inexpensive	[4]	good	good [3]/fair	2:35/satisfactory	average	624
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	All products: 902

[1] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

[4] Insufficient data to give a rating.

sistence pays off. Says one notebook company employee, "If I were the customer, I'd scream until the company took the notebook back—or I'd stop payment on my credit card." He adds, "When you're paying $3200 for a brand-new notebook, you shouldn't have to put up with even one bad pixel. They're too distracting."

This Month's Best Buys

POWER NOTEBOOKS

1 DELL LATITUDE CPI A366XT

PRO: Fast, relatively thin and light, modular bay offers flexible options

CON: Barely satisfactory battery life, no modem

Dell's latest corporate notebook combines a fairly thin, stylish case with Pentium II-366 performance and good support policies to claim our power Best Buy this month.

A PC WorldBench 98 score of 184 places the A366XT among the fastest notebooks we've tested. It also outperforms the Latitude CPi D300XT—the model it replaces and our power Best Buy for five months in a row—by some 16 percent. At $3248, it costs about the same as other PII-366 notebooks; blame the price on the newness of the chip.

The Dell Latitude CPi has a thin, 1.6-inch profile.

The A366XT keeps height to 1.6 inches and weight to 7 pounds by using a modular bay that accepts a range of thin devices. It accommodates an included 12X–24X CD-ROM drive, floppy drive, or weight-saving empty module. Alternatively, the bay can hold any of several extra-cost options, including a second battery ($169), a second hard drive that stores up to 6.4GB of data ($499), or an LS-120 removable storage drive ($199).

All of the bay's devices, as well as the optional docking station ($649), can be shared across the Latitude CPi notebook line, according to Dell. An included cable lets you connect the floppy drive to the notebook's parallel port in case you need to put another device in the bay. But odds are you'll use the bay to house an optional $169 second battery, given the A366XT's brief battery life of just 2 hours and 15 minutes.

Geared toward corporate buyers who need long-term configuration stability, the A366XT lacks the advanced video options other high-end notebooks routinely offer. Dell expects to offer DVD-ROM drives for its Latitude CPi line by the time you read this.

With a well-designed dark-gray case and stylish touchpad and mouse buttons, the A366XT emanates understated business chic. A wrist rest slightly thicker than the remainder of the notebook allows your hands to float comfortably over the nicely laid out keyboard. The A366XT's battery, CD-ROM drive, and floppy drive slide out easily. The system memory is easy to access from the bottom of the unit, but you'll need a screwdriver to remove the 6.4GB hard drive. If you work exten- ▶

PHOTOGRAPHS: KEN SMITH

TOP 10 NOTEBOOK PCs

STANDARD FEATURES

	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	Dell Latitude CPi A366XT*	Pentium II-366	7	64	6.4	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
2	Gateway Solo 5150LS	Pentium II-366	7.7	64	6.4	active	14.1	1024 x 768	16.8 million	lithium ion	touchpad
3	Dell Inspiron 7000 A366LT	Pentium II-366	10.4	64	8	active	15	1024 x 768	16.8 million	lithium ion	touchpad
4	Toshiba Satellite 4080XCDT	Pentium II-366	7.8	64	6.4	active	14.1	1024 x 768	16.8 million	lithium ion	eraserhead
5	NEC Versa SX	Pentium II-300	6.4	64	4	active	14.1	1024 x 768	65,536	lithium ion	touchpad
	BUDGET NOTEBOOK										
1	Gateway Solo 2500SE*	Celeron-266	8.1	64	6.4	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
2	Dell Inspiron 3500 C300XT	Celeron-300	7.3	64	4.3	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
3	HP OmniBook XE	Pentium II-266PE	7.4	64	4	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
4	Toshiba Satellite 4015CDS	Pentium II-266	7.7	32	4.1	dual-scan	12.1	800 x 600	16.8 million	lithium ion	eraserhead
5	AMS Tech Roadster 15CTA	AMD K6-2-300	7.9	32	2.1	active	12.1	800 x 600	16.8 million	NiMH	touchpad

*Best Buy ● Yes ○ No [1]Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

sively with spreadsheets while you're out on the road, you can squeeze a little more viewable area out of the A366XT's 13.3-inch screen by setting the resolution to 1280 by 1024 and enabling pan mode.

Dell offers above-average support for its Latitude line, including 24-hour toll-free support, a three-year parts warranty, and one year of free on-site service. But the line carries a skimpy one-year labor warranty, and you get printed documentation only on request. To judge from our anonymous calls, you may also encounter long waits to talk with support technicians.

Gateway Solo 2500SE

BUDGET NOTEBOOKS

1 GATEWAY SOLO 2500SE

PRO: Super battery life, great sound, lots of software, online documentation, good tech support

CON: Boxy, heavy

Our number two budget system in April, the Solo 2500SE vaults over Dell's Inspiron 3500 C300XT this month following a $100 price drop. Consumers, small-business owners, and corporate buyers alike should look at this 8.1-pound mobile Celeron-266 laptop with built-in CD-ROM and floppy drives.

The 2500SE earns a PC WorldBench 98 score of 149, which lags behind the average number for a PII-366 laptop by 26 percent. Still, it's faster than most Pentium II-266 notebooks. And for $1874, you get impressive features: a 6.4GB hard drive, a TV-out jack, headphones, and a clutch of home-office applications, including Microsoft's Money, Home Essentials, Encarta Encyclopedia (all '98 editions), and Greetings Workshop. The 2500SE can't hold two batteries at once, but you won't care: Its 12-cell (versus the standard 8-cell) battery soldiers on for a little over 5 hours, twice as long as some notebooks.

Gateway offers a couple of nice configuration options, too: If you're an eraserhead pointer fan, you can bypass the standard touchpad. And you can also ditch the standard floppy drive in favor of a fixed SuperDisk LS-120 removable media drive ($75), and replace the CD-ROM drive with a DVD-ROM drive ($100) for movie watching. If you want to use the 2500SE as your primary PC, you can snap up a port replicator for $99 more.

The Toshiba Satellite's speakers have clear sound.

New This Month

POWER NOTEBOOKS

4 TOSHIBA SATELLITE 4080XCDT

PRO: Fast, large screen, good audio

CON: A tad heavy, no modular bays, merely satisfactory battery life

Raw power and a beautiful 14.1-inch screen earn this $3199 desktop replacement the fourth spot on our power chart. Add good sound quality to the mix, and the chunky Satellite 4080XCDT makes a nice presentation machine for users who need solid performance but don't travel much.

A PC WorldBench 98 score of 184 puts the 4080XCDT close to the mean for a PII-366 notebook equipped with 64MB of RAM and 256KB of level 2 cache. Still, at 2 hours and 35 minutes, battery life could be better. And because it carries fixed CD-ROM and floppy drives, the 4080XCDT can't be reconfigured to hold two batteries.

The 4080XCDT boasts a slightly less sophisticated design than most laptops in its price range. It offers standard ports and connections, but nothing much on top of that. The screwed-in 6.4GB hard drive isn't easy to re-

		EXPANDABILITY					CUSTOMER SUPPORT			
CD/DVD-ROM drive speed	56-kbps modem protocol	Maximum RAM (MB)	Modular expansion bays	Bay for second battery	Optional docking station	Infrared port	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
12X-24X	not included	256	1	●	●	●	3/1	24	Sat, Sun	AOL, BBS, CIS, WWW
2X DVD	V.90	288	1	○	●	●	1/1	24	Sat, Sun	AOL, BBS, CIS, WWW
2X DVD	V.90	192	2	●	●	●	3/3	24	Sat, Sun	BBS, WWW
12X-24X	V.90	192	0	○	●	●	1/1	24	Sat, Sun	BBS, CIS, WWW
12X-24X	x2	256	1	●	●	●	3/3	24	Sat, Sun	AOL, BBS, CIS, MSN, WWW
8X-20X	V.90	288	0	○	●	●	1/1	24	Sat, Sun	AOL, BBS, CIS, WWW
10X-24X	V.90	256	1	●	●	●	3/3	24	Sat, Sun	BBS, WWW
12X-24X	V.90	256	0	○	○	●	1/1	24	Sat, Sun	AOL, BBS, CIS
12X-24X	V.90	160	0	○	○	●	1/1	24	Sat, Sun	BBS, CIS, WWW
10X-24X	K56flex	96	0	○	○	●	3/3	11	none	BBS, CIS, WWW

move for safekeeping. The angle-set, pop-out modem jack looks as though it would break off easily if it happened to snag on a stationary object, and the unit lacks a DVD-ROM drive upgrade option.

On the bright side, the keyboard and rubber mouse buttons feel comfortable, and a curved front edge gives this 7.8-pound, all-in-one notebook a sculpted, modern look.

The HP OmniBook XE has CD control buttons.

ROM and floppy drives, yet it weighs only 7.4 pounds (including AC adapter) and is 1.4 inches high with the screen closed. Extra-wide keytops make typing especially easy, though the action was too springy for us.

Despite its relatively slow type of RAM, the Pentium II-266PE–based OmniBook XE posted respectable performance numbers. Its PC WorldBench 98 score of 154 puts it ahead of the average Pentium II-266 notebook and close to some PII-300 portables.

HP's technical support staff answered our calls promptly and nailed our toughest questions. *PC World* readers complain, however, that too many components fail in HP notebooks; and HP's free tech support ends after three years.

BUDGET NOTEBOOKS

3 HP OMNIBOOK XE

PRO: Speedy, doubles as an audio CD player, comfortable keyboard, on-the-mark technical help
CON: Small screen, free tech support is limited

If you like to mix business with musical pleasure, this thin and reasonably priced new model from HP would make a fine choice. Buttons on the front of the case let you play audio CDs and control the volume without turning on the notebook or raising the screen. On our test unit, audio sounded pleasingly full-bodied.

For business-minded users, the OmniBook XE offers a fairly nice configuration in a compact package, a 3-hour battery life, and impressive performance for the price. The unit includes built-in, fixed CD-

Near Miss

Of the seven new notebooks that didn't make our charts, the WinBook XL 300 TFT came closest.

FOR INTEL-LIKE power at a low price, look for AMD inside. This $1399 WinBook—built around the mobile version of AMD's K6-2-300 chip—performs like a PII-233 notebook, for $300 less. The XL 300 TFT trails PII-233 laptops in features but does well as a desktop replacement.

A large, heavy notebook with a fixed floppy and an 8X–20X CD-ROM drive, the boxy XL tips the scales at 8.6 pounds with the AC adapter but carries only a 12.1-inch screen and 2.1GB hard drive. Though the nickel–metal hydride battery recharges fewer times than a lithium ion battery, it lasts a decent 2 hours and 50 minutes.

The big touchpad-equipped keyboard gives touch typists ample running room. A V.90 56-kbps modem is built in, and the XL connects to WinBook's $99 port replicator, so it's easy to use as your primary PC.

—Carla Thornton

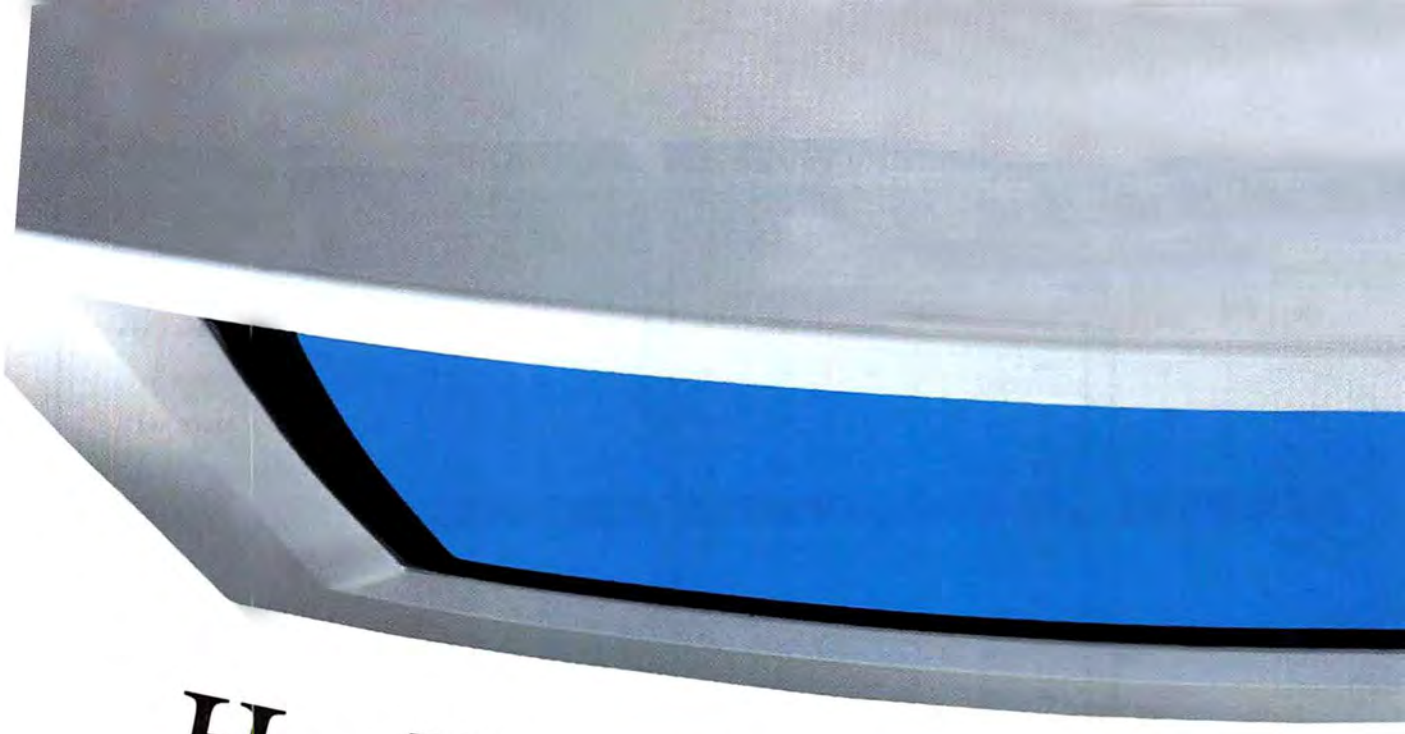
Contributing Editor Carla Thornton regularly writes about notebooks. ■

BEYOND THE TOP 10

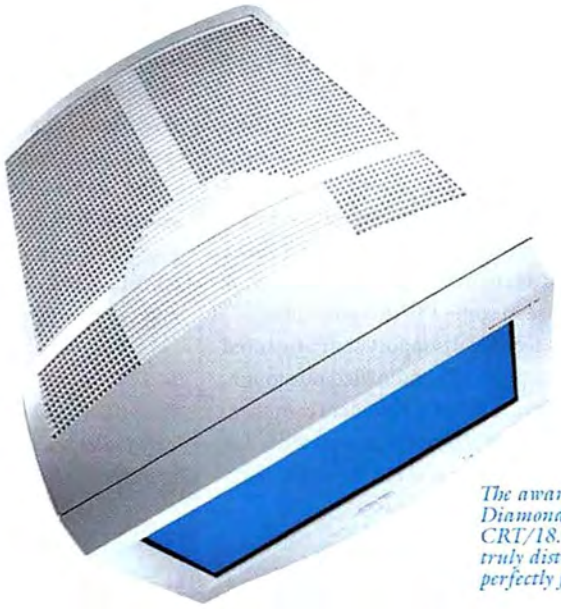
online

We also tested six other portables this month, but they didn't score high enough to make the *Top 10 Notebook PCs* chart. For reviews, visit PC World Online (www.pcworld.com/top400).

- **AMS Tech Rodeo 3082ECX**
- **MetroBook LT-266**
- **Micron TransPort Trek 2 333**
- **ProStar 8280**
- **Quantex I-1410**
- **WinBook XL2 366**



Has Your Monitor Been



The award-winning Diamond Pro 900u (19-inch CRT/18.0-inch DVI) is truly distortion-free with a perfectly flat screen surface.*

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USB

PC Magazine Editors' Choice — Diamond Pro 900u Jan. 19 1999

PC Magazine Editors' Choice — Diamond Pro 900u Best 19" upgrade March 9, 1999

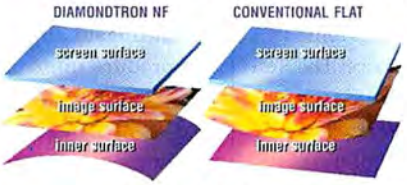
1998 Eddy Winner — Diamond Pro 900u March 1999

Desktop Pro — Diamond Pr February

Throwing You A Curve?

If you're using a conventional CRT monitor, your eyes and brain are working overtime to correct for the curvature. Now, however, with its DIAMONDTRON NF™ (Natural Flat) family, Mitsubishi has completely revolutionized monitor technology. With a perfectly flat screen from edge to edge and truly distortion-free imagery, you'll experience an unprecedented improvement in viewing pleasure. Not to mention the dazzling brightness, razor-sharp clarity and stunning color accuracy which puts Mitsubishi in a class by itself. With no curvature, reflections and glare are also eliminated. The result is remarkably realistic, natural-looking flat images. Your energy can now be spent being more creative and more productive. For added versatility, DIAMONDTRON NF monitors feature a unique self-powered USB hub which allows you to switch all connected USB peripherals between two computers automatically. With DIAMONDTRON NF monitors, Mitsubishi will forever change your view of the world. The difference is right before your eyes. For more information on the award-winning Diamond Pro 900u (19-inch CRT/18.0-inch DVI*) and new Diamond Pro 2020u (22-inch CRT/20-inch DVI*) models, contact Mitsubishi Electronics today.

DIAMONDTRON NF



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PC WORLD

TOP 10 HOME PCs

	POWER SYSTEM	Last month	Month tested	Street price (2/12/99)	Comments
1	Dell Dimension XPS T500 800/388-8542 www.dell.com	1	Apr 99	$2343	PRO: Fastest home system we've tested yet, Zip drive, recent $106 price drop. CON: Limited software package, small monitor included at this price.
2	Micron Millennia 450 Max 888/546-0501 www.micronpc.com	2	Dec 98	$2550	PRO: Great 3D graphics, extra goodies include Zip drive, Microsoft SideWinder joystick, and PC Pro GamePad 4. CON: On the pricey side.
3	Gateway Performance 500 800/315-2536 www.gateway.com	3	Apr 99	$2639	PRO: Fine performance, superior sound, great monitor quality, good expandability. CON: Expensive, mediocre software package.
4	Compaq Presario 5600i-450 800/345-1518 www.compaq.com	n/a	NEW	$2358	PRO: Great connectivity, DSL and built-in home networking capabilities, Zip drive, easy access to USB and IEEE 1394 ports, fast. CON: Pricey, company's support rating slipped.
5	Sony VAIO PCV-E518DS 888/476-6972 www.sony.com/pc	n/a	NEW	$3498	PRO: Lots of extras for digital imaging and multimedia. CON: Extremely expensive, inferior speaker quality, poor upgradability, decline in company's support rating.
	BUDGET SYSTEM				
1	Quantex QP6/333 M-1c 800/896-4898 www.quantex.com	2	Feb 99	$999	PRO: Very low price for a Celeron-333 PC, $50 cheaper this month, good performance. CON: Connectors not clearly labeled for setup.
2	Dell Dimension V400c 800/388-8542 www.dell.com	n/a	NEW	$1507	PRO: Impressive performance, improved support rating. CON: Fairly expensive for a budget system, not super-expandable, scanty software package.
3	CyberMax Enthusiast KII-350 800/345-8926 www.cybermaxpc.com	1	Apr 99	$1199	PRO: Decent budget performance, great price, wide-ranging selection of software titles. CON: Inferior 3D performance in graphics test, confusing control panel on monitor.
4	Micron Millennia 350 888/546-0501 www.micronpc.com	4	Dec 98	$1390	PRO: Good speed, very respectable 3D performance, $61 price drop. CON: On the expensive side for a budget PC, limited software package.
5	Gateway Performance 400 800/315-2536 www.gateway.com	n/a	Apr 99	$1699	PRO: Speediest performer among the budget systems, fast DVD-ROM drive, great expandability. CON: Most expensive budget system.

Best Buy | n/a = not applicable | Recommended as gaming system

[1] For more about products here, select the number on the product information card or visit www.pcworld.com/productinfo.

WATCH OUT. The price war continues between Intel and AMD. CPU prices are falling as fast as belligerent carousers in a barroom brawl. As the new chips roll out over the next few months, the markdown on older CPUs (especially Pentium IIs) will be precipitous. So watch for more big price cuts as Pentium III sales grow and dealers cut prices on older stock to clear out last season's inventory.

We tested our first 400-MHz Celeron system this month—and it's fast: Dell's Dimension XPS V400c debuts in the budget chart at number two. We also tested two new Pentium III PCs from Compaq and Sony. Compaq's Presario 5600i-450 and Sony's VAIO PCV-E518DS both did well enough to crack the power list. But neither of them earns a Best Buy.

Sony VAIO

This month's budget Best Buy is the Quantex QP6/333 M-1c, which rises a notch on the strength of a super $999 price. On the power list, the first-place Dell Dimension XPS T500 beats out the new Compaq and Sony machines, in part because it's both faster and cheaper.

This month's chart reflects our latest reliability and support data for Home PCs (see "PC Reliability and Service: The Best Are a Phone Call Away," page 155). One notable change: Dell earns a support rating of outstanding, versus fair last time.

AFFORDABLE SPEED

THE DELL DIMENSION XPS V400c, equipped with a 400-MHz Celeron processor and 64MB of RAM, posted a PC WorldBench 98 score of 190; it performs like a fast Pentium II-350 system. Meanwhile, the V400c's integrated ATI Rage Pro Turbo AGP graphics controller helped the system earn solid graphics scores for a budget machine, and Dell's D1028L monitor displayed crisp colors and blur-free fonts.

The V400c is suitable for exploring the Web, playing games, and running a home office. But for terrific graphics and sound, you'll have to upgrade the integrated audio and video chips. And you may end up wishing the PC had more than two free PCI slots. For their part, the system's bundled Harman/Kardon HK195 speakers produce unexceptional, rather flat-sounding audio. There's nothing spectacular about the V400c's looks, either—the exterior is generic and square-looking.

Its final drawback: At $1507, the V400c is a bit pricey for a budget machine, especially in comparison to the slower but much more attractively priced QP6/333 M-1c from Quantex, at only $999.

MORE MONEY, MORE PC

OF COURSE price isn't everything. If you want a system that can handle the heavy demands of the latest combat flight sim, or if

PHOTOGRAPHS: KEN SMITH

SCORECARD

★ Overall rating	PC WorldBench 98 score/rating	Price	Setup/ ease of use	Graphics	Reliability/ support	Features	Product info number [1]
103	231/outstanding	expensive	outstanding/ very good	outstanding	good/ outstanding	Pentium III-500, 128MB of SDRAM, 12GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Turtle Beach Montego sound card.	–
100	221/outstanding	expensive	good/ very good	outstanding	good/ good	Pentium II-450, 128MB of SDRAM, 14.4GB hard drive, 2X DVD-ROM drive, x2 56-kbps modem, 19-inch monitor, joystick, game pad.	633
99	229/outstanding	expensive	outstanding/ very good	outstanding	fair/ good	Pentium III-500, 64MB of RAM, 13.6GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 19-inch monitor, Boston Acoustics BA635 speakers.	634
95	226/outstanding	expensive	outstanding/ very good	outstanding	fair/ poor	Pentium III-500, 128MB of SDRAM, 14.4GB hard drive, 2X DVD-ROM drive, V.90/DSL modem, 19-inch monitor, built-in ethernet, JBL speakers.	635
93	217/very good	very expensive	outstanding/ good	outstanding	good/ fair	Pentium III-500, 128MB of SDRAM, 17GB hard drive, Sony CD-R/RW drive, V.90 56-kbps modem, 17-inch monitor.	636
Power scorecard weightings ▶	Performance 20 percent	Price 10 percent	Setup/ease 5 percent	Graphics 10 percent	R & S 40 percent	Features 15 percent	
90	169/very good	very inexpensive	good/ good	good	good/ good	Celeron-333, 64MB of SDRAM, 4GB hard drive, 12X-32X CD-ROM drive, V.90 56-kbps modem, 15-inch monitor.	637
89	190/outstanding	expensive	outstanding/ outstanding	good	good/ outstanding	Celeron-400, 64MB of SDRAM, 8.4GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Harman/Kardon HK195 speakers.	–
86	161/very good	inexpensive	fair/ very good	fair	fair/ good	AMD K6-2-350, 64MB of SDRAM, 6.4GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 19-inch monitor.	638
86	178/very good	expensive	good/ very good	very good	good/ good	Pentium II-350, 64MB of SDRAM, 8.4GB hard drive, 16X-40X CD-ROM drive, V.90 56-kbps modem, 17-inch monitor.	639
86	202/outstanding	very expensive	outstanding/ very good	outstanding	fair/ good	Pentium II-400, 64MB of SDRAM, 8.4GB hard drive, 4.8X DVD-ROM drive, V.90 56-kbps modem, 17-inch monitor, Boston Acoustics BA635 speakers.	640
Budget scorecard weightings ▶	Performance 15 percent	Price 25 percent	Setup/ease 10 percent	Graphics 5 percent	R & S 40 percent	Features 5 percent	All products: 904

you want to slow your PC's decline into obsolescence, you need all the computer you can get. The two Pentium III systems that broke into this month's power list might fit the bill.

For $3498, you expect a lot of PC, and with Sony's VAIO PCV-E518DS, you get it. This system is aimed squarely at digital imaging enthusiasts. The PCV-E518DS's Pentium III–500 CPU and 128MB of RAM are certainly powerful, though its PC WorldBench 98 score of 217 is the lowest for a PIII-500 home PC we've seen so far.

Dell Dimension V400c

You get a cavernous 17GB hard drive, and the Sony CD-R/RW drive offers good long-term storage. An IEEE 1394 or ILink port is located conveniently on the front of the case for fast downloads. We downloaded digital video from a Sony Digital Video Camera to the hard disk, and it worked fast, transferring 10 minutes worth of video in about 10 minutes.

Well-marked connections and clear instructions make setup easy. But image-editing fanatics may be put off by the unit's lack of expandability: If you want to add a video capture card or a fancy sound card or extra storage, be aware that the PC includes only one free PCI slot, one internal bay, and no externally accessible drive bays. To access the drive bay or add more memory, you'll first have to yank out the power supply.

WIRE YOUR HOME

THE OTHER Pentium III-500 newcomer is the $2358 Compaq Presario 5600i-450. It's faster than Sony's PCV-E518DS and has excellent graphics performance. Besides putting USB and FireWire ports on the front of the case and a built-in ethernet port inside, Compaq gives the 5600i an analog/ADSL modem for high-speed Internet access. This Presario is the first home PC we've seen to offer home networking via your existing phone line. A standard phone jack on the back of the system lets you connect to similarly equipped machines in your household.

The 5600i-450 includes WinGate's modem-sharing software, which lets multiple PCs access the Internet simultaneously via a single modem. Since the network and the phone can share a single physical phone line, families or home office denizens can access the Internet at the same time from two or three different PCs. So now family members won't have to race each other at dinner to be first to leave the table and jump online.

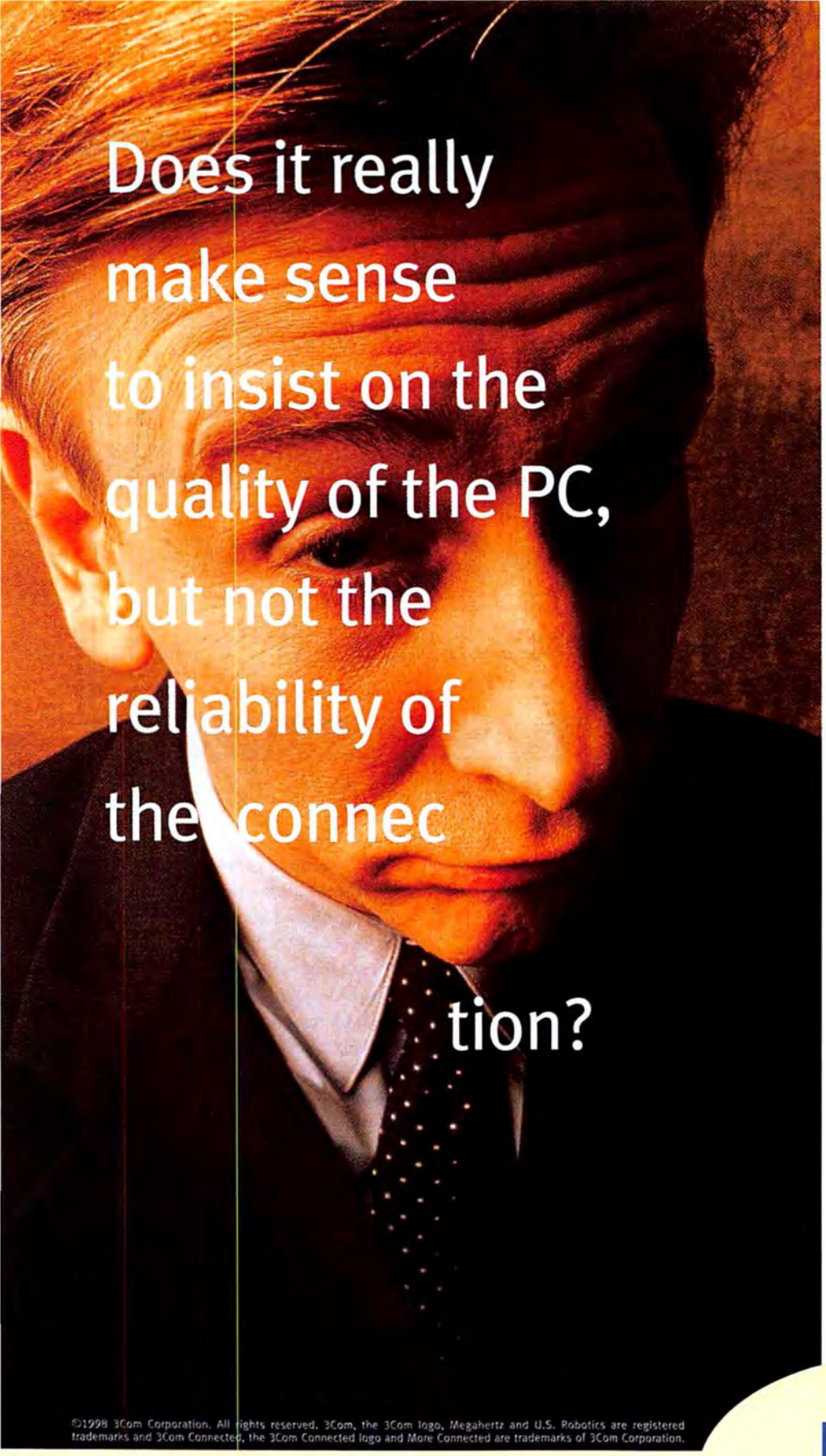
—Kirk Steers

Oakland, California, writer Kirk Steers is a contributing editor for PC World. ■

BEYOND THE TOP 10

We also evaluated the following systems this month, but they did not score high enough to make the *Top 10 Home PCs* list. For individual write-ups, see PC World Online (www.pcworld.com/t10homepcs).

- **HP Pavilion 6460**
- **HP Pavilion 8480Z**



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PC WORLD

TOP 10 PRINTERS

	SMALL-BUSINESS/ HOME MONOCHROME	Street price (2/8/99)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/gray-scale graphics	Comments	Product info number
1	Okidata OkiPage 6e 800/654-3282 www.okidata.com	$249	83	5.2/3.2	good/ adequate	**FEATURES:** LED, rated 6 ppm. Standard 2MB of RAM, 1200-by-300-dpi maximum resolution, 100 sheets input and output. **SUMMARY:** The retirement of our former Best Buy moves this low-cost laser up to first place. Good text quality, a modest footprint, and a simple control panel compensate for slow text and graphics speeds.	683
2	Xerox DocuPrint P12 800/832-6979 www.xerox.com	$599	82	9.2/3.9	excellent/ good	**FEATURES:** Laser, rated 12 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 330 sheets input, 250 output. **SUMMARY:** A $100 price drop lifts this high-quality model to second place. It's still pricey for a home printer, but high speeds and a three-year warranty recommend it for small-office use.	684
3	Minolta PageWorks 8L 888/264-6658 www.minoltaprinters.com	$379	82	6.5/3.4	very good/ adequate	**FEATURES:** Laser, rated 8 ppm. Standard 2MB of RAM, 1200-by-1200-dpi maximum resolution, 150 sheets input, 100 output. **SUMMARY:** This quiet, easy-to-use monochrome model has great documentation, but it's a bit pricey considering its somewhat pedestrian text printing speed. Text output looks handsome, but graphics are dark.	685
4	Okidata OkiPage 10ex (NEW) 800/654-3282 www.okidata.com	$399	81	8.6/3.4	good/ good	**FEATURES:** LED, rated 10 ppm. Standard 2MB of RAM, 600-by-1200-dpi maximum resolution, 250 sheets input, 100 output. **SUMMARY:** Quick new personal model offers good print quality, though text can look slightly jagged, and you need to buy extra RAM for the highest resolution. Good documentation helps balance sloppy design.	686
5	Brother HL-1040 800/276-7746 www.brother.com	$300	79	8.4/3.5	very good/ adequate	**FEATURES:** Laser, rated 10 ppm. Standard 2MB of RAM, 600-by-600-dpi maximum resolution, 200 sheets input, 100 output. **SUMMARY:** This inexpensive unit offers impressive text and graphics speeds, strong text output quality, and a convenient, easy-to-use design. But graphics are too dark, and the printer's paper tray seems flimsy.	687
	CORPORATE MONOCHROME						
1	Lexmark Optra S 1855 800/539-6275 www.lexmark.com	$1129	86	13.8/4.1	very good/ very good	**FEATURES:** Laser, rated 18 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. **SUMMARY:** Fastest text printing on the chart, extensive paper-handling options. But the usually strong gray-scale graphics print quality can be inconsistent, and it's the costliest printer on the chart.	688
2	Lexmark Optra S 1625 800/539-6275 www.lexmark.com	$999	85	11.6/2.5	very good/ very good	**FEATURES:** Laser, rated 16 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 350 sheets input, 250 output. **SUMMARY:** Low price for its class, strong performance, and very good overall print quality. Except for its print speed, specifications are identical to those of the Best Buy Optra S 1855. Priced $130 less, too.	689
3	HP LaserJet 4000 800/752-0900 www.hp.com	$1099	82	12.4/4.4	very good/ adequate	**FEATURES:** Laser, rated 17 ppm. Standard 8MB of RAM, 1200-by-600-dpi maximum resolution, 600 sheets input, 300 output. **SUMMARY:** Offers fast text and graphics printing, very good text quality, and extensive features for the price. However, you need to use special settings to achieve optimal graphics quality.	690
4	Xerox DocuPrint N17b 800/349-2769 www.xerox.com	$999	80	10.7/1.4	very good/ adequate	**FEATURES:** Laser, rated 17 ppm. Standard 16MB of RAM, 1200-by-600-dpi maximum resolution, 350 sheets input, 250 output. **SUMMARY:** Feature-rich model is the only one on our chart to come standard with Adobe PostScript. It also has comprehensive paper-handling options and lots of memory but is a bit slow for a corporate printer.	691
5	Samsung QwikLaser-7000 888/987-4357 www.samsungtelecom.com	$999	80	10.4/3.8	good/ adequate	**FEATURES:** Laser, rated 17 ppm. Standard 4MB of RAM, 1200-by-1200-dpi maximum resolution, 500 sheets input, 250 output. **SUMMARY:** Sharp, dark text and a handy built-in duplex feature for printing on both sides of a page (rare at this price) make up for less-than-"qwik" print speeds and only adequate gray-scale output quality.	692

Best Buy — Windows 95-certified Plug and Play — All products: 907

TEST PC WORLD CENTER **HOW WE TEST** The overall rating for both monochrome small-business/home printers and corporate printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

HAVE MONOCHROME LASER printers reached their apex? Despite renewed competition in every category—big, little, powerful, inexpensive—is the market a saturated ecological niche with no room for fledgling species? Consider: This month we tested four promising new printers, but only one, Okidata's OkiPage 10ex, made it onto the Top 10 chart. The three misses represent a range of styles and capabilities: a very low cost ▶

model, also from Okidata; Tally's first attempt to reach the consumer market; and a well-designed office system from IBM geared for large-format printing.

One safe prediction: The harder it gets for printer makers to stake out new turf, the more likely they'll resort to vicious price competition. Monochrome laser prices have dropped dramatically recently, and we expect that trend to continue.

NEW CHART MEMBER

OKIDATA RETIRED THE OkiPage 10i, which we ranked first in March, making room for the OkiPage 6e to rise to the top of the small-business/home chart. Meanwhile, the new OkiPage 10ex debuts in fourth place. At $399, this model costs $100 less than the 10i did, and offers nice overall print quality. While text looks good though not perfect, showing some jagged edges, the 10ex skillfully prints narrow lines and reproduces fine detail on graphics. It also runs fast for its price, printing 8.6 pages per minute on text. An optional 500-sheet paper feeder costs just $129.

The 10ex may frustrate some users, though. As with some other Okidata printers, its control panel presents a confusing array of dual-function buttons and opaque menus. Fortunately, the thorough documentation explains the menus well, despite its baffling layout. One other warning: The 10ex's standard 2MB of memory isn't enough for high-resolution printing. Although the printer performs well at the default resolution of 600 by 600 dpi, it stopped printing midway through some fairly simple graphic images when we switched to 600 by 1200 dpi. Worse, when printing was interrupted, we often had to restart the 10ex rather than simply eject troublesome pages and continue with other print jobs. If you plan to use the 10ex at its highest resolution, add extra memory (1MB lists for $79, including the necessary daughterboard).

Also on this month's small-business/home chart, Xerox slashed $100 from the price of its DocuPrint P12, promoting the printer to second place. Even at the new $599 price, the P12 costs a bit much for home use, but it offers exceptional value for a small office. It delivers a peppy 9.2 pages of text per minute, produces excellent text quality, and comes with an outstanding three-year warranty—rare even with more-expensive corporate models.

VALIANT EFFORTS

TALLY'S FIRST ATTEMPT at the consumer printer market, the T9112, matches the Xerox DocuPrint P12 on performance and comes close on print quality, but costs $849, a $250 premium. Tally recently debuted on our color chart with a quick, reasonably priced laser (see *Top 10 Printers*, April, www.pcworld.com/apr99/10printers), but the monochrome T9112 is pricey for what it offers. Finally, the Tally's messy driver fills the screen with a confusing, multitabbed window that makes it hard to find the options you want.

THE OKIPAGE 10EX from Okidata delivers good speed for its price, but you'll want to add memory for high-resolution printing.

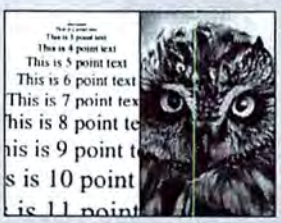
The bargain-priced OkiPage 8w brings up the rear among this month's new SOHO entries. About the size and shape of a loaf of homemade bread, the 8w looks as though it may have been put together as amateurishly. It prints text capably, and you can't argue with the $249 price, but the printer holds only 100 sheets of paper—a weakness shared by its top-ranked relative, the 6e—and its output rests on a flimsy plastic strip that blocks access to the input tray. The top of the printer, which kept closing on my hand, doesn't open far enough to let you see inside, so toner installation is difficult. Making matters worse, the 8w is noisy.

This month's lone new corporate printer, the IBM InfoPrint 20, barely misses the chart due to its hefty $1530 price, which isn't as high as it seems, given the unit's features: The InfoPrint 20 prints tabloid-size 11-by-17-inch documents. At 14.5 pages per minute, it prints text slightly faster than our Best Buy, the Lexmark Optra S 1855. Compared to other tabloid lasers, such as HP's LaserJet 5000, the IBM is a winner: It costs only $40 more than the HP and whips that competitor's 11.9-ppm text performance. You can augment the IBM's considerable paper-handling capabilities with a $440 duplexer, two 500-sheet feeders for $275 each, or a 2000-sheet feeder for just over $900.

—Dan Littman ■

PRINT QUALITY SAMPLES

Okidata: More Than Okay

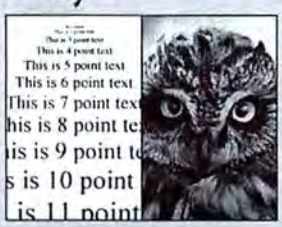


IBM INFOPRINT 20

Slight shadows appear in the IBM InfoPrint 20's otherwise good text; gray-scale images stand out with realistic tones, crisp details, and smooth transitions.

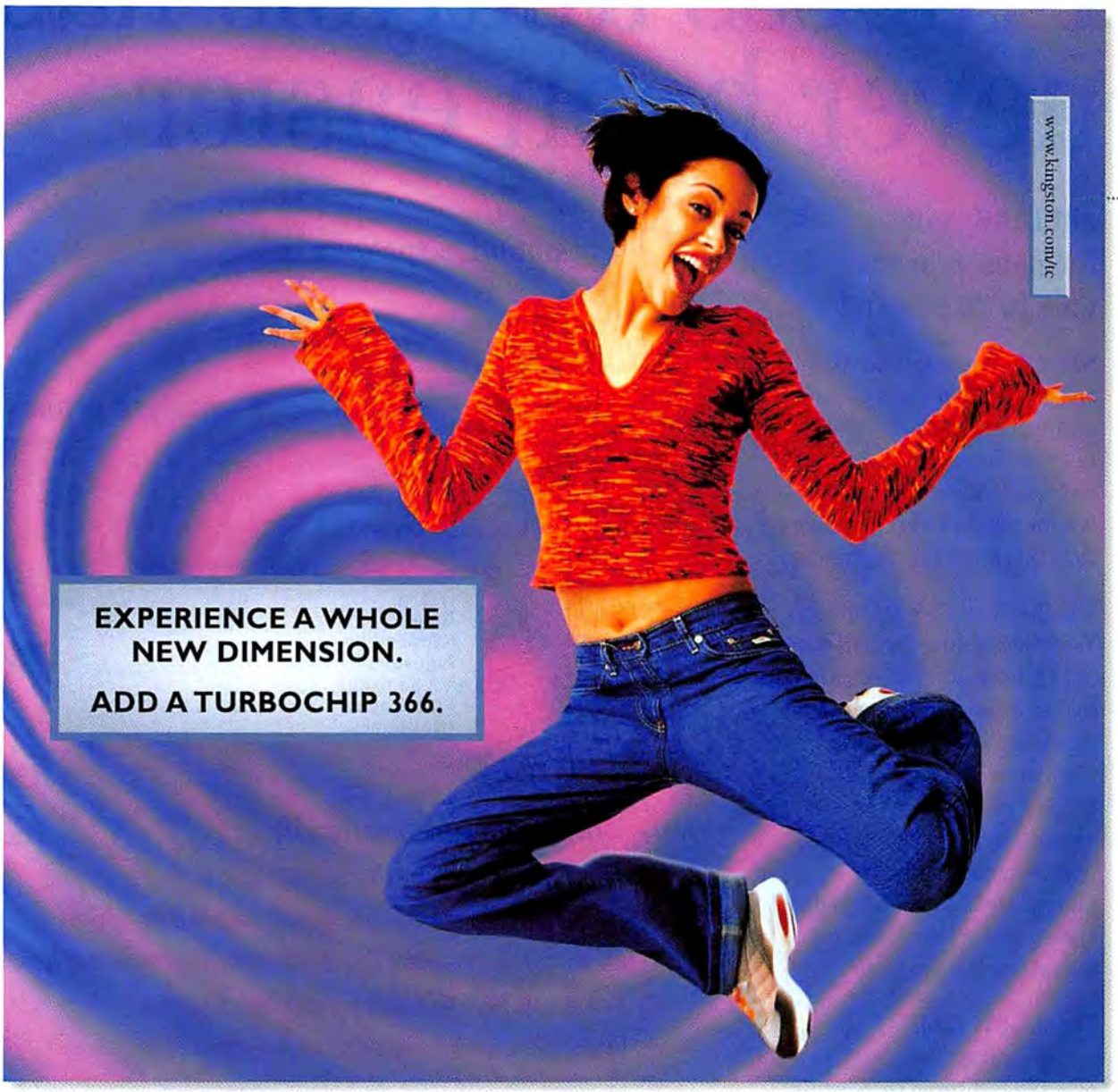
OKIDATA OKIPAGE 6E

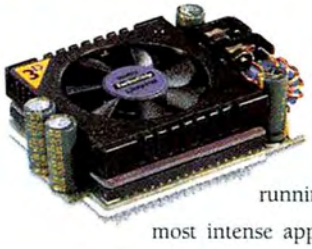
Our new SOHO Best Buy, the Okidata OkiPage 6e, creates readable text even at small point sizes, but we wish its gray-scale graphics weren't so dark.



OKIDATA OKIPAGE 10EX

New to our small-business/home monochrome chart this month, the Okidata OkiPage 10ex produces realistic grays and rich, if sometimes jagged, text.





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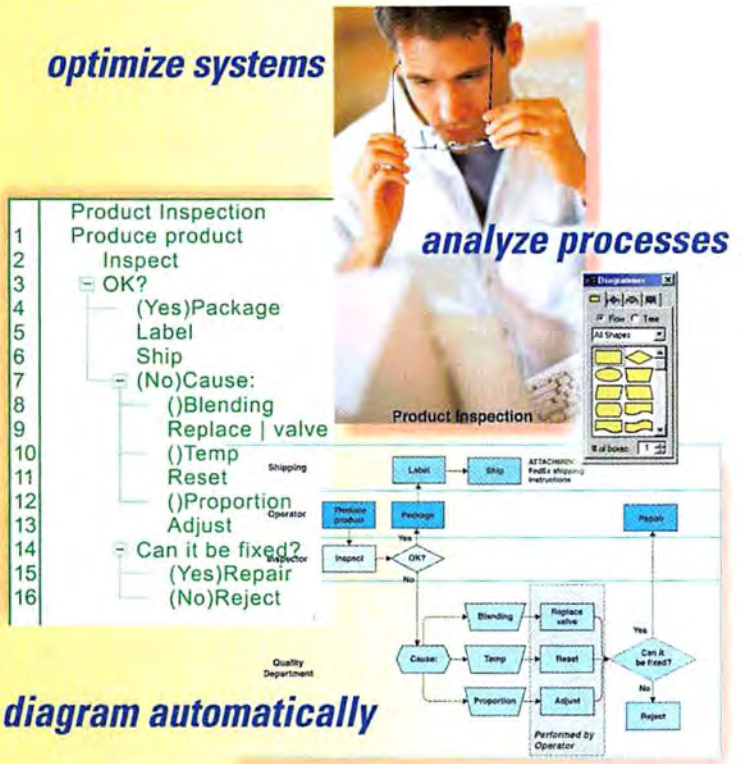

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PC WORLD

TOP 10 GRAPHICS BOARDS

	PCI BOARD	Month tested	Street price (3/1/99)	Overall rating	Mixed-media business rating	3D rating	Features rating	Comments	Product info number
1	Creative Labs 3D Blaster Banshee 800/998-5227 www.soundblaster.com	Mar 99	$100	93	good	excellent	excellent	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, 3Dfx Voodoo Banshee chip, no bundled applications. **SUMMARY:** Top-notch 3D performance and useful features like a color calibration tool; good upgrade for graphics software users and gamers.	696
2	STB Velocity 4400 PCI 800/234-4334 www.stb.com	Feb 99	$129	90	good	average	excellent	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, bundled graphics plug-ins, video editing tool, and 3D game. **SUMMARY:** Provides pleasing performance overall; a terrific value thanks to bundled apps and good support policies.	697
3	Matrox Millennium G200 SD PCI 800/361-1408 www.matrox.com/mga	Feb 99	$129	86	good	good	good	**FEATURES:** 8MB of SGRAM, 250-MHZ RAMDAC, MGA-G200 chip, bundled 3D modeling tool, image editing app, and 3D game. **SUMMARY:** Affordable, performs well, and comes with lots of extras; fine for both business users and casual gamers.	698
4	Diamond Monster Fusion 800/468-5846 www.diamondmm.com	Jan 99	$150	85	average	excellent	average	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, 3Dfx Voodoo Banshee chip, bundled 3D games. **SUMMARY:** Good for gaming, but a little pricey and lacks a utility for color-calibrating your monitor. AGP version also costs $150.	699
5	Metabyte Wicked3D Vengeance 510/494-9700 www.wicked3d.com	Feb 99	$99	84	good	excellent	average	**FEATURES:** 16MB of SGRAM, 250-MHz RAMDAC, 3Dfx Voodoo Banshee chip, bundled 3D game. **SUMMARY:** Cheapest PCI card here; terrific speed, but short on apps and support policies. $99 AGP sibling is good in business graphics, average in 3D.	700
	AGP BOARD								
1	Matrox Millennium G200 800/361-1408 www.matrox.com/mga	Oct 98	$119	93	excellent	good	excellent	**FEATURES:** 8MB of SGRAM, 250-MHZ RAMDAC, MGA-G200 chip, bundled 3D modeling tool and image editing app. **SUMMARY:** Splendid business graphics performance, terrific software. Marvel and Mystique models let you view games on TV.	701
2	STB Velocity 4400 AGP 800/234-4334 www.stb.com	Dec 98	$129	92	good	good	excellent	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, bundled 3D games, video editing tool, and graphics plug-ins. **SUMMARY:** Delivers solid 3D performance and comes with a generous software bundle.	702
3	Creative Labs Graphics Blaster RIVA TNT 800/998-5227 www.soundblaster.com	Feb 99	$130	92	good	good	good	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no bundled software. **SUMMARY:** A great value, thanks to $40 price cut, top-notch color calibration tools, capable performance, and weekend support.	703
4	Hercules Terminator Beast 800/532-0600 www.hercules.com	Dec 98	$80	90	good	good	good	**FEATURES:** 8MB of SDRAM, 250-MHz RAMDAC, S3 Savage3D chip, no bundled software. **SUMMARY:** The least-expensive board here offers solid overall performance for gaming fans, but it's backed by skimpy support policies.	704
5	Elsa Erazor II 800/272-3572 www.elsa.com	NEW	$129	90	good	good	good	**FEATURES:** 16MB of SGRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no bundled software. **SUMMARY:** Fine buy performs nicely in business graphics and 3D gaming, but it doesn't ship with extra tools such as image editing.	705

Best Buy

For reviews of products that didn't make the chart, visit www.pcworld.com/t10graphics.

All products: 908

TEST PC WORLD CENTER **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. We tested PCI boards in a Micron Millennia Mme PC with a Pentium MMX-233 and 32MB of RAM. We tested AGP boards 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.

MOST PRICES STABILIZE this month, but upcoming chips should launch new price cuts. The boards here are still great for day-to-day graphics acceleration. Best Buys from Creative Labs and Matrox provide top speeds. Newcomer Elsa Erazor II offers above-average performance but lacks bundled apps. New units from AOpen, Asus, Creative Labs, and Gigabyte Technology missed our chart due to pallid 3D and skimpy features and support. ■

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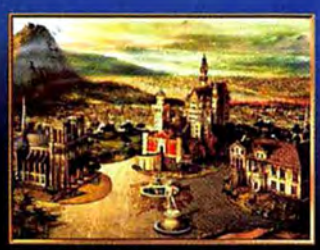

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PC WORLD

TOP 10 MODEMS

	INTERNAL V.90 MODEM	Month tested	Street price (2/21/99)	Overall rating	56-kbps downloads/ 33.6-kbps transfers (min:sec per MB)	Comments	Product info number
1	IBM 56K Modem Internet Kit 800/772-2227 www.ibm.com/options	Jan 99	$79	81	3:33/5:57	**FEATURES:** Supports x2, 16-bit ISA card, USR/TI chip set, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, DSVD, Caller ID, QuickLink Message Center software. **SUMMARY:** A great SOHO modem, the 56K comes with voice features, excellent 56-kbps performance, and around-the-clock support.	–
2	Zoom FaxModem 56K PCI Dualmode 800/631-3116 www.zoomtel.com	Jan 99	$64	79	4:16/5:40	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10EC error control, V.80 videoconferencing, distinctive ring, voice mail, Communicate software. **SUMMARY:** Top choice for SOHO on a strict budget has voice features and is backed by long support hours. But it runs a little slow on 56-kbps downloads.	610
3	Diamond Multimedia SupraExpress 56i 800/468-5846 www.diamondmm.com	Jan 99	$100	78	3:41/5:41	**FEATURES:** Supports K56flex, 16-bit ISA card, Rockwell chip set, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, Caller ID, FaxTalk Communicator software. **SUMMARY:** Excellent candidate for home offices performs well and has lots of features. Support reps are available 14 hours daily except Sunday.	611
4	Viking V.90 56K ISA Modem 800/338-2361 www.vikingcomponents.com	Feb 99	$60	78	3:23/5:41	**FEATURES:** Supports K56flex, 16-bit ISA card, Rockwell chip set, voice mail, speakerphone, QuickLink III software. **SUMMARY:** ISA modem sells for an exceptionally low price and sports great 56-kbps performance. Viking offers 24-hour support, but the modem's skimpy manual isn't much help.	612
5	Amquest Host PCI 56K Dual Mode Voice/Speakerphone 877/663-3648 www.amquestmodem.com	Feb 99	$49	78	3:35/5:39	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10EC, V.80 videoconferencing, voice mail, speakerphone, VoiceView, ASVD, DSVD, Caller ID, Amquest @fax.com software. **SUMMARY:** Ultracheap modem performs well and comes packed with voice features, but we found it a bit difficult to install.	613
6	Digicom Systems Modem Blaster Flash 56 PCI 800/833-8900 www.digicomsys.com	Apr 99	$50	77	3:54/5:39	**FEATURES:** Supports K56flex, PCI card, Rockwell chip set, MNP-10, V.80 videoconferencing, distinctive ring, voice mail, speakerphone, ASVD, Caller ID, QuickLink Message Center III software. **SUMMARY:** $10 off cheap, full-featured modem backed by daily 14-hour support. Thorny installation and middling manuals hold it back.	614
7	3Com U.S. Robotics 56K Faxmodem 800/342-5877 www.3com.com	Jan 99	$120	76	3:42/5:51	**FEATURES:** Supports x2, 16-bit ISA card, USR/TI chip set, distinctive ring, Caller ID, RapidComm software. **SUMMARY:** This model returns to the chart following a $10 price cut, but you still pay a premium for the brand name and for the excellent, easy-to-read documentation that comes bundled with the unit.	615
	PC CARD V.90 MODEM						
1	3Com Megahertz 56K Cellular Modem PC Card 800/638-3266 www.3com.com/mobile	Mar 99	$199	83	3:38/5:54	**FEATURES:** Supports x2, 3Com/TI chip set, cellular connectivity, voice mail, speakerphone, Caller ID, digital line voltage protection, Xjack pop-out phone jack, RapidComm software. **SUMMARY:** Costs plenty, but it's fast, comes with crystal-clear setup instructions, digital voltage protection, and a retractable phone jack.	616
2	TDK CyberExpress 5600 56K 800/999-4835 www.tdksystems.com	Mar 99	$99	82	3:36/5:41	**FEATURES:** Supports K56flex, Rockwell chip set, MNP-10EC, distinctive ring, Caller ID, digital line voltage protection and alert, QuickLink III software. **SUMMARY:** This PC Card unit lacks a handy pop-out phone jack, but it installs easily and costs considerably less than the other two PC Card modems on the chart.	617
3	IBM 56K PC Card Modem 800/772-2227 www.ibm.com/options	Mar 99	$160	82	4:01/6:06	**FEATURES:** Supports x2, USR/TI chip set, direct cellular connections, Caller ID, digital line voltage protection and alert, Xjack pop-out phone jack, QuickLink III software. **SUMMARY:** A little pokey at 56-kbps downloads, but comes with both a built-in phone jack and digital voltage protection. Users can call tech support anytime.	–

Best Buy For reviews of products that didn't make the chart, visit www.pcworld.com/t10modems. All products: 906

TEST PC WORLD CENTER **HOW WE TEST** We test V.90 (56-kbps) and V.34 (33.6-kbps) performance over a Telecomm Analysis Systems simulated phone network. We connect each modem to two common Internet service provider modems—Ascend's Max 6000 and 3Com's Total Control. Using each ISP modem, we perform two tests. In the Network Model Coverage test, we send a .zip file over several different line conditions. In the File Type test, we send a mix of four files—graphics, text, program, and compressed—over one line condition. We average the results for the two ISP modems to calculate NMC and FT scores, which make up, respectively, 60 and 40 percent of the total performance score. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

FOR THE FIRST TIME in months, modem titan 3Com cut the price of its U.S. Robotics 56K Faxmodem. At $120, it still costs more than any other internal unit on the chart, but it comes with excellent, easy-to-read documentation. Meanwhile, the company's $199 Megahertz 56K Cellular Modem retains the top spot on the PC Card chart thanks to its combination of speed and travel conveniences including a built-in pop-out phone jack. ■

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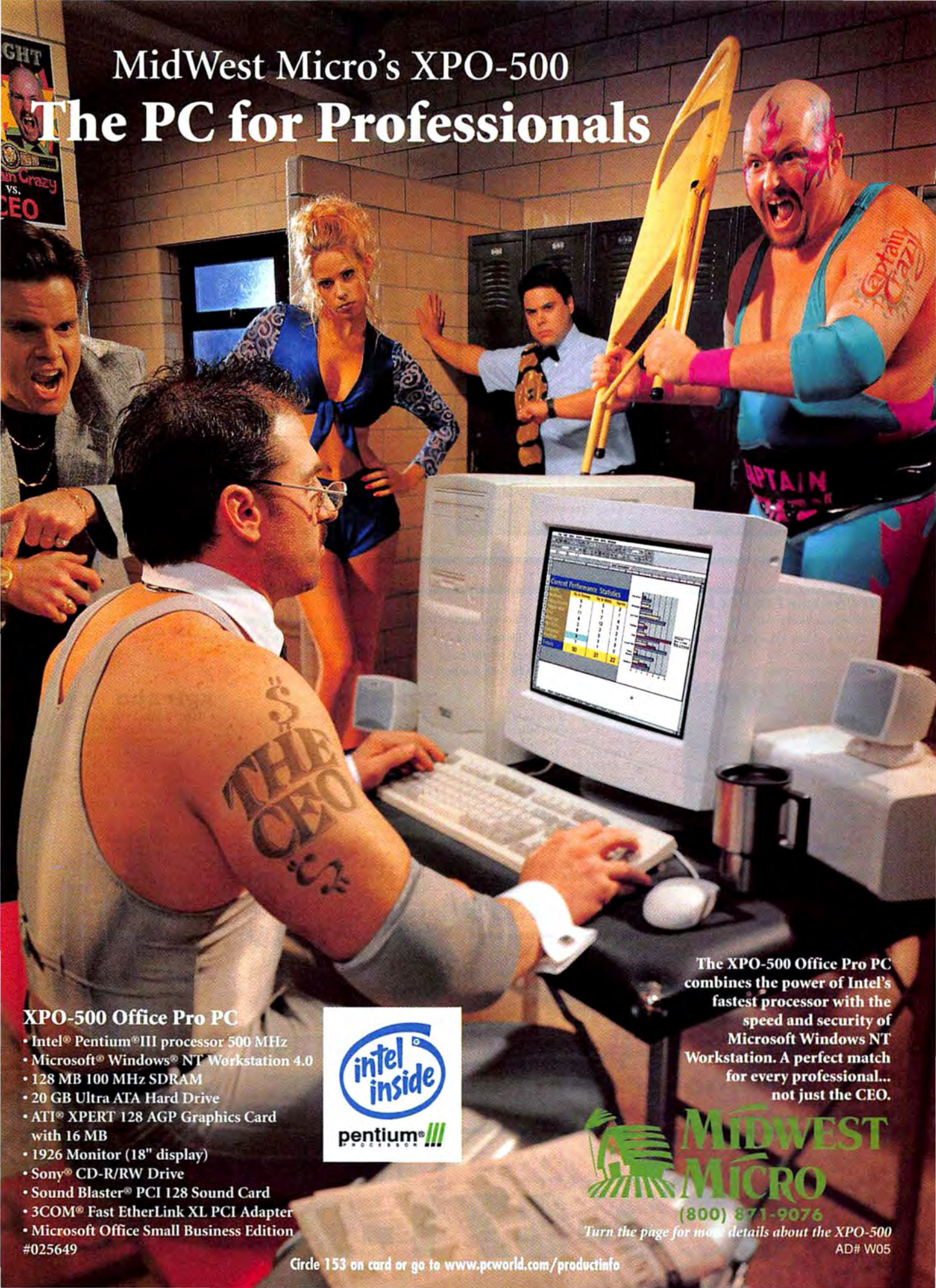

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HERE'S HOW

WINDOWS TIPS SCOTT DUNN

Quickly Get to Previously Accessed Files or Sites

WINDOWS 9*x* makes it easy to retrieve recently used files via its Documents menu, an automatically updated list of the last 15 files opened on your computer. Unfortunately, the document you want may not be among the last 15, and the menu doesn't include links to Web pages. Here are some other ways to access files and Web sites without opening a folder or digging through dialog boxes.

Favorites. Both Windows 98 and Internet Explorer 4's Desktop Update add a Favorites menu to the Start menu. If you have Windows 95, you still may have a Favorites folder created by one of Microsoft's many other products (IE 3.*x*, the retail version of Microsoft Exchange, Microsoft Office, or others). To get quick menu access to the shortcuts in this folder, simply go to the \Windows\Favorites folder and copy it to the \Windows\Start Menu folder. You can even rename it—which is especially helpful if you customarily access the Start menu from the keyboard (otherwise the *F* in Favorites conflicts with the Find menu's *F*). The Favorites menu will be updated every time you change the Favorites folder, either directly or from another application.

History. If you use IE 3.0 or later and want to access recently visited Web sites from your Start menu, you can apply the same technique: Drag the History folder from the Windows folder to the Start Menu folder. Unlike the Favorites menu, the History menu has a few drawbacks: In older versions of IE, it may not update every time you visit a new Web site, but restarting Windows is a surefire way to update it. If your History menu becomes too big, you can limit the number of days it stores by choosing *View•Options* from the IE 3.*x* menu and changing the setting on the *Navigation* tab. In IE 4.*x*, select *View•Internet Options* and change the setting on the *General* tab.

Attachments. If your e-mail client lets you specify a folder for storing incoming attachments, create an Attachments folder in the Start Menu folder and direct your e-mail application to use that location. In Eudora, for example, select *Tools•Options*, select the *Attachments* icon on the left, and click the button under 'Attachment directory'. Navigate to your new folder and click *Use Directory*. To keep the menu from becoming unwieldy, check the option *Delete attachments when emptying Trash*. If you work with Netscape Messenger or Microsoft Outlook, use *Save As* to store a copy of im-

FIGURE 1: MAKE ALL of your documents and links reachable in a single click by adding key folders to the Start menu.

ILLUSTRATION: RICHARD DOWNS

FIGURE 2: EMBED THE FAVORITES folder inside itself for quicker access to your favorite links.

portant attachments in your Start Menu\Attachments folder for easy access later. Just remember to clean out the folder once in a while. Note that, like the History menu, an Attachments menu may not always update immediately.

Your Documents. If you have a system of folders for storing documents by project, you can move oft-used folders to the Start menu for easy access to their documents. If you use Office, you already have a My Documents folder; just drag it to the Start Menu folder in the Windows folder. You can also rename it, if desired. This tip works best if you keep documents organized into a series of subfolders so that no one folder (with its corresponding menu) gets too large (see **FIGURE 1**). If you have a lot of subfolders, keep their names short so none of the files inside will have a path name longer than 260 characters (the maximum Windows allows).

FASTER FAVORITES

IF YOU TEND TO add, remove, rename, or reorganize items in your Favorites folder often, here's a quick way to get there faster: Create a shortcut to the Favorites folder inside the folder itself. True, IE 4 and Windows 98 include a menu option for organizing the Favorites folder (Favorites•Organize Favorites), but the result is a small dialog box that lacks the familiar Explorer interface. Moreover, the Favorites folder on the Start menu contains no such command, so you'll need this shortcut when you use that menu. Here's what to do: If you're viewing the Favorites folder in a two-pane Explorer window, use the right mouse button to drag the Favorites folder from the tree pane to its open window on the right and select *Create Shortcut(s) Here*. Now just choose this shortcut from the Favorites menu any time the menu needs housekeeping (see **FIGURE 2**).

SEE FILES IN WINDOWS FOLDER

IF YOU USE Web View for your folders, you probably know that every time you open the Windows folder, you're treated to an obnoxious warning about how risky it is to modify its contents, and then you have to click *Show Files* before you see anything beyond the handiwork of Microsoft's graphic artists (see **FIGURE 3**).

The admonition reappears when you navigate to the System folder in the Windows folder. How can you banish this annoying augury for good? The easy way is to choose *View•as Web Page*, thereby turning off Web View.

But if you want to have your Web View without the warning, do this: First choose *View•Folder Options*, click the *View* tab, and uncheck *Hide file extensions for known file types*. While you're there, look under the 'Hidden files' section and make sure that the 'Show all files' option is selected. Click *OK*. Go to the Windows folder and click *Show Files*. Locate and select the file named *Folder.htt*; this is an HTML template that determines the appearance of the folder in Web View. Press **<F2>** to rename it, type something like **folder.bak,** and press **<Enter>**. Next, open the same file in the System folder and rename it **folder.bak**, too. Then navigate to the Web folder in the Windows folder. Select the *Folder.htt* file and choose *Edit•Copy*. Press **<Backspace>** to return to the Windows folder, and then choose *Edit•Paste* to copy the file to the Windows folder. Next, open the *System* folder and choose *Edit•Paste* again to copy it to this folder as well.

FIGURE 3: STOP WINDOWS' disappearing act by changing the default Web View template.

The next time you open either of these folders, you won't trigger the tedious warning. If you don't get the Web View to which you're accustomed, you may need to choose *View•as Web page* again.

We welcome tips and questions and pay $50 for published items. Scott Dunn is a PC World *contributing editor and a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995). See page 12 for contact information.* ■

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Bolster Security With Partition Savvy

IN LAST MONTH'S column, I covered two basic Windows NT security topics: creating a day-to-day user account, and locking down your workstation when you leave it. But these measures don't make your system impervious to intruders. Determined snoops can easily bypass your login security if you use FAT (file allocation table), the ancient DOS file system that still lives on in Windows 9x. If you share your PC, you should also control who can access your files.

Windows NT 4.0 supports two file systems: FAT16 and its own NTFS. (It can't read FAT32 partitions.) As inefficient as FAT16 is, you may need it if you have to boot multiple operating systems and open the same files from each. To create a partition for each file system, use PowerQuest's $70 PartitionMagic.

Unlike FAT16, NTFS lets you control who gets access to which files. When you installed NT, you had the option of converting the target FAT partition to NTFS. But because the setup program doesn't explain the benefits of converting, you probably didn't. You may be using one file system or a mix of both, which may not suit your needs. To help you choose the optimal system for you, I've listed the pros and cons of each configuration option:

Convert all partitions to NTFS. NT's file system offers the highest level of security and file-storage efficiency among the three options. But it won't let you boot Win 9x or another operating system in order to gain compatibility with software or hardware that NT doesn't support.

Leave all partitions as FAT16. This configuration allows you to boot multiple OSs for maximum compatibility with your older software and hardware. However, FAT16 stores files inefficiently on partitions that are larger than 512MB, and the maximum partition size is 2GB.

Leave boot partition as FAT16, create separate NTFS partition. You get dual-booting; files stored in the NTFS partition benefit from higher security, storage efficiency, and compression. But dual-booting makes it easier for miscreants to delete your NTFS partition.

FROM FAT TO NTFS

WINDOWS NT'S Disk Administrator utility—find it at *Start•Programs•Administrative Tools (Common)•Disk Administrator*—enables you to convert a FAT partition to NTFS (or vice versa), but doing so erases the partition's contents. To convert from FAT to NTFS without destroying files, select *Start•Run* and type **command**. Then, at the prompt, type **convert d: /fs:ntfs**, where *d:* is the drive letter of the partition you want to convert. If you're trying to convert your C: drive, the conversion will take place the next time you boot.

LOCK YOUR FILES

ON WINDOWS 95 and NT PCs that use FAT, anyone who can log in has complete access to every file. In contrast, NTFS maintains a list of all users and groups that have permission to read, modify, or delete each file or folder. If you're not on the list, you're locked out.

By default, all users have full access rights to most files, but you can change that. Create a new folder in NT, right-click it, and choose *Properties*. Choose the *Security* tab and click *Permissions* (see **FIGURE 1**).

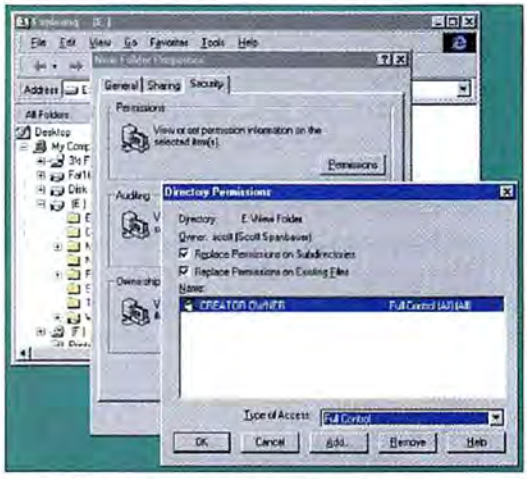

FIGURE 1: CREATE A PRIVATE FILE FOLDER in Windows NT Explorer by changing NTFS access permissions.

To lock others out, remove the Everyone group (select the group and click *Remove*), and replace it with your user account (select *Add•Show Users*, double-click your account, and click *OK*). Change Type of Access from the default, Read, to *Full Control*, then click *OK*.

online *Find files from this article at www.fileworld.com/magazine. Scott Spanbauer is a contributing editor for* PC World. *See page 12 for contact information.* ■

Ready for the Euro?

FOR YEARS, you've heard about the euro, and you couldn't have cared less, right? Suddenly, you need to send a memo that discusses projected revenues in U.S. dollars, yen, and euros. You don't even know what the currency's symbol looks like! To bring NT 4.0 up to date, download Microsoft's 1.4MB update from FileWorld (the patch is also included in Service Pack 4). You'll find more than you ever thought you would need to know about using the euro symbol at www.microsoft.com/typography/faq/faq12.htm.

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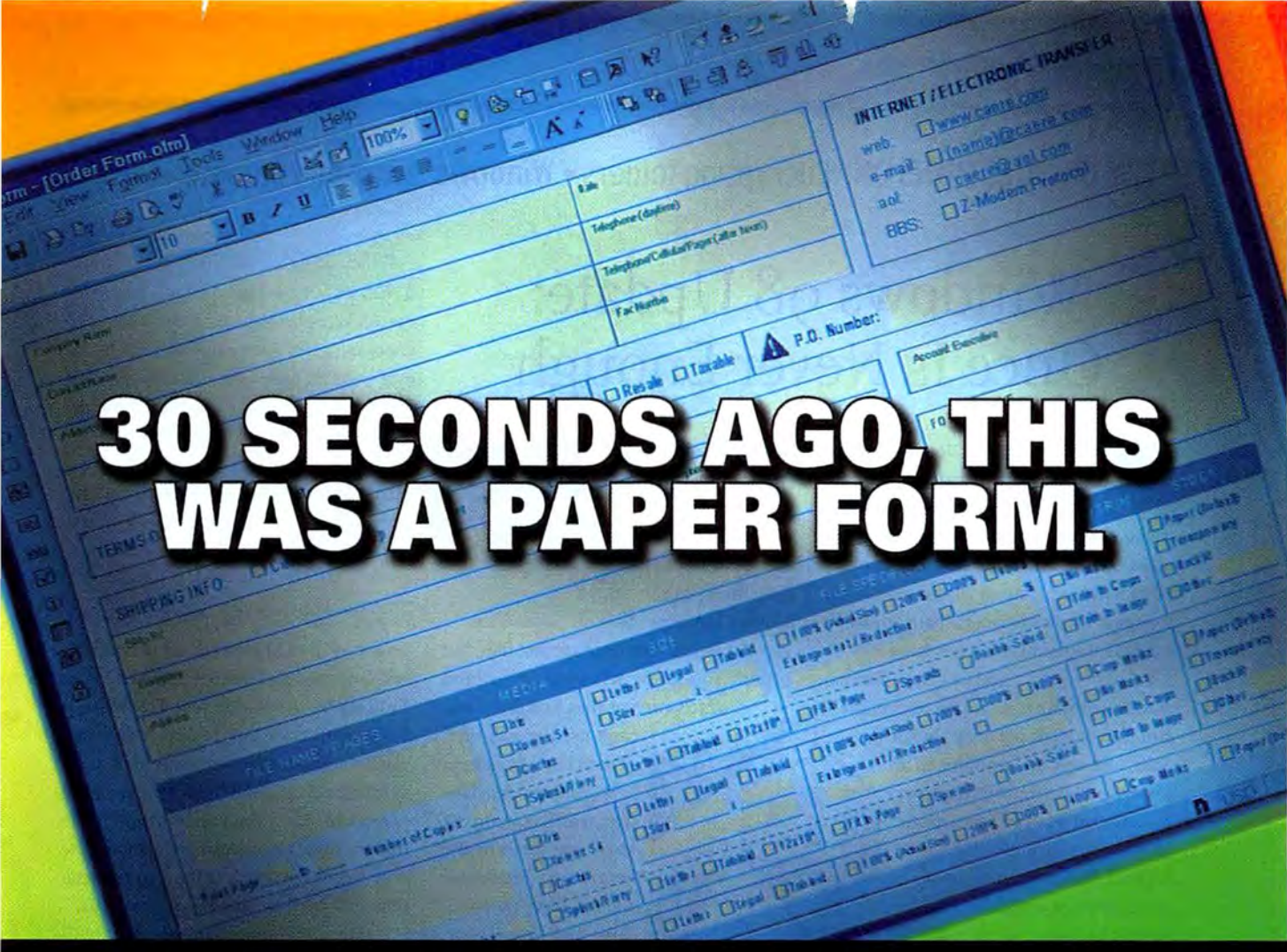
ILLUSTRATIONS: RICHARD DOWNS (LEFT); JEFFREY PELO (RIGHT)



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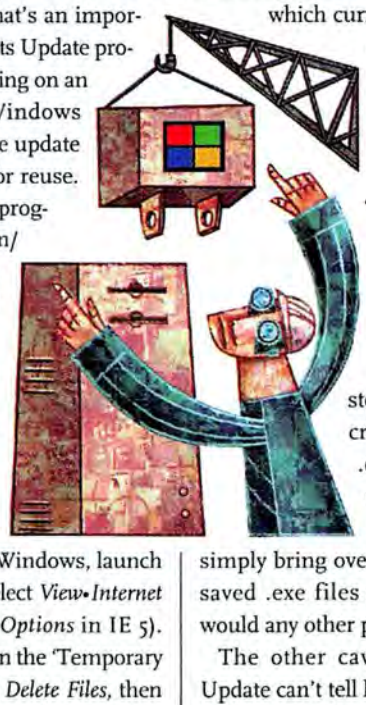
YOUR QUESTIONS ON: Encrypting folders • **Windows' swap and uninstall files**

Windows 98 Update: Once Is Never Enough

WINDOWS 98'S Update feature downloads and installs improvements and files automatically. But if you ever need to do the same update again—say, because you have more than one PC or you must reinstall Windows—you have to repeat the download. Is there any way I can save the downloaded files for reuse?

Roger Chan, Toronto

MICROSOFT ADMITS that's an important feature it left out of its Update program and says it is working on an improved version of Windows Update that lets you save update files to your hard disk for reuse. I'll track the company's progress at www.pcworld.com/may99/answers. In the meantime, the official word from Microsoft is that this procedure can't be done and you shouldn't even try. So I'll tell you how to do it—with some caveats.



Start with a clear cache: Before updating Windows, launch Internet Explorer and select *View•Internet Options* (*Tools•Internet Options* in IE 5). Under the General tab, in the 'Temporary Internet files' box, click *Delete Files*, then *OK*. When the files are deleted, click *OK*.

Now select *Start•Windows Update*. Once you're at the Windows Update Web page, click *Product Updates*. If asked, install and run Microsoft Windows Update Active Setup. When Windows Update asks if it may peruse your hard drive for installed components, click *Yes*. Select the updates you want, then click *Download*. At the final page, click *Start Download*.

When the installation's done, open the C:\Windows\Temporary Internet Files folder. Select *View•Details*. Click the *Type* column header to sort files by type. Update files will be application files (.exe) or cabinet files (.cab). Utilities like WinZip can extract files from cabinet files, but unless you know where they go (and which current files to delete), you can't use the .cab files. (That's the first caveat.)

So, only the .exe files are worth saving. If you leave them in the 'Temporary Internet files' folder, they will eventually disappear, so copy them to another folder or to some form of removable storage. Luckily, the most critical updates tend to be .exe files. When you want to update a new Win 98 installation, simply bring over your downloaded and saved .exe files and run them as you would any other program.

The other caveat is that Windows Update can't tell how current this new installation is and will therefore offer to install features you already have. The best solution is to note the name of an update when you install it, and keep a list.

PASSWORD-PROTECT FOLDERS

IS THERE ANY WAY I can password-protect whole folders so that other users can't see their contents?

Jared Miller, Melbourne, Florida

YOU CAN USE shareware to encrypt folders. One product I like is Encrypted Magic Folders by PC-Magic (see **FIGURE 1**). It keeps your choice of folders scrambled until you press a hot key, type your password, and click a button. Then everything is readable until you either scramble the folders again or reboot your system. The only major drawback is the $59 registration fee—high by shareware standards.

If that's too rich for your blood, try C-Flash Software's FlashLock, which costs only $15. It's not as convenient as Encrypted Magic Folders (you have to re-encrypt after every decryption), but the hassle is minor. FlashLock requires Pretty Good Privacy 2.6.2 for DOS (a free program). Just install PGP, then FlashLock. FlashLock's installation program will walk you through PGP's settings. (See the bottom of page 262 for vendor information.)

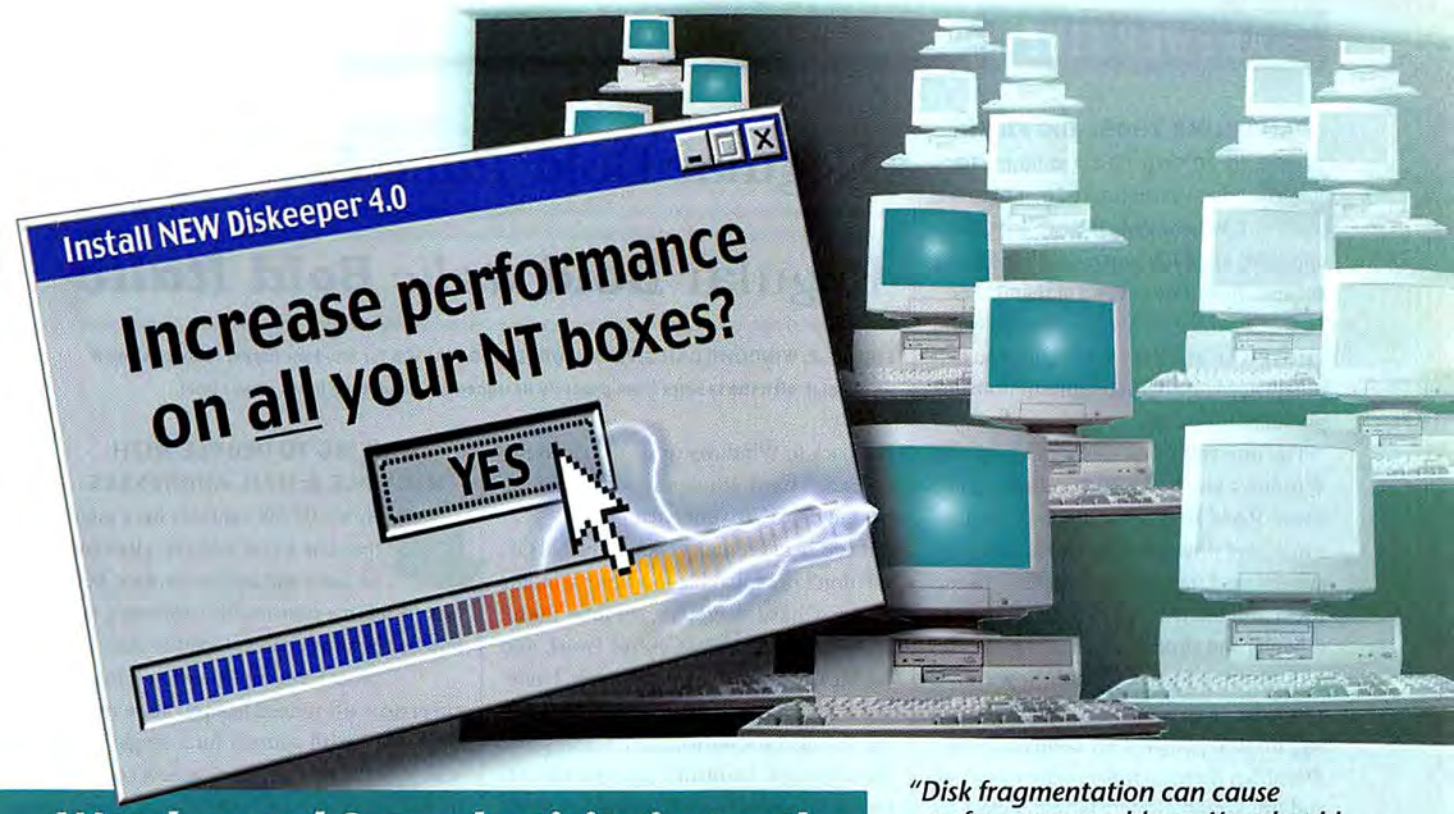
You can find more encryption utilities on PC World Online's FileWorld. ▶

FIGURE 1: PREVENT OTHER USERS from poking around your files with Encrypted Magic Folders.

Bypassing Quicken 98's Dialer

IF YOU'VE TOLD Quicken 98 that you access the Net via a phone line, it sometimes breaks your connection at inopportune times (a problem that's been fixed in Quicken 99). The solution: Don't tell it. Select *Online•Internet Connection•Setup*. On the first page of the resulting wizard, select *I have a direct Internet connection*, and click *Next*. Race through the rest of the wizard, picking defaults. From now on, Quicken will go directly to Windows to access the Net, Windows will dial your ISP if necessary, and Quicken won't hang up.

ILLUSTRATIONS: JEFFREY PELO (TOP); RICHARD DOWNS (BOTTOM)



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*— Microsoft Windows NT Server Resource Guide**

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CAN I DUMP THOSE BIG FILES?

IN TRYING TO clean up my hard drive, I've discovered that two files, C:\windows\win386.swp and C:\winundo.dat, are eating up more than 120MB between them. Can I get rid of them?

Ed Seroka, Ringtown, Pennsylvania

THOSE ARE BIG FILES, all right. You definitely need one of them but can probably get rid of the other.

The one you need is win386.swp, the Windows swap file. If Windows needs more RAM than your PC has, it uses some hard drive space as virtual memory, swapping data back and forth between RAM and the win386.swp file. Windows expands and shrinks this file as it sees fit.

If you're concerned with how much space the swap file is using, you can set a size limit: Right-click *My Computer*, select *Properties*, then click the *Performance* tab and the *Virtual Memory* button. Select *Let me specify my own virtual settings*.

Now you can set a maximum size for the swap file. Just keep in mind that the smaller your setting, the fewer the number of programs you'll be able to load. I generally recommend a 96MB maximum, but if you're short on drive space and don't run lots of programs simultaneously, you can try something smaller. You can always change the setting later if it doesn't prove satisfactory.

You can also improve performance by setting a minimum size, since that keeps Windows from wasting time resizing win386.swp. I keep both the minimum and the maximum size set at 96MB.

When you've made your settings, click *OK*, then *Yes* (don't worry about the warning), *Close*, and *Yes* again to reboot.

You have winundo.dat on your system because when you upgraded to Windows 98, you chose to have the option of going back to your old operating system. This big file contains information that the Windows 98 uninstall program needs to bring you back to Windows 95 or 3.*x*. (If you've upgraded from Windows 3.*x* to Windows 95, the file is W95undo.dat.)

If you're never going back to the old OS, you don't need that file—or several others on your hard drive. To remove them, select *Start•Settings•Control Panel*, and double-click *Add/Remove Programs*. Under the Install/Uninstall tab, scroll through the installed software list and select *Delete Windows 98 Uninstall Information*. If you've upgraded from Windows 95, select *Old Windows 3.x and MS-DOS System Files*, then click *Add/Remove*.

Encrypted Magic Folders
$59 registration fee; PC-Magic; www.pc-magic.com

FlashLock
$15 registration fee; C-Flash Software; www.geocities.com/CollegePark/Union/1904/cflash.html

FIGURE 2: WINDOWS CAN GIVE YOU BOLD AND ITALICS for any font (upper line), but you'll be happier with the results from properly designed bold and italic fonts (lower line).

WHAT'S WITH THE MULTIPLE FONT FILES?

I RECENTLY HAD to reduce the number of fonts on my system. I noticed that while some fonts come in only one file, others have separate normal, bold, italic, and bold italic files. Since every application I've used can make a font look bold, italic, and bold italic, why do I need these other files taking up space?

Don Ferron, Lima, Montana

WHETHER YOU WANT to keep those extra files is a matter of who you want designing your fonts: a human being capable of making aesthetic judgments or an application's algorithm.

Font designers often create bold, italic, and bold italic versions of their fonts, finding visually pleasing ways to darken and slant the letters. Windows, as well as your applications, use these if they're available. If they aren't available, the apps extrapolate bold and/or italic effects by altering the normal font. The results are never as nice as the special fonts created by a professional designer (see **FIGURE 2**).

In other words, if you care about the look of your printed text, you'll keep the bold and italic fonts.

WRITING TO PEOPLE WITH MULTIPLE E-MAIL ADDRESSES

MANY OF MY contacts have more than one e-mail address—often one for home and another for work. Outlook 98 lets me store multiple addresses, but how do I pick the address I want to use?

Jerry Solomon, Brandon, Florida

OUTLOOK 98 indeed lets you store more than one e-mail address for a single person. When you're entering a new contact or editing an existing one, type an e-mail address into the 'Add new' field, then press **<Enter>**. Repeat this for each e-mail address for that person. To make one the default, highlight it and click *Set as Default*.

When you're addressing a message to someone for whom you have multiple addresses, enter the person's name as you normally would. Then if you don't want to use the default, right-click the name and select an address from the pop-up menu.

Interestingly, Outlook Express 4.*x* (bundled with IE 4.*x*) can also store multiple e-mail addresses for one person. However, it does not offer you a way to use those addresses once you've entered them, rendering the whole feature pointless unless you plan to switch to Outlook 98 or IE 5's Outlook Express 5. The only way to use two e-mail addresses for one person in Outlook Express 4.*x* is to keep two separate address-book entries—for example, Juan at work and Juan at home.

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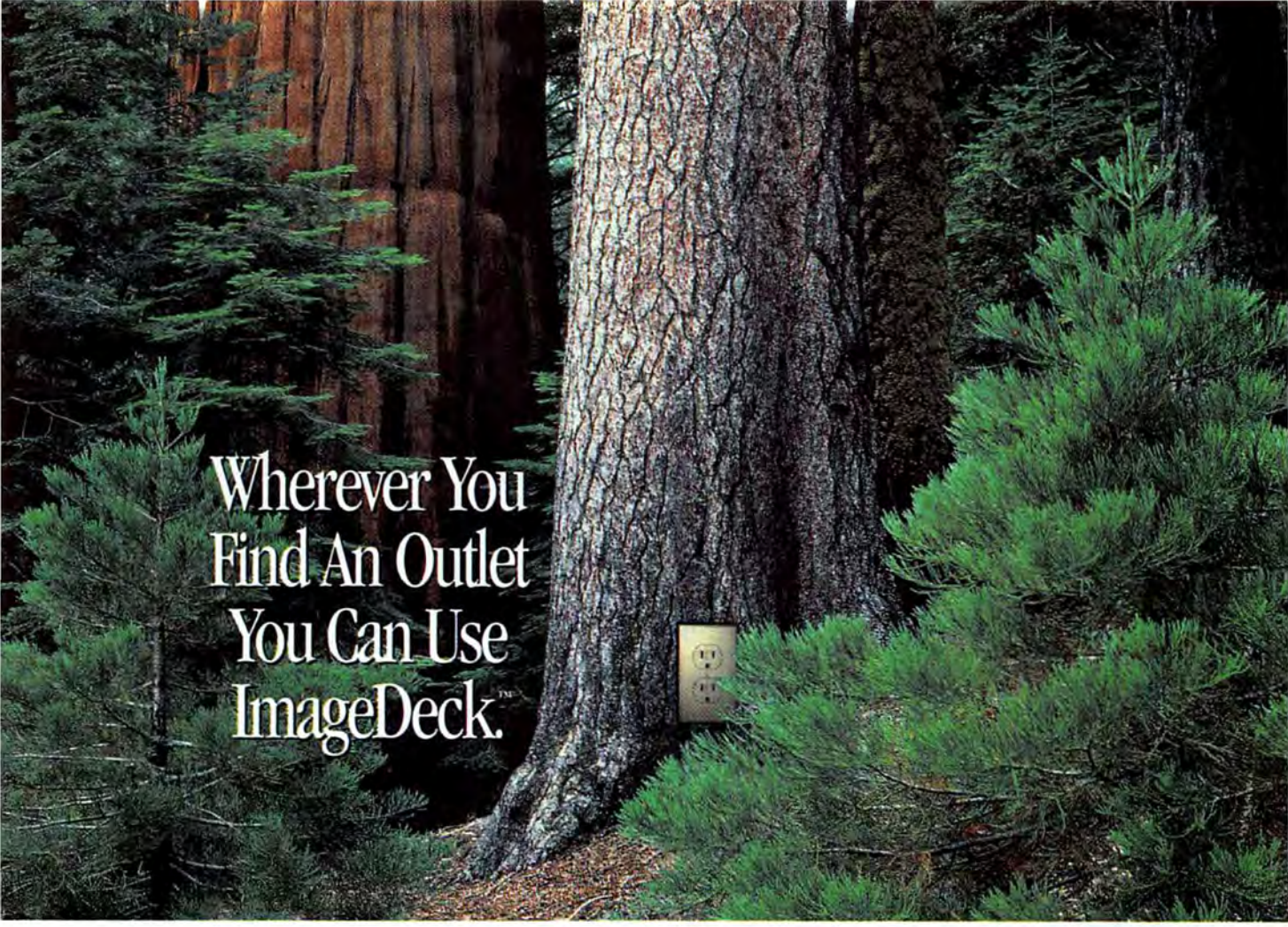

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Start a discussion group ◆ Learn to be a Webmaster ◆ Unleash a search hound

Manage Your Many Web Site Passwords

IN THE WORLD of free content, the only currency you need to carry is your persona. Sites such as the *New York Times'* (www.nytimes.com) let you peruse their valuable contents only if you tell them about yourself: your gender, your age, your income, and so on. You don't need to provide your real name, though an e-mail address is usually necessary for verification purposes. Privacy gurus tell us to keep different user names and passwords for different sites and services, and to vary all of them periodically. But remembering all those passwords and IDs is nearly impossible. To avoid the dreaded "unauthorized access" page, I keep my Web passwords in my Rolodex, but that's just me. Here are several tricks for managing all your online personae.

FIGURE 1: NAVIGATOR USERS can store a name and password in a bookmark's Description field.

Store your alter egos with your Bookmarks. In Netscape's browsers (versions 3 and higher), you can store any information in the Bookmark's Description field (see **FIGURE 1**). First add the site to your Bookmarks, then click *Bookmarks•Edit Bookmarks*, right-click the bookmark you want to edit, and select *Bookmark Properties*. In the description box, type your user name and password or a hint to remind you of either.

Better yet, here are two virtually unknown tricks for saving your passwords with your saved site information. These gems were submitted by Declan Fox of PC World Online.

Navigator Bookmarks: Click *Bookmarks•Edit Bookmarks*, right-click the bookmark that you want to edit, and then select *Bookmark Properties*. Click inside the Location field, and press the **<End>** key to get to the end of the address. If the address appears as a "straight" address (that is, it ends with .com, .net, .html, or another common suffix), type a question mark followed by any information that will remind you of your "identity." The question mark tells the browser to ignore anything from that point on, but the information will display on the address bar whenever you go to that site. So if your user name is *Bob* and your password is *cookoo*, that line will be **http://www.nytimes.com?bob cookoo**. If the URL appears to be a query (that is, it contains reference to cgi-bin or some weird character strings), type an ampersand (**&**) followed by the reminder.

IE Favorites: Select *Favorites•Organize Favorites*, right-click the shortcut you wish to edit, select *Properties*, click inside the URL box, and press **<End>** to get to the end of the address. See the information in the preceding paragraph about adding a question mark or an ampersand.

Note that while some addresses seem to be pure URLs, they may in reality be pointers to queries (for example, mail.yahoo.com), so you'll need to experiment before you know whether you need a question mark or an ampersand.

Have IE 5 type them for you. The newest version of Internet Explorer offers an AutoComplete feature for Web forms that "remembers" user names and passwords after you type them into a Web page. These are stored in encrypted form on your hard disk. Just double-click a name field, and you'll get a drop-down list of all the names you've used. When you select one, the password is entered for you.

Use a password utility. My favorite tool for keeping passwords at hand is the freeware Password Pal by Dotted Decimal Software, available on PC World Online's ▶

FIGURE 2: EGROUPS LETS YOU SET UP a public discussion group that others can read either on the Web or through e-mail.

E-Mail Signature Hiccups

DO MESSAGES YOU send to subscribe to mailing lists come bouncing back? The receiving computer may be rejecting messages that include anything beyond mailing list commands like subscribe and unsubscribe. The culprit may be your e-mail signature, so delete it before you send the message. If your mail software adds signatures automatically—in other words, if you don't see them when you write your notes—try sending the message via a different client, or disable your signature temporarily.

ILLUSTRATION: JEFFREY PELO

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FileWorld. Click the key that Password Pal places on your Toolbar, and your passwords and log-on names will pop up—password-protected, of course. You need to enter only one password to access all your other passwords, or you can configure the program to demand it each time you want a specific password. Webpass, a $12 shareware tool from C3 Software, will enter your password into a Web site for you at the click of a button, but it doesn't store it in password-protected form.

FIGURE 3: SET UP DISCUSSION MAILING lists—private or public, moderated or unmoderated—on OneList.

YOUR VERY OWN PUBLIC DISCUSSION GROUP

HAVE YOU EVER wanted to run your own newsgroup-style discussion group? Have you thought about hosting a mailing list but are intimidated by the management responsibilities? Or do you just want an intimate place on the Web where you and a few friends can meet? A growing number of Web sites let you host your own discussion groups—for free. And they let you set them up in many different ways. Your discussion group can be public or private, moderated or unmoderated. You can configure it so messages are displayed bulletin board–style on the Web, or you can set it up so messages are e-mailed to participants in vintage mailing-list style, as well as displayed through a Web page. Caveat emptor: The services listed below were somewhat buggy as we went to press, but they've attained popularity with users nonetheless.

EGroups:

You can set up free public or private mailing list–style discussion groups on EGroups (www.egroups.com). Participants can read the messages on the Web as they would a bulletin board, as well as receive them in their e-mail boxes. The site lets you create an event calendar; folders containing text items such as FAQs; Web page links; and even surveys for your group (see **FIGURE 2**). EGroups also archives messages.

Unfortunately, the service is slow to respond to commands, and is sometimes also slow to post messages. You can set up your discussion group to be moderated, but it's awkward for the moderator to review and post messages.

OneList:

You can set up free mailing lists on OneList (www.onelist.com), either public or by invitation only. Like traditional mailing lists, OneList e-mails subscribers messages that are posted to the list. You can moderate your list by weeding out unwelcome spams. Subscribers can read archives of past messages, and you can host lists in any language (see **FIGURE 3**).

OneList provides HTML code that you can add to your own site as a link to your discussion list. I experienced some technical problems setting up lists. Sometimes when I tapped into my own list I got error messages reporting that the system hadn't confirmed my e-mail address; my subscribers received similar messages. I also had difficulty finding the list I created; OneList's searcher erroneously kept reporting that it didn't exist.

Deja News Communities:

Want to run your own newsgroup? Try the free Deja News Communities area, www.dejanews.com/communities (see **FIGURE 4**). Unlike full-fledged Usenet newsgroups, your newsgroups are visible only on Deja News. You can create a forum for any topic, and make it public or private. However, you can't screen messages before they're posted.

FIGURE 4: CREATE YOUR OWN Usenet-style discussion groups on Deja News and keep them as private as you want.

Files from this article can be found at www.fileworld.com/magazine. We welcome questions and tips and pay $50 for published items. Contributing Editor Judy Heim is coauthor of The Quilter's Computer Companion *(No Starch Press, 1997). See page 12 for contact information.* ■

'Poor Richard's Web' Site Offers Help for Wannabe Webmasters

WANT TO SET UP a Web site but don't know where to begin? Get yourself a copy of Peter Kent's *Poor Richard's Web Site* ($38, Top Floor Publishing, www.poorrichard.com/pk1). Kent tells you how to figure out whether you actually need a Web site (many businesses don't), and how to shop for a hosting service, select a domain name, and create an effective low-budget site. He even tells you how to take orders online, publicize your site cheaply, and read Web page logs.

Dogpile Searches Like a Crazy Hound

I HAVE A DOG who, if you put him on a scent, just keeps going and going, pawing, digging, running, sniffing. He'll never stop. That's the concept behind Dogpile (www.dogpile.com). Dogpile picks through not only major searchers like Yahoo, Excite, and AltaVista but also gateway services such as Mining Co. and Usenet databases like Deja News, plus FTP searchers and even news wires, including business ones. It will even search weather sites. You can tell Dogpile to search specific resources for a set period of time—say, 60 seconds—then move on to another one. I wish I could teach my dog that trick.

Automate captioning ◆ Switch between docs easily ◆ **Create custom calendars**

Automate Your Word Document Launch

FOR MANY OF US, the routine is the same: When we start Windows up, we automatically launch Word as well. Even more convenient is having Word automatically open the last document we worked on. Sure, opening it yourself takes only a few mouse clicks, but automating the process can help you customize your desktop to suit the way you work. Here's how to set up this operation in Word 7 and Word 97:

MAKE WORD START WHEN WINDOWS DOES...

A LITTLE MANIPULATION of the Start Menu in Windows 95 and 98 is all that's required to get Word to start automatically. The method below is the easiest and ensures that you'll also be able to launch Word from the Start menu at any time.

1. From the desktop, right-click a blank area on the taskbar, and then select *Properties* from the pop-up menu.
2. In the Taskbar Properties dialog box, click the *Start Menu Programs* tab, then click *Advanced* (see **FIGURE 1**).
3. In the left pane of the *Exploring – Start Menu* window, expand the Programs listing by clicking the plus sign next to the word Programs.
4. Click *Programs* in the left pane, and then scroll down in the right pane until you find the Microsoft Word entry. If it isn't there, you will have to locate the icon manually. It will be in the folder that you normally open when you use the Start menu to run Word.
5. Scroll, if necessary, to make sure the StartUp folder is visible in the left pane of the Exploring window, then right-drag the *Microsoft Word* entry to the StartUp folder in the left pane.
6. Select *Copy Here* in the pop-up menu. This puts Word in the StartUp folder while retaining it in its previous location so you will be able to run it after exiting StartUp.

Hint: If you're using Windows 98 or the Active Desktop in Internet Explorer 4.0, you may also want to right-drag the Word icon to the Quick Launch toolbar, where it's always accessible via a single click.

...AND CREATE A MACRO FOR AUTOMATIC FILE OPENING

WANT WORD TO open the last document you worked on as soon as it launches? Here's a simple macro that does just that.

FIGURE 1: AUTOMATING Word startup begins with the Start Menu Programs tab.

Make Reverse-Order Printing Your Default in Word

IF YOUR PRINTER ejects pages face-up, you're probably used to shuffling your output pages to get them in the right sequence. Forcing Word to print your documents in reverse order is a snap, but Word hides this ability in its menus. In all versions of Word, select *Tools•Options*, then click the *Print* tab. In the 'Printing options' section of the dialog box, select *Reverse print order* to enable that option, then click *OK*.

Word 97:

1. With Word running, select *Tools•Macro•Macros*.
2. Type **Autoexec** in the 'Macro name' field of the Macros dialog box, and click *Create*.
3. Carefully type the single line of macro text below, between the Sub autoexec() and End Sub lines, in the macro editor. Include punctuation as shown. (See **FIGURE 2** on the following page.)

```
RecentFiles(1).Open
```

4. Select *File•Save Normal*, then *File•Close* and *Return to Microsoft Word*.

Hint: If you would rather have Word display the *File•Open* dialog box instead of launching the last document you worked on, type **wdDialogFileOpen** into the macro instead of the line above. To have Word display the *File•New* dialog box, type **wdDialogFileNew**.

Word 7:

1. With Word running, select *Tools•Macro*.
2. Type **Autoexec** in the 'Macro name' field of the Macros dialog box, and click *Create*.
3. Type the macro text shown below, between the Sub MAIN and End Sub lines.

```
FileList 1
```

4. Select *File•Close* and click *Yes* when prompted to save the changes in the macro.

SET UP AUTOMATIC CAPTIONING

ALL VERSIONS OF Word from 6.0 on can automatically insert a numbered caption line whenever you insert a graphical element, table, equation, or almost any other object in your document. But this feature is turned off by default. Here's how to ▶

ILLUSTRATIONS: RICHARD DOWNS (LEFT); JEFFREY PELO (RIGHT)

FIGURE 2: TYPE the middle line to get this macro for automatic file opening in Word 97.

turn the feature on and make it work the way you want:

1. Select *Insert•Caption*, then click *AutoCaption* in the Caption dialog box.
2. In the AutoCaption dialog box, click and mark an item in the list for which you want automatic captions. You'll see Word's default label for that item in the Use Label field, and the default position for the item in the Position field.
3. To change the default label, click *New Label*, then type the desired text in the New Label dialog box and click *OK*.
4. To change the default position for captions for this type of object, move the pointer down the list and choose the position you prefer.
5. To change the automatic numbering scheme, click *Numbering* and select options in the Caption Numbering dialog box.
6. Repeat steps 2 through 5 for all object types you want captioned.

Note: Once Word inserts an automatic caption for an inserted object, you can add to the label by typing your own text in the document window.

TOOLBAR BUTTONS FOR DOCUMENT SWITCHING

IF YOU COMMONLY leave multiple documents open in Word, you've noticed that using the Window menu to switch between documents is a two-step nuisance and that remembering the keyboard command (<Ctrl>-<F6>) is difficult. Here's how to simplify toggling between documents in Word 97 and in Word 6 and 7 with a couple of toolbar buttons:

Word 97:

1. Select *Tools•Customize*, and click the *Commands* tab.
2. Choose *All Commands* in the Categories pane, then scroll down until you find the NextWindow command in the Commands pane of the Customize dialog box.
3. Click the *NextWindow* line, drag it to the desired toolbar (or to the menu bar), and drop it.
4. Choosing *PrevWindow* from the Commands pane, repeat steps 2 and 3.

If the command appears as text only on the toolbar (or the menu bar), you can change it to an icon only or to an icon with text by right-clicking the button when the Customize dialog box is still open. Select *Default Setting* if you want the standard icon, without any text. Right-click the button and select *Change Button Image* to pick from one of the offered icons. (Pick the left-pointing arrow for Previous and the right-pointing arrow for Next, as commonly found in Web navigation tools.)

Word 6 and 7:

1. Select *Tools•Customize*, then click the *Toolbars* tab.
2. Choose *All Commands* in the *Categories* pane, then scroll down until you find the NextWindow command in the Commands pane of the Customize dialog box.
3. Click the *NextWindow* line, drag it to the desired toolbar, and drop it. When the Custom Button dialog box appears, select a button from the palette or select *Text button*, then click *OK*.
4. Choosing *PrevWindow* from the Commands pane, repeat steps 2 and 3.

CREATE CUSTOMIZED CALENDARS

NEED A CALENDAR for your wall? You don't have to buy one. Word can create one for you with its Calendar Wizard. Word 6 and 7 install this wizard with the default installation, so it's ready for use. Word 97 doesn't automatically install this file, but it's on your Office 97 CD, in the \valupack\templates\word folder. Copy the file *calendar.wiz* to the \msoffice\templates folder on your system (it might be under \Program Files). If you are connected to the Internet, you can select *Help•Microsoft on the Web•Free Stuff* menu and download the Calendar Wizard at no charge, after registering on the site. Save the download into your msoffice\templates folder.

Once you have the file on your hard disk, you can create monthly calendars in several styles. Select *File•New*, then select the *Calendar Wizard*, which should appear under the *General* or *Other Documents* tab (see **FIGURE 3**).

Follow the instructions in the wizard to choose from the available styles and to select the months that you want the calendar to cover. You can even insert a placeholder for a graphic. And if you're not happy with the results, you can edit them easily—the calendar itself is a standard Word table.

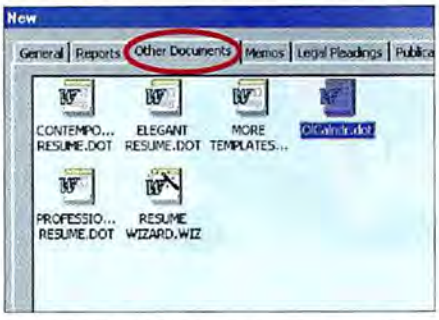

FIGURE 3: TO CREATE calendars in Word, select Calendar Wizard in General or Other Documents.

DUMP WORD'S DEFAULT TABLE BORDERS INSTANTLY

WORD 97 AND 2000 add a thin, printing border around every table you insert. That's fine if you want a border but annoying if you don't. Worse, there's no way to change this default. There is, however, an undocumented way to eliminate the borders that doesn't require a trip to Word's Table•Autoformat: Immediately after inserting a table with the *Insert•Table* command, press **<Ctrl>-<Alt>-U**, and the border disappears.

We welcome your questions and tips and pay $50 for published items. George Campbell is a contributing editor for PC World. *You can reach him via his Web page at www.osomin.com, or see page 12 for contact information.* ■

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waiting?"

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Sure, you love the idea of surfing the Web at up to 400 Kbps. But what if you could get your favorite Web sites and Usenet Newsgroups delivered straight into your PC by satellite — **automatically**, without even having to tie up your phone line to ask for them? That's just what DirecPC's Turbo WebCast™ and Turbo NewsCast™ services do — so you're never behind on the news and information that's important to you. The best thing about these two services? They're **free** with your paid subscription to any Turbo Internet™ service package.

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Price of Service Plan (Including ISP)	$29.99/Month	$49.99/Month	$129.99/Month
Price of Service Plan (Without ISP)	$19.99/Month	$34.99/Month	$109.99/Month
Hours of Service (Availability)	24 Hours a Day	24 Hours a Day	24 Hours a Day
On-Line Time (Hours of usage for Turbo Internet)	25 Hours /Month	100 Hours/Month	200 Hours/Month
Additional Hourly Rate (Including ISP) Additional Hourly Rate (Without ISP)	$1.99/Hour $.99/Hour	$1.99/Hour $.99/Hour	$1.99/Hour $.99/Hour
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Turbo Newscast: Broadcast delivery of up to 30,000 Usenet Newsgroups to your PC's hard drive	Included	Included	Included
Turbo Internet: Fully interactive access to the Internet at speeds up to 400Kbps	Included in Online Time	Included in Online Time	Included in Online Time
Free E-mail Accounts	1	1	4
Networking (Number of Seats)	N/A	N/A	4

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HUGHES NETWORK SYSTEMS

Thermometer-Style Graphs Made Easy

MOST PEOPLE ARE familiar with "thermometer"-style graphs, which show the percentage of a project completed. It's easy to make such a display in Excel. The key is to create a chart that uses a single cell (containing a percentage value) as a data series.

FIGURE 1 shows a worksheet set up to track daily progress toward a goal: 1000 new customers in a 15-day period. Cell B18 contains the goal value. Cell B19 contains a simple sum formula, **=SUM(B2:B16)**, and cell B21 contains **=B19/B18**, a formula for calculating the percentage of the goal attained. As new data is entered in column B, the formulas display the current results.

To create the chart, enter the formulas listed above, along with the figure's sample data; then select cell B21, and click the *Chart Wizard* button. Notice the blank row preceding cell B21. If you fail to include this blank row, Excel will use the entire data block—not just the single cell—to construct the chart. Since B21 is isolated from the other data, the Chart Wizard uses only the single cell. In step 1 of the Chart Wizard dialog, specify a *Column* chart and a Clustered Column subtype (the first choice). Click *Next* twice, and then in step 2 make additional adjustments: Add a Chart Title (*Title* tab), dump the *Category (x) axis* (*Axes* tab), delete the legend (*Legend* tab), and specify *Show value* (*Data Labels* tab). Click *Finish* to view the chart.

The chart needs further customization. To display the Format Data Series dialog, double-click the column. Click the *Options* tab, and set the Gap width to **0** (this setting instructs the column to occupy the entire width of the plot area). To change the pattern used in the column, click the *Patterns* tab and make your selection. The example shown here uses a gradient fill effect. Next, double-click the vertical axis to bring up the Format Axis dialog. In the *Scale* tab of the Format Axis dialog, set Minimum to **0** and Maximum to **1**.

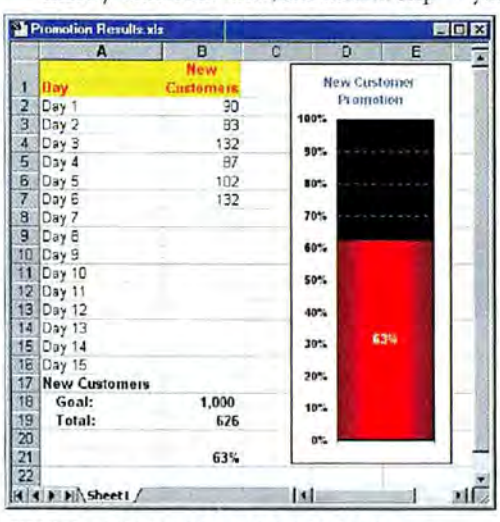

FIGURE 1: THIS "THERMOMETER" CHART uses a single-cell data series to show progress toward a goal.

HOW MANY DAYS ARE LEFT?

IF YOU'VE EVER had to figure out which of the year's 365 days a particular date falls on, or how many days remain in the year, you've probably found that Excel lacks functions to perform the calculation. But you can create formulas to do the job. The formula below returns the day of the year for a date in cell A1:

=A1-DATE(YEAR(A1),1,0)

Excel automatically formats the cell as a date, so change the number format to another option (like General).

To calculate the number of days remaining in the year (assuming that the date is in cell A1), use the following formula:

=DATE(YEAR(A1),12,31)-A1

AUTOMATIC LIST NUMBERING

IN EXCEL, to consecutively number items in nonconsecutive cells, simply plug formulas that refer to the cells in column B into column A's cells (see **FIGURE 2**). The formula **=IF(B1<>"",COUNTA(B1:B1)&".","")** displays the next consecutive item number if a cell has something in it; if a cell is empty, it displays nothing.

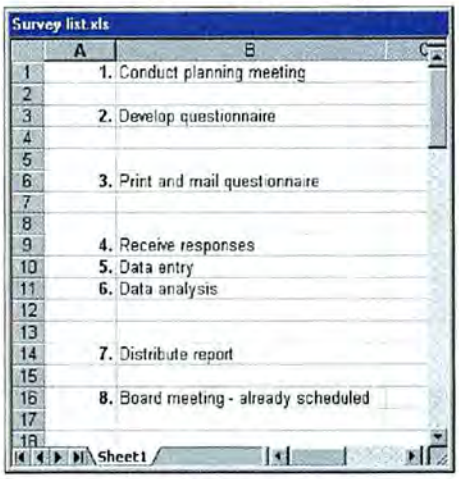

FIGURE 2: FORMULAS IN column A display consecutive numbers in nonconsecutive cells.

After you have entered the formula, you can copy it down the column as many times as you need to handle all of the items you'll be entering.

For 1-2-3, use the following formula to produce the same result:

@IF(B1="","",@STRING(@COUNT(B1..B1),0)&".")

We welcome questions and tips and pay $50 for published items. Contributing Editor John Walkenbach is the author of the upcoming Excel 2000 Bible *(IDG Books, 1999) and maintains The Spreadsheet Page (www.j-walk.com). See page 12 for contact information.* ■

Really Hide an Excel Worksheet

YOU CAN USE Excel's *Format•Sheet•Hide* to hide an entire worksheet. But unless you password-protect the workbook structure, anyone can select *Format•Sheet•Unhide* to see the hidden sheet. Brian Veara of Green Bay, Wisconsin, suggests a better method for Excel 97 or later: Press <Alt>-<F11>; in the Project window, double-click *Microsoft Excel Objects* and select the sheet to hide. Press <F4> and set the Visible property to *xlSheetVeryHidden*. To unhide the sheet, set the Visible property to *xlSheetVisible*.

ILLUSTRATION: JEFFREY PELO

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(It's Time We Introduce Ourselves)

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TP15 LCD	15", speakers & microphone	1024 x 768 TFT/Active	$949

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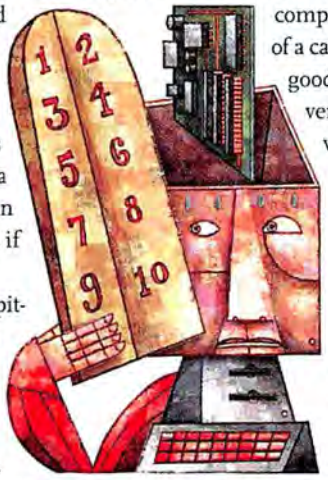
Install devices and drivers • The truth about daisy-chaining USB devices

The Ten Commandments of Installing Upgrade Cards

FOR MOSES, the Ten Commandments were carved in stone. Thou shalt do this, Thou shalt not do that. Life was simpler then. Nowadays we have PCs. They're supposed to make our lives easier by doing this and not that. Take Plug and Play. The technology has made adding new hardware a snap—especially with Windows 98—but it's still far from foolproof. Installing a network card or video accelerator, for instance, can cause a ripple effect of conflicts even when the device is installed correctly. And a botched installation can cost you several hours, if not days, of downtime.



You can avoid all the pitfalls associated with card upgrades by following what I call the ten commandments of installing upgrade cards.

1. Don't burn your bridges. Installing hardware usually entails installing driver software as well. And if you experience problems during the installation, important files may be changed, corrupted, or even deleted. So always have a recent backup of your data handy. Ideally, you have a complete replica of your hard disk—PowerQuest's Drive Image 2.0 is great for this—stored in a safe place. If that's not practical, at least back up your key system files: system.dat, user.dat, system.ini, and win.ini (all in the Windows folder) and autoexec.bat and config.sys (in the root folder).

2. Do your homework. Installation often requires you to make obscure and nonintuitive choices, so read the documentation. Gather all setting information like COM ports or, for non–Plug-and-Play hardware, IRQs and DMA addresses. Next, go to the vendor's Web site and look for confirmation of the installation instructions. While you're there, see if a more recent version of the card's driver exists, and if it does, download it. But be wary; many companies will post beta versions of a card's drivers. Unless you have good reason to believe a beta driver is stable, avoid it. They are works in progress and may not qualify for tech support.

Benefit from the experience of others. If there's an FAQ or knowledge base on the vendor's site, check it for known problems and other issues with your card.

3. Consult the experts. If you don't find satisfactory answers online or in the printed documentation, call the card vendor's technical support line before you start the installation. Support technicians are your best source of current information and troubleshooting tips on specific hardware.

The single largest library of collected troubleshooting information is located at Microsoft's online KnowledgeBase (support.microsoft.com) and at its associated, more technical database, TechNet (www.microsoft.com/technet).

4. Remove old drivers first. If you're replacing an existing card, remove the old card's drivers before installing the new one. Go to Device Manager (right-click *My Computer•Properties*, select the old device, and hit the *Remove* button; or starting from the Control Panel, run *Add/Remove*). You can't remove a video card driver, so—to work around this problem—double-click the display driver entry in Device Manager, hit the *Update-Driver* button on the *Driver* tab, and replace your current driver selection with Windows' Standard VGA driver (see **FIGURE 1**).

5. Never interrupt a driver installation. Always finish the installation of a driver and *then*, if you want, uninstall it. Stopping in midinstallation may change or damage key system files. And you may not be able to undo the damage by removing the partially installed components with *Add/Remove* or by reinstalling the driver.

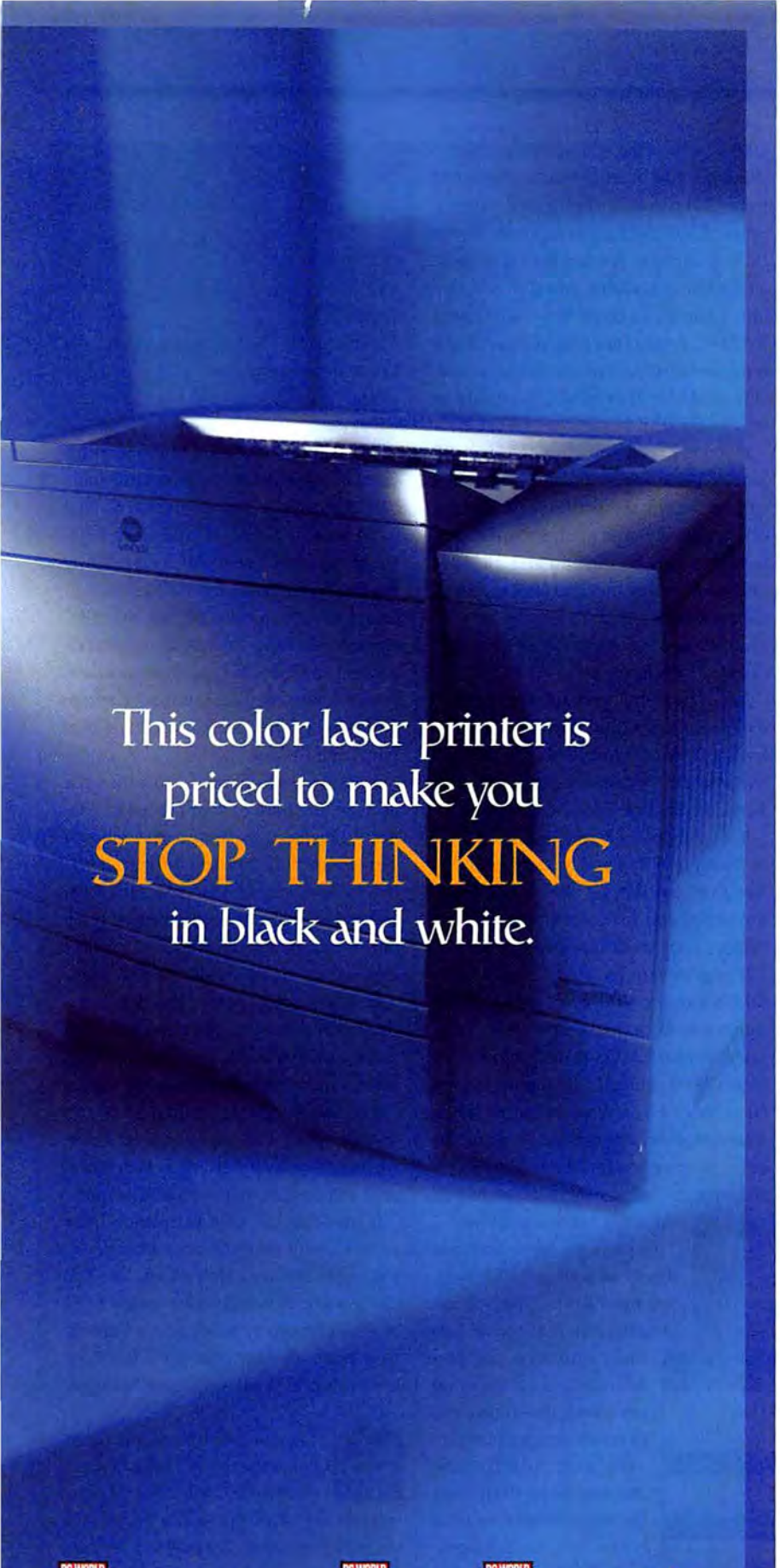
6. Install one card at a time. If you're adding more than one card, install one first and then use your system for a while. Make sure it has no performance conflicts before you add the others. This will ▶

FIGURE 1: INSTALL WINDOWS' VGA DRIVER before you remove your old graphics card and install a new one.

Increase Printer Capability

HAVING TROUBLE printing big or complex graphics files? On some printers, you can adjust a few settings that will help you print large files. Select *Start•Settings•Printers*, right-click your printer's icon, and select *Properties*. On the *Details* tab, in the 'Transmission retry' box, lengthen the time for which Windows 98 will send data to the printer. Then click the *Spool Settings* button and change the Spool data format from EMF to *RAW*. When you're done printing, change the setting back to *EMF*.

ILLUSTRATIONS: RICHARD DOWNS (LEFT); JEFFREY PELO (RIGHT)



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make any problems that arise far easier to isolate and resolve.

7. Get grounded. Static electricity on your body can destroy chips. Always ground yourself by touching a large grounded conductive object (aluminum or steel). If no such object is available, touch your PC's case while it's still plugged in to a grounded outlet.

8. Be gentle but firm. Insert cards with care. Sometimes substantial pressure is needed to insert a card into an expansion slot. If the motherboard flexes at all, back off and try realigning the card.

9. Use the screws. Always fasten the card's bracket to the PC's frame. The card may seem to be firmly in place, but it can easily come loose, causing all kinds of trouble.

10. Save your old card and software. Murphy's Law of Installations: The day after you throw something away, you'll need it.

GET ON THE BUS

DOES USB REALLY let you connect 127 devices to a single port and provide power for each device? I don't see how I can daisy-chain my USB devices as easily as magazine articles claim.

Jean-Andre Corpuz
Pasadena, California

YES, THEORETICALLY you can attach 127 devices to your system; and yes, a Universal Serial Bus connection does provide limited power to each device. But there are some important practical issues you need to consider to successfully hook up USB peripherals to your system.

To establish a USB connection, you need both hardware and a BIOS that support USB as well as the appropriate version of Windows. Just because your motherboard has a USB port doesn't mean you have the proper BIOS and hardware. To see if your PC is USB ready, you can run USBReady, a free utility available on PC World Online's FileWorld or from www.usb.org/faq.html. It examines your system's hardware, installed drivers, and Windows version, and identifies what, if anything, is needed for USB to work (see **FIGURE 2**).

If you're having trouble with your USB port and your motherboard is more than 18 months old, the port may be improperly designed. Some motherboard manufacturers jumped the gun and included USB ports before the final USB specifications were completed. To see whether your motherboard suffers from this problem, call your system vendor.

And if your motherboard does have an older, nonfunctional port, or it doesn't have a USB port installed, you can add ports via a PCI expansion card such as the $40 USB BusPort from Belkin.

Both Windows 98 and the last versions of Win 95 (OSR2.1 and 2.5) support USB. But if you use Win 95, always check with the peripheral manufacturer to ensure Win 95 USB drivers are available for it.

If your system has everything it needs for USB and you still can't get a USB peripheral to work, make sure USB is activated in your CMOS setup program. To enter CMOS setup, hit the appropriate key (as indicated by a screen prompt) when your computer first starts up. Where in the setup program you find the USB setting—and what it is called—varies depending on the BIOS version and brand.

To hook up more than one device to a single USB port, you need a hub. The two rectangular external connectors built into new motherboards—which make up the root hub—allows you to attach one peripheral to each port. And if those devices have their own built-in hubs with external connectors, you can piggyback additional peripherals on the root hub.

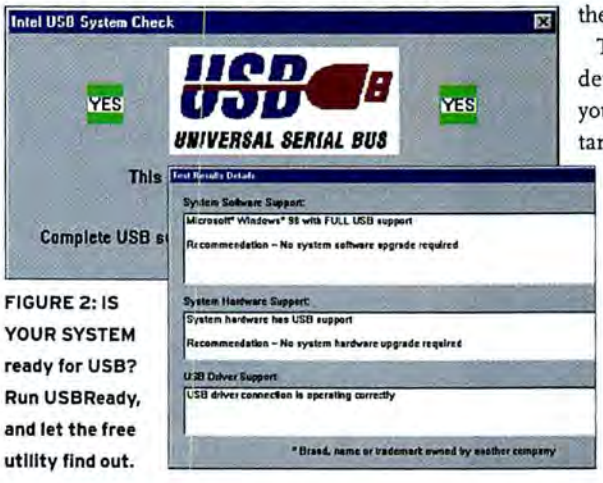

FIGURE 2: IS YOUR SYSTEM ready for USB? Run USBReady, and let the free utility find out.

Drive Image 2.0
List price: $70; PowerQuest; 800/379-2566; www.powerquest.com
PRODUCT INFO NO. 601

ExpressBus 4-Port USB Hub, USB BusPort
Street price: hub, $80; port, $40; Belkin; 800/223-5546; www.belkin.com
PRODUCT INFO NO. 602

For example, the ADI MicroScan 6P monitor comes with a four-port hub in its base that offers a convenient way to plug in a mouse, a keyboard, and other desktop peripherals. And if one of those newly attached peripherals has its own built-in hub, you can continue adding more devices to the chain. But not all peripherals possess an on-board hub. In such a case, you can buy a dedicated four- or seven-port hub like the $80 ExpressBus 4-Port Hub from Belkin.

A single USB channel—to which the ports on the back of your computer connect—provides a maximum of 12 mbps of bandwidth to all attached devices. If you need more bandwidth for data-hungry peripherals like scanners and printers, you'll have to add another channel, like Belkin's ExpressBus, to gain an additional 12 mbps.

USB ports don't deliver just data to peripherals; they also deliver power. USB hubs come in two types: bus-powered hubs, which draw power from the incoming connector and can output up to 100 mA per port; and self-powered hubs, which draw power from their own power cord and provide up to 500 mA per port.

If your attached USB peripherals draw more current than the bus can support, the entire bus may shut down. You can check whether this potential conflict is a problem for you by looking for a warning icon next to the Universal Serial Bus Controller entry in Windows' Device Manager.

You can find files mentioned in this article on PC World Online's FileWorld (www.fileworld.com/magazine). Kirk Steers is a PC World *contributing editor. We pay $50 for published questions and tips. See page 12 for contact information.* ■

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Install a New Hard Drive

SO YOU THINK your hard disk is large enough? Well, beyond the demands of Windows, Office, and all your shareware, you face the real space gluttons. For creating or editing graphics, sound, or video files, you need more than last year's 2GB or 4GB EIDE hard drive.

Before you install a new hard drive, though, take note: Pre-1994 PCs don't recognize drives larger than 528MB, pre-1996 PCs have a 2.1GB barrier, and some more recent PCs max out at 8.4GB. Although software bundled with EIDE drives evades these limitations, consider updating your PC's BIOS anyway, especially if you're concerned about Y2K compatibility. If your PC has a flash BIOS, you can upgrade by downloading software from the manufacturer's Web site. If not, you'll need to buy a BIOS upgrade chip.

New EIDE drives use the 33-mbps Ultra DMA/33 interface. The EIDE connectors on PC motherboards made more than two or three years ago, however, can't handle that speed. You can use contemporary drives, but not without sustaining a slight performance hit.

Since your new drive will be bigger and faster than your old one, install it as your C: drive and use the old one as your D: drive. To copy your data from the old drive to the new one, use the disk copying utility that accompanies the new drive, or buy one separately (simply copying the files using DOS commands won't work).

Stan Miastkowski is a contributing editor for PC World. ■

THE TOP DOWN

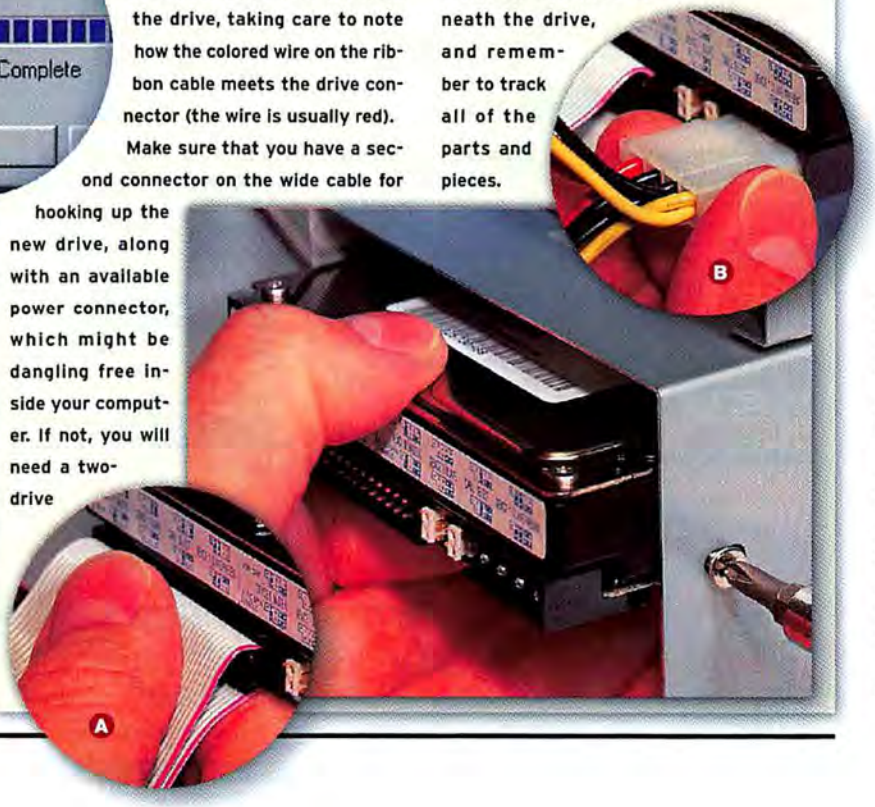
Benefits: higher capacity, better performance
Costs: $200 for 10GB, $250 for 12GB, $300 for 14GB, $600 for 22GB or 25GB
Possible vendors:
IBM (www.storage.ibm.com),
Seagate (www.seagate.com),
Western Digital (www.wdc.com).
Expertise level: intermediate
Time required: 2 to 3 hours
Tools required: Phillips screwdriver, needle-nose pliers
If you need...
a drive copy utility: DriveCopy 2.0, $30, www.powerquest.com
a BIOS chip: Unicore, www.unicore.com

1 Optimize your existing drive. First, make sure your current hard drive is trouble-free. Run ScanDisk (select *Start•Programs•Accessories•System Tools•ScanDisk*), and then optimize the drive (*Start•Programs•Accessories•System Tools•Disk Defragmenter*). Then do a full backup of the drive's contents.

If the disk preparation software included with your new hard drive comes on a bootable floppy disk, put the disk into your A: drive and reboot your PC. If the software does not come on a bootable floppy disk, you'll have to reboot with one on hand or create one. To create a bootable floppy, put a blank floppy in the A: drive, double-click *My Computer*, select the drive, and then select *File•Format*. Choose *Full format*, and be sure to put a check in the box next to *Copy system files*. After you've rebooted to the A> prompt, insert your disk preparation software's floppy disk and follow the accompanying manual's instructions for launching the software.

2 Access the old drive. Turn off your PC, remove the cover, and find out how difficult it is to get to the jumpers on your existing drive. If you're lucky, you'll be able to access the jumpers without removing the old drive. If you do have to remove it, disconnect the wide ribbon cable (A) and the power connector (B) from the drive, taking care to note how the colored wire on the ribbon cable meets the drive connector (the wire is usually red). Make sure that you have a second connector on the wide cable for hooking up the new drive, along with an available power connector, which might be dangling free inside your computer. If not, you will need a two-drive ribbon cable plus a Y-adapter for creating two power connectors out of one.

If you have to pull out the old drive to access the jumpers, removal might be a simple matter of sliding it out, or it might entail removing up to four screws. Either way, be careful not to damage the sensitive electronics beneath the drive, and remember to track all of the parts and pieces.

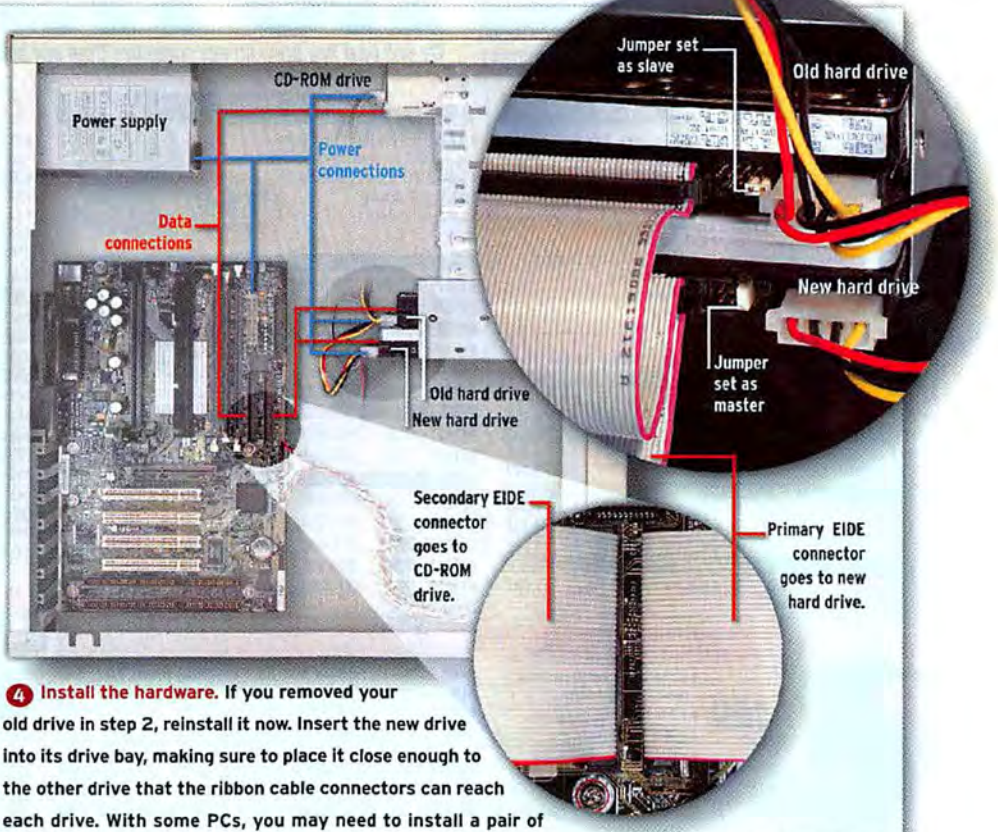


PHOTOGRAPHS: KEVIN CANDLAND; ILLUSTRATION: JEFFREY PELO

3 Set the drive jumpers. When two EIDE drives connect to a single data cable, one must be set as the master and the other as the slave. Most drives—such as the Western Digital drive shown here—also have a single-drive jumper setting for you to use if your PC has only one drive.

Most hard drives have jumper settings printed on their topside labels (C). If yours does not, check the manual that came with it for information about which settings to use.

Set the jumper setting on your new drive to master, and change your old drive's setting to slave.

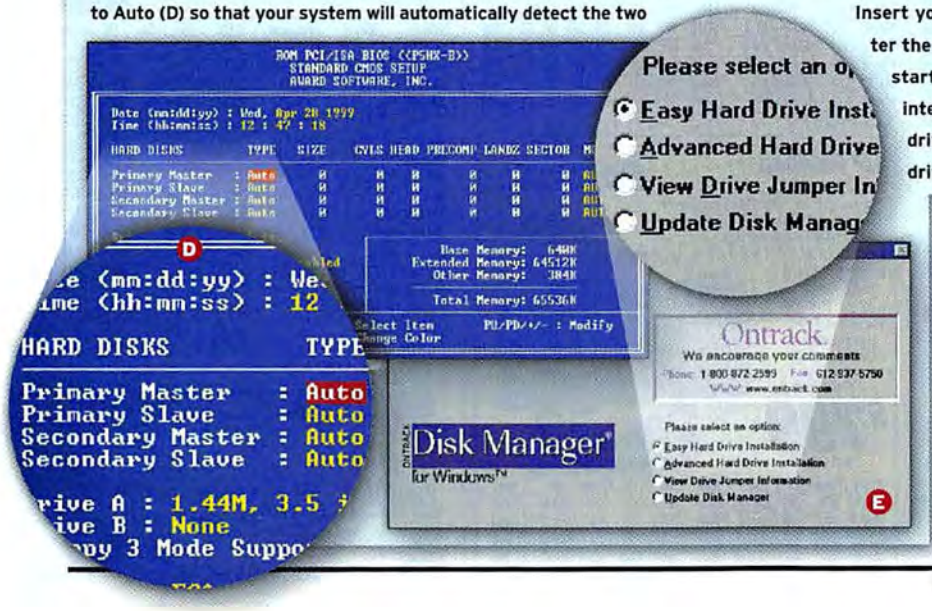


4 Install the hardware. If you removed your old drive in step 2, reinstall it now. Insert the new drive into its drive bay, making sure to place it close enough to the other drive that the ribbon cable connectors can reach each drive. With some PCs, you may need to install a pair of drive rails or even a pair of mounting brackets to adapt a 3.5-inch drive to a 5.25-inch drive bay. (Check the box that your PC was shipped in; new systems often come with extra rails and brackets.)

Attach the two connectors on the ribbon cable to the old and new drives. It doesn't matter which connector you join to which drive. Make sure the colored wire on the cable goes to the pin closest to the power connector. (Some data cable connectors are keyed to prevent you from connecting them improperly.) Now check that the data cable's connection to the motherboard is secure. It's likely that your hard drives' cable is connected to the primary EIDE connector, and that the cable for other EIDE devices is connected to the secondary EIDE connector. Plug the power connectors into both drives.

5 Copy the old to the new. Start your PC. During start-up, enter your computer's setup program and make sure drives 1 and 2 are set to Auto (D) so that your system will automatically detect the two drives and set up the correct parameters. Save the setup settings, and then reboot from your bootable floppy disk.

Insert your drive copy utility's floppy disk, and enter the command (usually printed on the label) to start it. Follow the directions—à la Ontrack's interface shown here (E)—to set up the new drive, and then copy all data from your old drive to your new one.



6 Final steps. When the utility software is finished, remove the floppy disk and restart your PC. It should boot up and start Windows normally. Once you are sure everything's working, consider reformatting your old drive to clean it up before it receives any new data. To do this, double-click *My Computer*, right-click the letter representing your old drive—now D:—and choose *Format*.

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#43517**	4080XCDT	366 PII MMX	64	6.4GB	24X	14.1" TFT	56K	$3,199
Libretto								
#39002**	110CT	233 MMX	32	4.3GB	—	7.1" TFT	—	$1,697

*Windows 95. **Windows 98.

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#44077*	TP396E	300 PII MMX	32	3.2GB	24X	13.3" TFT	V.90	$2,579
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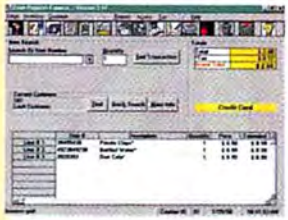

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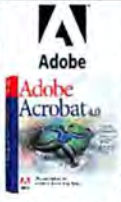

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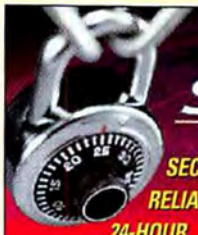

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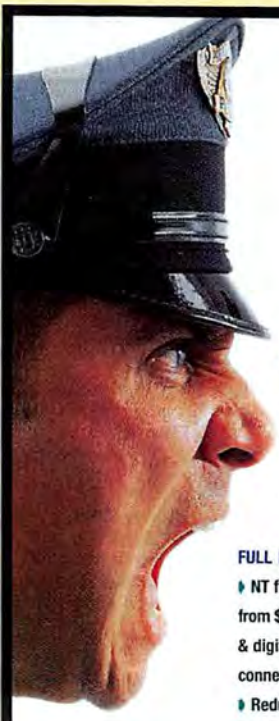

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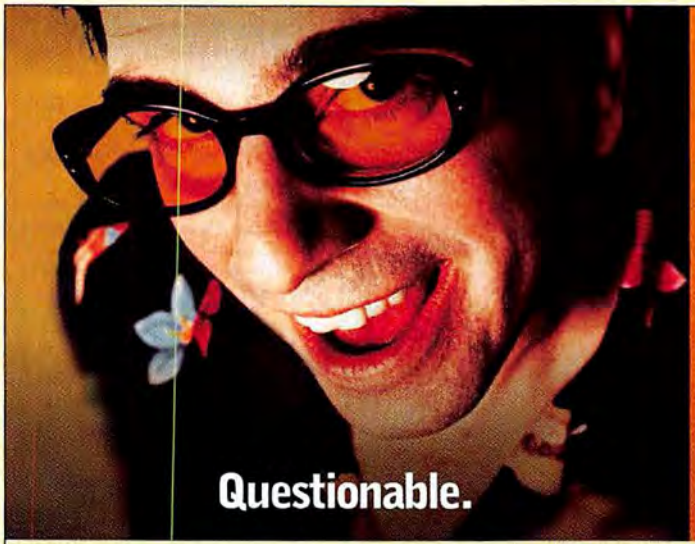

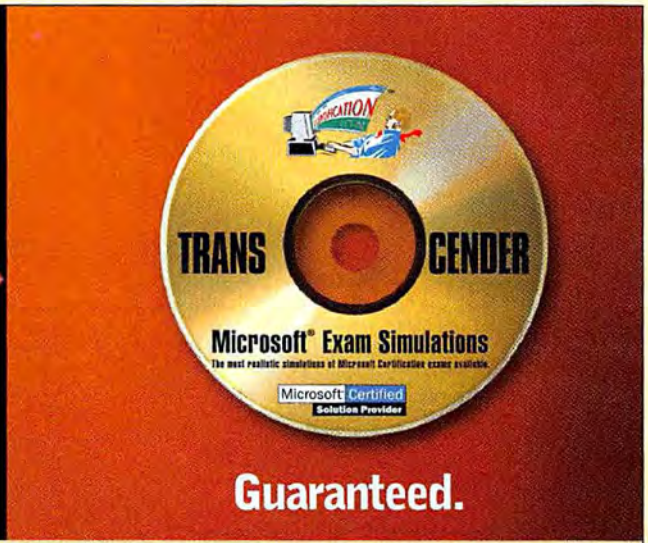

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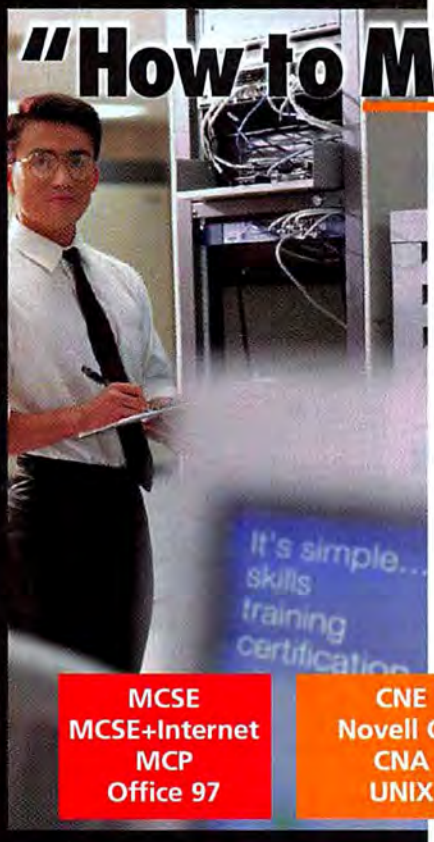

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16Meg	34	—	—	—		
32Meg	59	59	59	69	129 / 139	139 / 149
64Meg	99	119	119	124	219 / 269	239 / 289
128Meg	194	224	209	239	949 / 599	— / 629
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8 x 32 32 mg	89	–	–
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4 x 32 16 mg EDO	44	–	–
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Panasonic 4410/4430	–	49	–	–	–	99	–	–	–	–
Panasonic 4455	–	49	–	–	–	99	–	–	–	–
Panasonic 4400	–	49	–	–	–	99	–	–	–	–
Panasonic 4405, 5410	–	69	–	–	–	99	–	–	–	–
Panasonic 6500	–	14	–	–	–	99	–	–	–	–
Qms 2400, 3460, 3600, 3700E	–	49	–	–	–	99	–	–	–	–
Sharp 9500, C, H, 9700, 9750	–	–	–	–	–	236	–	–	–	–

MEMORY FOR MULTIFUNCTION AND FACSIMILE...CHECK OUR WEB SITE!

COMPAQ MEMORY MODULES

Deskpro 450, 4100, 575, 590, 5150, 5133	4/8/16/32Meg	6/19/49/89
Deskpro 2000, 5120, 5133, 5150, 5160 (EDO, pairs)	4/8/16/32Meg	6/19/49/79
Deskpro 2000, 4000, 6000 Series (EDO, pairs)	4/8/16/32Meg	6/19/49/79
Deskpro 2000, 4000, MMX (SDRAM)	16/32/64/128Meg	29/49/99/199
Deskpro 6000	16/32/64/128Meg	34/59/129/229
Deskpro 5/60M, 5/66M, XE560 (pairs)	4/8/16/32Meg	14/29/59/98
Deskpro XL 610, 8200 (EDO, pairs)	8/16/32/64/128Meg	Call
Presario 510, 520, 524, 680, 7120, 724, 900	4/8/16/32Meg	6/19/49/89
Presario 920, 924, 954, 974, 978, 992	4/8/16/32Meg	6/19/49/89
Presario 2100,2120, 2200,3200, 3060 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Presario 4112, 4120, 4160, 4462 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Presario 4504, 4506, 4528 (SDRAM)	16/32Meg	34/59
Presario 4704, 4706, 4710, 4712, 4714, 4719 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Presario 4764, 4772, 4784, 4786 (SDRAM)	16/32Meg	34/59
Presario 4902, 4914 (SDRAM)	16/32Meg	34/59
Presario 7172, 7180, 9526, 9546, 9548, 9564 (pairs)	4/8/16/32Meg	6/19/49/89
Presario 7182, 7184, 8040, 8042, 9642, 9663 (pairs)	4/8/16/32Meg	6/19/49/89
Proliant 1000 5/60, 2000, P, 4000, P, Xeon	4/8/16/32Meg	14/29/59/98
Proliant 1500, 1500R (pairs)	4/8/16/32Meg	14/29/59/98
Proliant 5000, 5000R (quads)	4/8/16/32/64Meg	9/29/44/89/129
Proliant 5000, 5000R (pairs)	32/64/128/256Meg	Call
Prolinea 575, 590, 5100, 5120, 5133 (pairs)	4/8/16/32Meg	6/19/49/89
Prolinea 5100, 5120, 5133, 5150, 5166 (EDO pairs)	4/8/16/32Meg	6/19/49/79
Prolinea 575E, 100E, 120E, 575MX (pairs)	4/8/16/32Meg	6/19/49/89
Prolinea 590SM, 5120MX (pairs)	4/8/16/32Meg	6/19/49/89
Prolinea 6150, 6166, 6240, 6266, 6290	8/16/32Meg	29/49/99
Presignia 300 S/75, S/90, S/120, S/150 (pairs)	4/8/16/32Meg	14/29/59/98
Presignia 500 S/90, S/120, S/150 (pairs)	4/8/16/32Meg	14/29/59/98

COMPAQ NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMH/Li-ion
Armada 1100, 1110, 1120T, 1120, 1125	8/16/32/64Meg	24/44/79/139	104/—
Armada 1130, 1130T	8/16/32/64Meg	24/44/79/139	104/—
Armada 1500, 1500 Series	8/16/32/64Meg	24/44/79/139	139/229
Armada 1700, 3500, 7400	16/32/64/128Meg	39/79/149/429	—/219
Armada 4100, 4130, 4120T, 4125D (KB)	8/16/32/64/128Meg Kit	29/49/89/129/279	—/219
Armada 4121, 4131, 4125T, 4135T (KB)	8/16/32/64/128Meg Kit	29/49/89/129/279	
Armada 4210T, 4220T (KB)	8/16/32/64/128Meg	29/49/89/129/279	
Armada 6500	32/64/128Meg	79/129/429	
Armada 7300, 7330, 7350, 7360, 7362, 7370, 7380, 7600	16/32/64Meg	44/79/139	—/231
Armada M4 7700 Series	16/32/64Meg	44/79/139	—/229
Armada 7800 Series 5250, 5233, 5200, 5266	16/32/64Meg	44/79/139	
Armada 7800 Series 5210T	16/32/64/128Meg	39/79/149/429	
Contura 4/25, 4/25C, 4/25CX	4/8/16Meg	31/44/79	119/—
Contura 430C, 430CX, 410C, 415CX	4/8/16Meg	5/44/74	104/—
Contura 420C, 420CX, 430CX, 430CDX	4/8/16/24Meg	31/44/74/89	104/—
LTE 5000, 5100, 5200, 5300, 5400 (Kit)	8/16/32/64Meg Kit	3?/49/?/?/223	139/259
Presario 1020, 1010, 1020, 1030, 1010, 1080	8/16/32Meg	19/34/109	119/217
Presario All 1200, 1600, 1800 Series	16/32/64Meg	39/79/139	112/236

TOSHIBA NOTEBOOK MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMH/Li-ion
Libretto 50CT, 70CT, 100CT	5/15/32Meg	39/59/89	—/161
Tecra 500CDT, 510CDT, CDT, 530CDT, 530CDT	8/16/32/48/64/128Meg	22/44/79/119/139/289	231/239
Tecra 540, 550, 550CDT	8/16/32/64/128Meg	22/44/79/129/289	259/—
Tecra 700CS, 700CT (SDRAM)	8/16/32Meg	59/89/149	279/259
Tecra 710CDT, 720CDT, 730CDT, 730XCDT, 740CDT	8/16/32/64/128Meg	39/49/89/149/289	279/259
Tecra 750CDT, 750CDM, DVD, 780 Series	8/16/32/64/128Meg	22/44/79/129	
Tecra 8000 Series	32/64/128Meg	79/149/429	
2100 Series	4/8/16/24Meg	4/29/49/79	104/—
T1900, T1950, T4600, T4700, T4900 All Models	4/8/16/32Meg	33/49/89/119	104/—
T4400, T6400 T6600	32/64/128Meg	99	
Satellite 2100CS, 2105CS, 2110CS, 2115CS	8/16/32Meg	35/59/99	104/—
Satellite 2130CDS, 2250CDS, 2310CS, CT Series	8/16/32Meg	35/59/99	104/—
Satellite 2135CDS, 2255CDS, 2305CS	8/16/32/48/64/128Meg	24/44/79/119/139/289	196/208
Satellite 300, 305, 310, 315, 320, 325, 330, 335 Series	8/16/32/64/128Meg	22/44/79/139/289	196/208
Satellite 2595CDS	16/32/64Meg	44/94/149	
Satellite 4000 Series	8/16/32/64Meg	79/149/429	
Satellite Pro T400, 405, 410, 415, 420, 425, 430, 435 Series	8/16/32Meg	39/59/89	
Satellite Pro 440CDT, 443CDX, 445, 460CDT	8/16/32/48/64/128Meg	24/44/79/119/139/289	196/208
Satellite Pro 460, 470, 480	8/16/32/48/64/128Meg	24/44/79/119/139/289	196/208
Satellite Pro 490	16/32/64/128Meg	44/79/129/229	
Portege 610CT, 620CT	8/16/32/64Meg	39/59/89	
Portege 650CT, 660CT	16/32/64Meg	59/89/169	—/210
Portege 7000, 7010	64/128Meg	149/429	

PC CARDS (PCMCIA) Version 2.0

DIGITAL CAMERA & STORAGE CARDS

ATA FLASH	8/16/32/48/64/96/128/160/224Meg	59/89/129/179/229/319/429/559/749
ATA Compact Flash	8/16/24/32/48Meg	54/69/99/129/189
S-Ram Cards	1/2/4Meg	79/139/259/499
Smart Media	2/4/8/16Meg	25/29/39/99
Compact Flash Adapter	15	Smart Medial Adapter .65

DATA/FAX MODEMS

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PC CARDS

Ethernet Combo (10 BT & 10 B2)	59.00
Kingmax 100 Base-TX	109.00
Kingmax 2V Mpeg	129.00
Kingmax Video Conference	299.00
Calluna Tech Type III Hard Drive, 260 Meg	399.00
Calluna Tech Type III Hard Drive, 520 Meg/1GIG	599/899
PCMCIA Card Reader (Internal)	119.00
PCMCIA Card Reader (External)	119.00
CD Rom Kit (Card, Drive, Cables) 2Gx	299.00
DVD Rom Drive Kit (External)	799.00

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NiMH/Li-ion
ACER Extensa 336/367/366/368	16/32/64Meg	49/89/149	
ACER Extensa 390, 39*, 392, 393, 394, 395	16/32/64Meg	49/89/149	
ACER Aspire 763, 765, 752, 784, 786	4/8/16Meg	19/29/49	
ACERNote Light 256, 356, 359, 361 (pairs) edo	4/8/16Meg	19/29/59/89	147/—
ACERNote Nuevo 971, 972, 372, 373, 374	8/16/32Meg	29/49/79	
ACERNote Pro 950, 954, 959, 957, 959 (pairs)	4/8/16Meg	19/29/64 ea	
ACER Travelmate 340		49/89	
AST Ascentia A Series and M Series	8/16/32/64Meg	29/49/79/139	154/219
AST Ascentia P30, P50	8/16/32Meg	49/89/129	—/299
AST Ascentia 210, 230, 250 (pairs)	8/16/32/64Meg	19/29/59/89	—/182
AST Ascentia 800N, 810N, 800N, 810N	4/8/16Meg	19/29/59	105, 147/187
AST Ascentia 950N	8/16Meg	39/79	—/187
AST Ascentia M5/330 J/M 5280X	16/32/64Meg	49/89/149	
AT&T Globalyst 130	4/8/16Meg	19/29/59	103/—
Canon Innova Book 350CD, 360, 475 (pairs)	8/16Meg	29/59 ea	118/—
Canon Innova Book 480, 490 EDO (pairs)	8/16Meg	29/59 ea	118/—
CTX EZ Book 300 EDO (pairs)	8/16/32Meg	29/59/129 ea	138/—
CTX EZ Book 500, 600 Series	4/8/16Meg	19/29/69	138/—
CTX EZ Book 700, 750, 760 (EDO) (pairs)	4/8/16/32Meg	19/29/59/129 ea	138/—
CTX EZ Book 766MT, 765MT (EDO) (pairs)	8/16/32Meg	29/59/109 ea	138/—
DEC HiNote Ultra 2000	16/32/64Meg	49/79/139	
DEC HiNote VP 500, 520/525,545/*58MX (pairs)	4/8/16Meg	19/29/59 ea	119/259
DEC HiNote VP 510P, 5120	8/16/32/64Meg	29/49/79/149	119/—
DEC HiNote VP, CSS, LSS, CTS, LTS	8/16/32/64Meg	29/49/79/149	119/—
DEC HiNote VP 610	16/32/64Meg	49/79/139	
Dell Inspiron 3000, 3200, 7000	16/32/64Meg	49/79/149	—/229
Dell Latitude CP & CPi Series	16/32/64Meg	49/89/149	
Dell Latitude LM, LMT, LM+, LM+MMX (pairs)	4/8/16/32Meg	19/29/59/129 ea	—/243
Dell Latitude 433, C, CX	4/16Meg	49/79	119/—
Dell Latitude LX, M	4/8/16Meg	49/59/89	105/—
Dell Latitude XP, XPi, XP, XPi CD M166ST (pairs)	4/8/16/32Meg	19/29/69/159 ea	
Epson ActionNote 830, 850C, 860c, 860cx	8/16Meg	9/59/89	119/—
Epson ActionNote 880, 866C, 890, 910	4/8/16/32Meg	19/29/59/99	119/—
Fujitsu Lifebook 600, 610, 700, 900 Series	8/16/32/64Meg	29/49/79/149	133/283
Fujitsu Lifebook 500, 600, 700, 900 Series	16/32/64Meg	49/79/139	133/283
Fujitsu Monte Carlo, Montego, Milan	8/16/32/64Meg	29/49/79/149	—/203
Gateway 2000 Solo 4100, 4133	8Meg	59/179	112/—
Gateway 2000 Solo Series (pairs)	4/8/16Meg	19/29/59 ea	
Gateway Solo Series 2/00, 2200 edo	8/16/32Meg	49/79/179	—/219
Gateway Solo 2500, 2500, 2500, 5100, 9100	8/16/32Meg	49/79/129	
Hitachi J Series	8/16/32Meg	29/44/139	
Hitachi E-Series, MMX Series	8/16/32Meg	49/69/129	119/219
Hitachi M Series	8/16/32Meg	49/79/129	104/—
Hitachi Visionbook Elite, Plus, Pro	8/16/32/64Meg	29/49/79/149	154/217
HP Omnibook 800	8/16/32/64Meg	49/79/129/159	—/145
HP Omnibook 2100 PII, 4100	32/64/128Meg	89/169/299	
HP Omnibook 4000C, CT, C	4/8/16Meg	49/79/129	126/—
HP Omnibook 5000CT, CTS, C, 5500CS	8/16/32Meg	54/79/129	126/—
Micron Go Book 233 Lite, 233, 266	16/32/64Meg	49/89/189	
Micron Millenia Transport (pairs), MRx	8/16Meg	29/59 ea	
Micron Millenia Transport VLX P133 (pairs)	4/8/16Meg	19/29/59 ea	
Micron Millenia Transport VLX P166MMX	16/32/64Meg	49/79/149	
Midwest Micro Elite or Soundbook Plus or Sx/dx II, HP	8/16/32Meg	59/69/129	119/—
Midwest Micro Elite or Soundbook CD	4/8/16Meg	19/29/69	
NEC Ready Notebook 220T, 330T	16/32/64/128Meg	49/89/159/299	133/—
NEC UltraLite Versa, E, J, MP	8/16/32/64Meg	9/44/79/129	133/—
NEC Versa 2600 Series (pairs)	4/8/16Meg	19/29/69 ea	
NEC Versa 4000, 4050/4080, 4200, 4230	8/16/32/64Meg	39/49/79/129	—/219
NEC Versa 6030, 6050, 6060	8/16/32/64Meg	39/79/99/149	
NEC Versa 6200MX edo	8/16/32/64Meg	29/59/79/149	
Packard Bell Statesman	8Meg	89	165/—
Panasonic CF-45, 46	4/8/16/32Meg	49/59/79/149	126/—
Panasonic CF-62 P100, P133	8/16/32/64Meg	39/59/79/149	
Panasonic Toughbook 25, 35, 45	16/32/64Meg	49/89/149	
Sager NP8000	8/16/32/64Meg	99	Call
Samsung Sens 810, 560	8/16/32Meg	49/79/129	—/219
Sharp 3030, 3040, 3070	8/16/32Meg	49/69/129	
Sharp 3010, 3020, 3060	4/8/16/32Meg	19/29/59/129	133/—
Sharp 8700, 8800, 8900	4/8/16Meg	49/59/79	124/—
Sharp 9000, 9030, 9040, 9050, 9300CD, T edo	8/16/32Meg	49/69/129	299/252
Sharp 9000, 9080 (pairs)	4/8/16/32Meg	19/29/69/129 ea	—/299
Sharp 9080 (pairs) edo	4/8/16Meg	19/29/59 ea	
Sharp Widenote 100T	8/16/32Meg	29/59/99	
Sony 505G, 505GX, 505FX	32/64Meg	99/149	
Sony VAIO PCG-750C, 707C, 719	16/32/64Meg	49/79/139	
TI 4000, TI 4000E, TI 4000M	4/16Meg	49/340	58, 113/—
TI 5000, 5100, 5200, 5300	8/16Meg	9/89	—/159
TI 6020, 6030, 6050, 6150	8/16Meg	29/69	—/215
TI Extensa 450, 450T, 455, 455T	8/16/32Meg	19/29/69	147/—
TI Extensa 510, 515 (pairs) edo	4/8/16Meg	19/29/59 ea	147/—
TI Extensa 590, 595, 560, 565, 570 (pairs)	4/8/16Meg	19/29/69 ea	181/—
TI Extensa 600, 605, 650, 900, T, CDT edo	8/16/32Meg	29/59/89	147/—
TI Extensa 700 Series	16/32/64/128Meg	49/89/169/299	147/—
Winbook FX P100, P133, P150	8/16/32Meg	49/79/119	—/329
Winbook XL, XLi, XL2	16/32/64Meg	49/79/149	139/219
Winbook XPC, XP	16/32Meg	69/129	112/217
Winbook XP5	32Meg	119	112/217
Winbook LM (pairs)	8/16Meg	29/69 ea	

HARD DRIVES for Laptop & Notebook

ACER NOTE	2.1C	3.2G	4.0G	5.1G	6.4G	8.0G
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950-959	199	259	299	339	419	699
Nuovo 971, 972	199	259	299	339	419	699
AST Ascentia	**2.1C**	**3.2G**	**4.0G**	**5.1G**	**6.4G**	**8.0G**
800N, 810N	199	259	299	339	419	699
COMPAQ	**2.1C**	**3.2G**	**4.0G**	**5.1G**	**6.4G**	**8.0G**
Contura 4/25	199	259	299	339	419	699
Contura 400-430	199	259	299	339	419	699
LTe 5000-5400	199	259	299	339	419	699
FUJITSU	**2.1C**	**3.2G**	**4.0G**	**5.1G**	**6.4G**	**8.0G**
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Monte Carlo	199	259	299	339	419	699
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750, C, CE, CS, P	199	259	299	339	419	699
755, C, CD, CE, CS	199	259	299	339	419	699
760, CD, E, EL, ELD	199	259	299	339	419	699
765, D, E, LD	199	259	299	339	419	699
770, 770E, 770X	199	259	299	339	419	699
NEC VERSA	**2.1C**	**3.2G**	**4.0G**	**5.1G**	**6.4G**	**8.0G**
E, M, P, V	199	259	299	339	419	699
S	199	259	299	339

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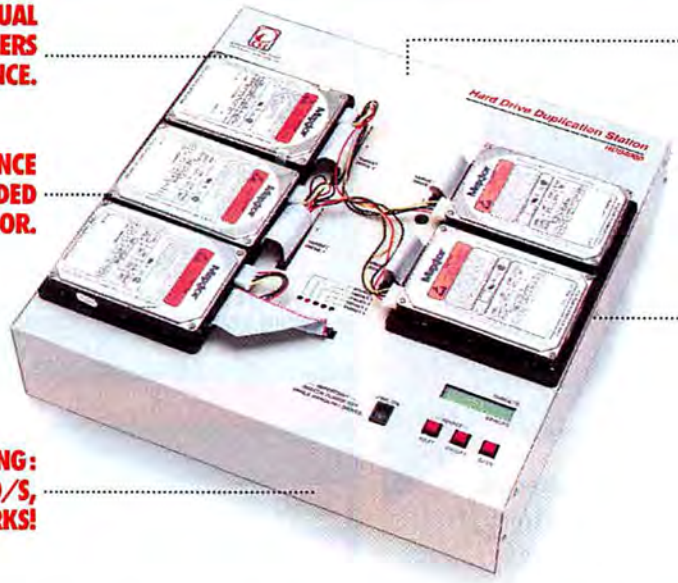

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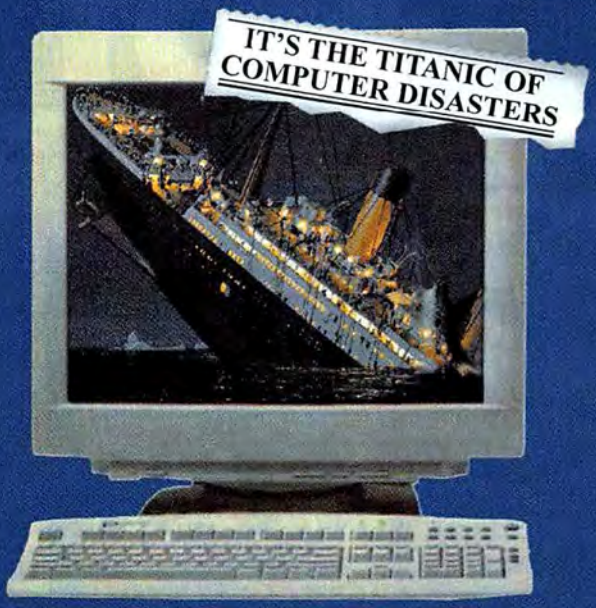

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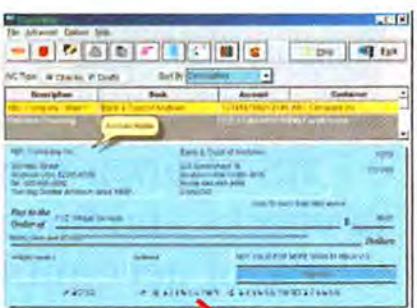

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954 Monitors and video boards
955 Accounting software
956 Graphics software
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It's the kind of thing good neighbors and good corporate citizens must do. We hope it helps and we hope you'll come out and take part when the Journey of Hope tour visits a city near you.

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Tiger 573 Form Factor: **AT** • CPU: **Socket 7** • Bus Speed: **Up to 75MHz** • On Board Video: **No** • On Board Audio: **YES** • PCI Slots: **4** • ISA Slots: **2** • Memory: **2DIMM/4SIMM** • Max Memory: **128/256 MB**

Tiger 571 Form Factor: **AT** • CPU: **Socket 7** • Bus Speed: **Up to 83 MHz** • On Board Video: **PCI 4MB** • On Board Audio: **YES** • PCI Slots: **4** • ISA Slots: **3** • Memory: **2DIMM/4SIMM** • Max Memory: **128/256 MB**

Tiger 598 Form Factor: **AT** • CPU: **Super Socket 7** • Bus Speed: **Up to 100MHz** • On Board Video: **AGP 8MB** • On Board Audio: **YES** • PCI Slots: **3** • ISA Slots: **2** • Memory: **3DIMM** • Max Memory: **768 MB**

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Tiger 6BE+ BX Form Factor: **ATX** • CPU: **Slot 1** • Bus Speed: **Up to 100MHz** • PCI Slots: **4** • ISA Slots: **3** • Memory: **3 DIMM Sockets** • Max Memory: **768 MB**

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Form Factor: **ATX** • CPU: **Socket 7** • Bus Speed: **Up to 100 MHz** • AGP Slots: **1** • PCI Slots: **5** • ISA Slots: **2** • Memory: **3DIMM Sockets** • Max Memory: **768MB**

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AT Slot 1 with 4 PCI/1 ISA

Micro ATX Slot 1 with 3 PCI/1 ISA

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Pre-Assembled Kits: Motherboard in dual-cooling fan case; keyboard, speakers, mouse,3D AGP video, 56KFlex faxmodem, 1.44MB floppy, 24X CD-ROM, Wave Table sound.

Tiger 767 Form Factor: **AT** • CPU: **Slot 1** • Bus Speed: **Up to 100 MHz** • On Board Video: **8MB AGP** • On Board Audio: **YES** • PCI Slots: **4** • ISA Slots: **1** • Memory: **DIMM** • Max Memory: **768 MB**
Tiger 760 Form Factor: **Micro AT X** • CPU: **Slot 1** • Bus Speed: **Up to 100MHz** • On Board Video: **8MB AGP** • On Board Audio: **YES** • PCI Slots: **3** • ISA Slots: **1** • Memory: **DIMM** • Max Memory: **768 MB**

MOTHERBOARD SPECIFICATIONS

Motherboard Design	Processors Supported
Tiger 571 AT including Wave Table sound and PCI video	**AMD** Up to K6-300 & K62-266 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR300
Tiger 573 AT including Wave Table sound	**AMD** Up to K6-300 **IBM/Cyrix** Up to PR300; **Intel** Pentium up to 233 MMX
Tiger 598 AT including 1MB Cache, Wave Table sound and PCI video	**AMD** Up to K6-3/400 Intel Pentium up to 233 MMX **IBM/Cyrix** Up to PR350
Tiger SS7 Super Socket 7 1MB Cache	All **AMD** Up to K62-400; Intel Pentium up to 233 MMX **IBM/Cyrix** up to MII 350
Tiger 767 AT Slot 1 with Sound & AGP video	**Celeron** up to 433MHz **Intel** Pentium II up to 500MHz
Tiger 760 Micro-ATX Slot 1 w/Sound & AGP video	**Celeron** up to 433MHz **Intel** Pentium II up to 500MHz
Tiger 6KE LX ATX Slot 1	**Celeron** up to 433MHz **Intel** Pentium II up to 333MHz
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BB1-C-2D	$129.99	$119.99	Unassembled—ATX case with 235-Watt power supply & Free Floppy Drive
BB1-E-5A	$149.99	$137.99	AT Case 200 W Power Supply
BB1-E-6A	$139.99	$128.99	Micro ATX Case 140W Supply
BB1-T-10A	$114.99	$99.99	Unassembled—ATX case with 235-Watt power supply & Free Floppy Drive
BB1-T-9A	$149.99	$139.99	Unassembled—ATX case with 235-Watt power supply & Free Floppy Drive

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Software, Lies, and Videotape

FORGET "WHERE DO YOU want to go today?" From now on, let's change the Microsoft slogan to "Things can happen with software." According to the *New York Times*, that's part of what Microsoft general counsel Bill Neukom said when the company mocked up a videotape "proving" that Windows 98 ran slower with Internet Explorer 4 removed, then was forced to admit the tape was bogus.

Neukom also said, "We make very good software, but we didn't make a very good videotape." He was half right.

That Microsoft can't be trusted may be news to the public, but it's not news to the industry or to those of us who've followed the company over the years. We've come to expect the company's cavalier attitude as part of our daily lives.

The list of broken promises and bogus claims is virtually endless. Microsoft's ship date pronouncements inspire industry snickers. The company asserts technological breakthroughs that never actually appear, and seems to equate "quality control" with "service packs." Then there are the black-is-white claims, such as IE 4's "integration" into Windows 95.

That Microsoft can't be trusted may be news to the public, but it's not news to the PC industry.

ARROGANCE MEETS IGNORANCE

THE COMPANY HIRES lots of smart, savvy workers, but The Microsoft Way often amounts to arrogance coupled with ignorance. Complain about a product that doesn't work right or assaults users with stupid design, and typical Microsofties will insist that you simply don't understand.

At Microsoft, where every problem is seen first as a matter of marketing, employees work harder to change *bugs* into *issues* than they do trying to fix the problems. True, Microsoft folks will on occasion admit that a product wasn't quite as wonderful as they initially would have had us believe. The occasion? The release of a new version that fixes (some of) its predecessor's shortcomings.

Where image is everything, truth takes a backseat. The company fights desperately to win glowing reviews and good press. On one occasion, a public relations flack for Microsoft tried to get an editor to kill a negative story I was writing about one of its products, then dropped veiled innuendos about how I wasn't always "objective" about the company. ("Objective," at Microsoft, means "positive.")

Microsofties tend to wield ignorance as a weapon. When the right answer to a question is "I don't know," what you often get instead is a half-educated guess. When Internet Explorer 4.0 junked the handy sortable history folder in favor of a brain-dead "easy-to-use" version, a top executive assured me I could still sort the folder the old way from Windows Explorer. It was a nice idea; it just happened to be untrue.

STUMBLING IN PUBLIC

IF THE PUBLIC DIDN'T realize it before, it's now abundantly clear that Microsoft keeps its partners and customers faithful out of fear, not love or trust. Even Compaq, one of the company's closest hardware partners, revealed in an internal memo that it feared Microsoft might retaliate if it favored Netscape's browser over IE.

As the trial winds down, the company's best remaining argument is based on fear of the unknown: How can punishing Microsoft be good for consumers? Well, who knows? There's only one item in a computer that hasn't seen a steady price decline in recent years—Windows.

The Microsoft party line is that it keeps improving Windows and adding new features. But it also takes features out, or hides them; in the Windows 98 upgrade, the fax software that came with Win 95 is almost impossible to find, and it's so clumsy some hardware vendors don't even bother to ship it. The "improvement" argument falls apart when you consider how much more you get for your money in virtually every aspect of hardware. Since the release of Windows 95, computing power per dollar has more than doubled. Does anybody seriously believe Windows 98 is twice as good as its similarly priced predecessor? How much worse could the unknown be?

"Things can happen with software." It's not just a slogan, it's an excuse. Seems perfect for a monopoly that shrugs with contempt for courts, competitors, collaborators, and customers.

PC World *Contributing Editor Stephen Manes has been writing about computers and their discontents for more than 15 years. He is coauthor of* Gates, *a biography of Microsoft's chairman.* ■

PHOTOGRAPH: ERIK BUTLER

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- Logitech First Mouse+ Wheel (PS/2v)
- Intel LANDesk® Client Manager
- ★ *Upgrade to a 6.4GB Ultra ATA Hard Drive, add $39.*
- ★ *Upgrade to a 17" (16.0" vis, .26dp) M780 Monitor, add $109.*

$999

Business Lease[15]: $33/Mo., 36 Mos.

E•VALUE CODE: 03620-590409

DELL DIMENSION DESKTOPS FOR HOME

Common features: Mini-Tower Model • 512KB Integrated L2 Cache (128KB on Intel Celeron Processor-Based Systems) • 3Com USR V.90[11] PCI Telephony WinModem with Trial Offer ConnectDirect™ Internet Access[14] • 3.5" Floppy Disk Drive • Two USB Ports • MS Works Suite 99 with Money 99 Basic • McAfee VirusScan • MS Windows 98 • 3-Year Limited Warranty[2] • 1-Year At-home[3] Service **Upgrades:** 3-Year At-home[3] Service, add $99 • HP DeskJet® 882c, add $299

NEW DELL DIMENSION XPS T500
PENTIUM III PROCESSOR AT 500MHz

- 128MB 100MHz SDRAM
- *NEW* 20.4GB[4] Ultra ATA Hard Drive
- 19" (18.0" vis) P990 Trinitron Monitor
- 16MB Diamond Viper TNT 3D AGP Graphics Card with STB PCI TV/FM Tuner
- 4.8X Max[10] Variable DVD-ROM Drive
- *NEW* Sony CD-RW Drive
- Turtle Beach Montego II Sound Card
- ACS-295 Speakers with Subwoofer
- 100MB Iomega Zip BUILT-IN Drive
- Dell QuietKey Keyboard
- MS IntelliMouse
- ***NEW* Power Game Pack**[22]

$2899

Personal Lease[16]: $108/Mo., 36 Mos.

E•VALUE CODE: 03620-500428

NEW DELL DIMENSION XPS T500
PENTIUM III PROCESSOR AT 500MHz

- 128MB 100MHz SDRAM
- *NEW* 13.6GB[4] Ultra ATA Hard Drive
- 17" (16.0" vis, .26dp) 1000HS Trinitron Monitor
- 16MB Diamond Viper TNT 3D AGP Graphics Card
- 4.8X Max[10] Variable DVD-ROM Drive
- Turtle Beach Montego A3D 64V Sound Card
- ACS-295 Speakers with Subwoofer
- MS Natural Keyboard Elite
- Logitech MouseMan Wheel
- ***NEW* Power Game Pack**[22]

$2299

Personal Lease[16]: $86/Mo., 36 Mos.

E•VALUE CODE: 03620-500422

NEW DELL DIMENSION XPS T450
PENTIUM III PROCESSOR AT 450MHz

- 128MB 100MHz SDRAM
- *NEW* 9.1GB[4] Ultra ATA Hard Drive
- 17" (16.0" vis, .26dp) M780 Monitor
- 8MB ATI XPERT 98D 3D AGP Graphics Card
- 40X Max[5] Variable CD-ROM Drive
- Turtle Beach Montego A3D 64V Sound Card
- harman/kardon HK-195 Speakers
- Dell QuietKey Keyboard
- Logitech MouseMan Wheel
- ***NEW* Power Game Pack**[22]

$1799

Personal Lease[16]: $68/Mo., 36 Mos.

E•VALUE CODE: 03620-500417

DELL DIMENSION V333c
INTEL CELERON PROCESSOR AT 333MHz

- 32MB SDRAM
- 4.3GB[4] Ultra ATA Hard Drive
- 15" (13.8" vis) 800F Monitor
- ATI 8MB 3D AGP Graphics
- 32X Max[6] Variable CD-ROM Drive
- Yamaha XG 64V Wavetable Sound
- harman/kardon HK-195 Speakers
- Dell QuietKey Keyboard
- Logitech First Mouse + Wheel
- ★ *Upgrade to 64MB SDRAM, add $49.*

$999

Personal Lease[16]: $39/Mo., 36 Mos.

E•VALUE CODE: 03620-500409

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- Publisher 98
- Outlook 98
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- Expedia Streets 98

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- Works 4.5a
- Works Calendar
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- Expedia Streets 98

Software Upgrades:

- Intuit QuickBooks 99, add $118
- MS Windows NT® Workstation 4.0, add $99.

DELL WORKSTATION

DELL PRECISION™ WORKSTATION 410
NEW PENTIUM III PROCESSOR AT 500MHz
(DUAL PROCESSOR/RAID CAPABLE)

- 128MB 100MHz ECC SDRAM
- 4GB[4] Ultra-2/LVD SCSI Hard Drive
- 19" (18.0" vis) P990 Trinitron Monitor
- Diamond 8MB AGP Graphics Card
- 40X Max[5] Variable CD-ROM Drive
- Sound Blaster Pro Compatible Sound
- Integrated 3Com 10/100 PCI NIC
- Remote Client Manageability Support via DMI 2.0; Wakeup on LAN Capable
- MS Windows NT Workstation 4.0 and 1-Year NT Telephone Support
- 3-Year Next-Business-Day On-site[3] Service
- 7x24 Dedicated Workstation Hardware Telephone and Online Technical Support
- ★ *Second Pentium III Processor at 500MHz, add $898.*

$3479

Business Lease[15]: $117/Mo., 36 Mos.

E•VALUE CODE: 03620-490434

DELL POWEREDGE® SERVERS

Standard features: 512KB Integrated L2 ECC Cache • Intel Pro/100+ PCI Ethernet Adapter • HP[5] OpenView™ NNM Special Edition • 32X Max[6] Variable CD-ROM Drive • 7x24 Dedicated Server Hardware Technical Telephone Support • 3-Year Next-Business-Day On-site[3] Service

DELL POWEREDGE 2300 SERVER
PENTIUM III PROCESSOR AT 500MHz
(RAID 5 CONFIGURATION)

- 128MB 100MHz ECC SDRAM
- Three 9GB[4] Ultra-2/LVD SCSI Hot-Swap SCSI Hard Drives
- Ultra-2/LVD PowerEdge Expandable RAID Controller 2 (Single-Channel)
- Integrated Ultra-2/LVD and Ultra/Narrow SCSI Controllers
- 6 Expansion Slots: 4 PCI, 2 PCI/ISA
- 6-1" Hard Drive Bays
- 4 Media Bays: 3-5.25" and 1-3.5"
- ★ *APC Smart-UPS 700W Power Supply, add $369.*

$5399

Business Lease[15]: $181/Mo., 36 Mos.

E•VALUE CODE: 03620-290453

NEW DELL POWEREDGE 1300 SERVER
PENTIUM II PROCESSOR AT 400MHz
(DUAL PROCESSOR/RAID CAPABLE)

- 64MB 100MHz ECC SDRAM
- 4GB[4] Ultra-2/LVD SCSI Hard Drive
- Integrated PCI Ultra-2/LVD SCSI Controller
- 6 Expansion Slots: 5 PCI, 1 PCI/ISA
- 4 Hard Drive Bays: 2-1.6" and 2-1.0"
- 3-5.25" Media Bays
- ★ *Microsoft Windows NT Server 4.0 (10 Client Access Licenses), add $799.*
- ★ *12/24GB Variable SCSI DAT Tape Backup Unit, add $749.*
- ★ *Upgrade to 128MB 100MHz ECC SDRAM, add $129.*

$1849

Business Lease[15]: $62/Mo., 36 Mos.

E•VALUE CODE: 03620-290418

DELL INSPIRON™ NOTEBOOKS

Common features: 3D Surround Sound with Wavetable • Lithium Ion Battery • Touchpad • 3-Year Limited Warranty[2] • Microsoft Windows 98 **Upgrades:** 3-Year Next-Business-Day On-site[3] Service, add $99 • Second Lithium Ion Battery, add $119 • Internal 56K Capable[11] V.90 Fax Modem, add $59 • Deluxe Nylon Case, add $49 • APC Notebook SurgeArrest Pnote Pro, add $29

NEW DELL INSPIRON 7000 A366LT
PENTIUM II PROCESSOR AT 366MHz

All-in-One Multimedia Performance

- 15" XGA Active Matrix Display
- 128MB SDRAM (384MB Max[13])
- 6.4GB[4] Ultra ATA Hard Drive
- Removable Combo 4X[10] DVD-ROM and Floppy Drive
- 2X AGP 8MB ATI RAGE™ LT Pro 3D Video
- MS Office 97 Small Business Edition (Ask about Our *FREE* MS Office 2000 Upgrade Offer)
- APC Notebook Surge Protector

$3599

Business Lease[15]: $121/Mo., 36 Mos.

E•VALUE CODE: 03620-890435

DELL INSPIRON 7000 A300LT
PENTIUM II PROCESSOR AT 300PE MHz

All-in-One Multimedia Performance

- 15" XGA Active Matrix Display
- 32MB SDRAM (384MB Max[13])
- 4GB[4] Ultra ATA Hard Drive
- Removable Combo 24X Max[7] Variable CD-ROM and Floppy Drive
- 2X AGP 4MB ATI RAGE LT Pro 3D Video
- MS Office 97 Small Business Edition (Ask about Our *FREE* MS Office 2000 Upgrade Offer)

$2399

Business Lease[15]: $80/Mo., 36 Mos.

E•VALUE CODE: 03620-890423

NEW DELL INSPIRON 3500 A300GT
PENTIUM II PROCESSOR AT 300PE MHz

Light Weight, Light Price

- 14.1" XGA Active Matrix Display
- 32MB SDRAM (256MB Max)
- 4.3GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM
- Modular Floppy Drive
- NeoMagic® 256AV AGP Video
- Internal 56K Capable[11] V.90 Fax Modem with Trial Offer ConnectDirect Internet Access[14]
- MS Office 97 Small Business Edition (Ask about Our *FREE* MS Office 2000 Upgrade Offer)

$2199

Business Lease[15]: $72/Mo., 36 Mos.

E•VALUE CODE: 03620-890421

DELL INSPIRON 3500 C300XT
INTEL CELERON PROCESSOR AT 300MHz

Light Weight, Light Price

- 13.3" XGA Active Matrix Display
- 32MB SDRAM (256MB Max)
- 3.2GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM
- Modular Floppy Drive
- NeoMagic 256AV AGP Video
- Microsoft Works Suite 99 with Money 99 Basic
- ★ *3-Year Next-Business-Day On-site[3] Service, add $99.*

$1799

Business Lease[15]: $60/Mo., 36 Mos.

E•VALUE CODE: 03620-890417

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PENTIUM® III PROCESSOR AT 500MHz

- 128MB 100MHz SDRAM
- 512KB Integrated L2 Cache
- NEW 9.1GB[4] Ultra ATA Hard Drive (7200 RPM)
- 17" (16.0" viewable, .26dp) M780 Monitor
- 8MB ATI XPERT 98D 3D AGP Graphics Card
- 40X Max® Variable CD-ROM Drive
- Yamaha XG 64V Wavetable Sound
- harman/kardon HK-195 Speakers
- 100MB Iomega Zip BUILT-IN Drive
- MS® Office 97 Small Business Edition with Bookshelf Basics 99 (Ask about Our *FREE* MS Office 2000 Upgrade Offer); McAfee VirusScan
- MS Windows® 98
- Dell QuietKey® Keyboard
- MS IntelliMouse®
- 3-Year Limited Warranty[2]
- 1-Year Next-Business-Day On-site[3] Service

★ *Upgrade to a Sony CD-RW Drive, add $80.*

★ *3Com® USRobotics V.90[11] PCI Telephony WinModem, add $49.*

$1999

Business Lease[14]: $67/Mo., 36 Mos.

E•VALUE CODE: 03618-590419

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