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MARCH 1998

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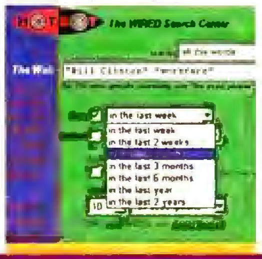

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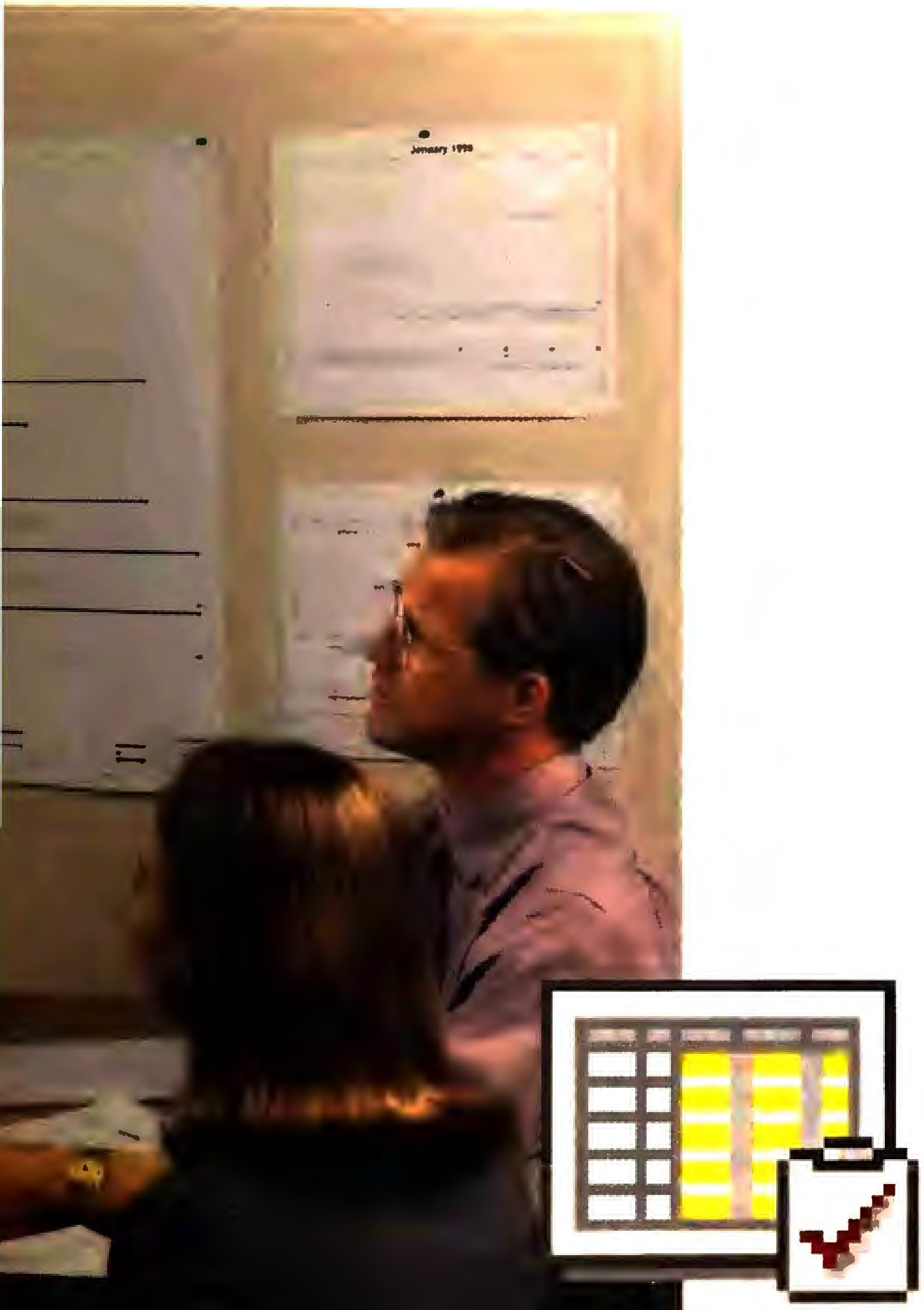

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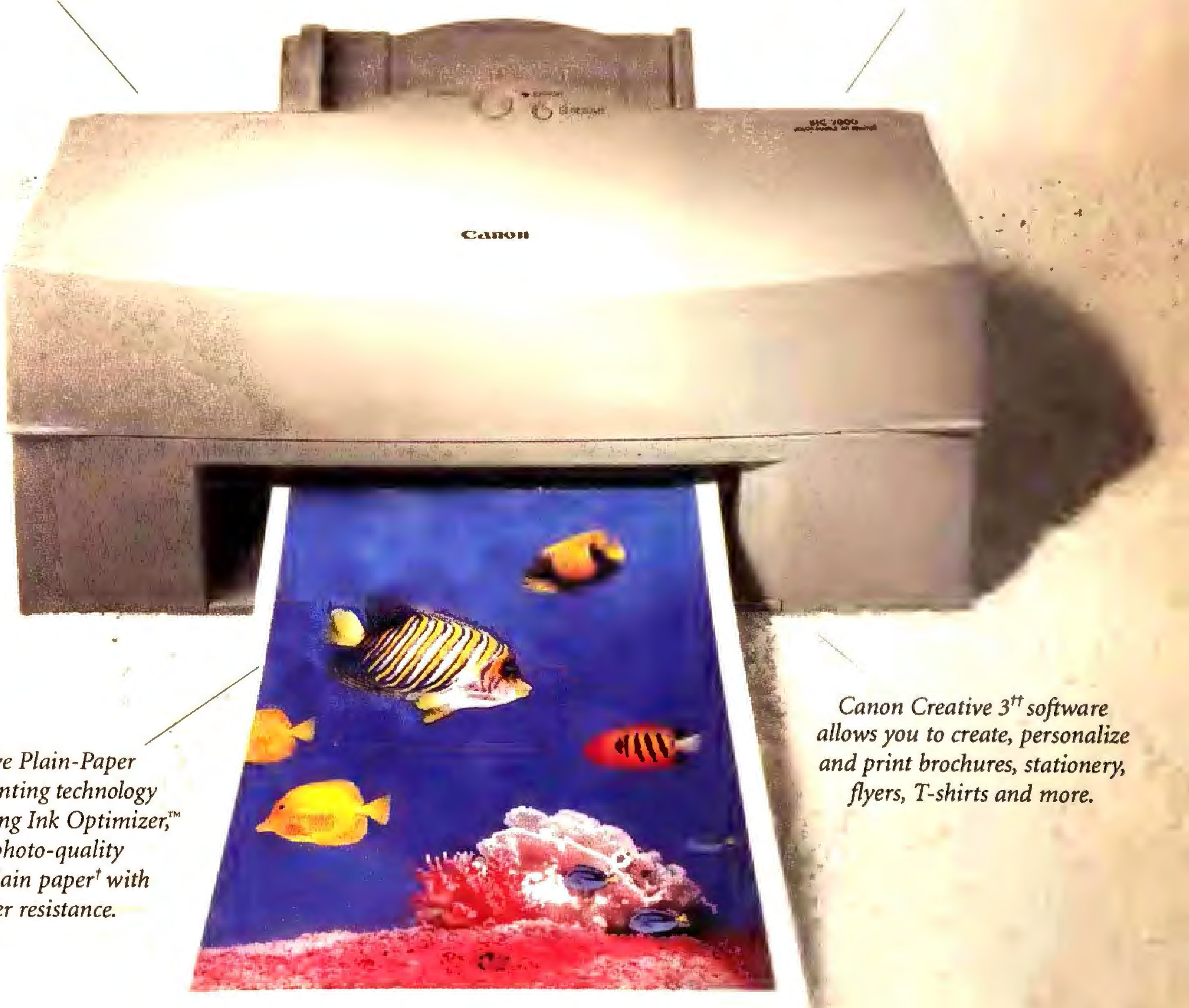
The BJC-7000's unique dual printhead design has more than 1,000 nozzles for enhanced detail, smoother color gradation and crisp, sharp text.



Our exclusive Plain-Paper Optimized Printing technology (P-POP), featuring Ink Optimizer,™ gives true photo-quality printing on plain paper† with 100% water resistance.

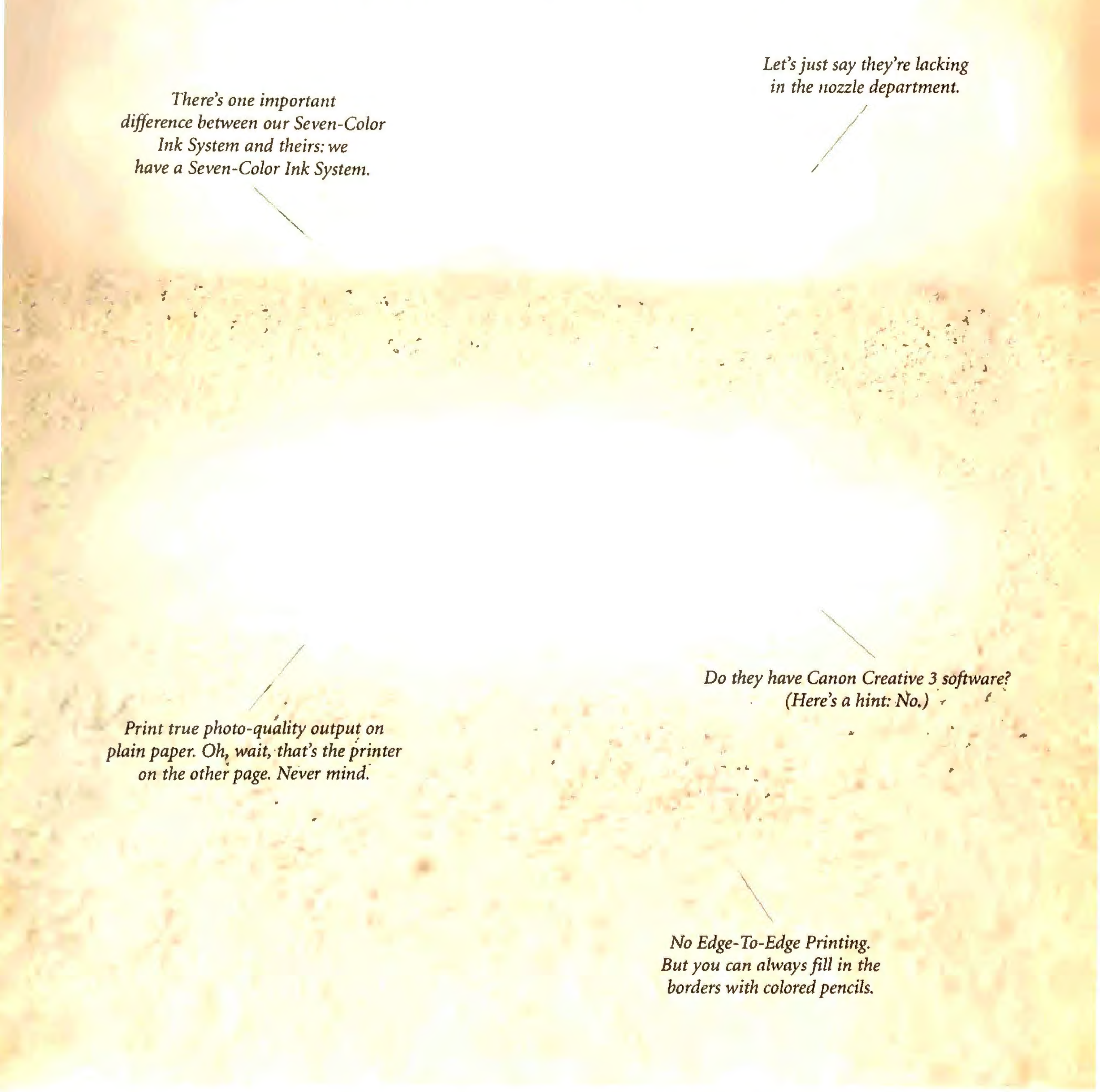
Canon Creative 3†† software allows you to create, personalize and print brochures, stationery, flyers, T-shirts and more.

Imagine printing to the edge of an 8-1/2" x 11" page. While not shown here, our exclusive Edge-To-Edge Printing and optional LetterPlus paper make it easy.

We have something they don't. The Canon BJC-7000 Color Bubble Jet™ printer has arrived. Featuring our exclusive Seven-Color Ink System, it sets a new industry standard in photo-realistic color printing. By mixing seven inks, we've achieved colors unprecedented in range, depth and richness, for image quality that matches that of a real photograph. And with Plain-Paper Optimized Printing™ (P-POP™), the BJC-7000 can print these incredible

†Output shown printed on Canon HR-101 paper, sold separately. ††Software designed for use with Windows® 95, and available on CD-ROM only *Manufacturer's suggested retail price Dealer prices may vary ©1997 Canon Computer

Their new 7-color printer.



There's one important difference between our Seven-Color Ink System and theirs: we have a Seven-Color Ink System.

Let's just say they're lacking in the nozzle department.

Print true photo-quality output on plain paper. Oh, wait, that's the printer on the other page. Never mind.

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No Edge-To-Edge Printing. But you can always fill in the borders with colored pencils.

images on plain paper, with 100% water resistance. You won't find all of these features in any other ink jet printer. As for the price, at $449,* we'd ask you to compare it to the other printers in its class. But that's impossible. To get more information or to locate a Canon dealer in your area, visit our Web site at www.ccsi.canon.com or call us at 1-800-848-4123.

See what we mean:™

Canon

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MARCH

VOLUME 16 ◆ NUMBER 3

COVER STORY

116 WINDOWS 95 HEADACHES (AND HOW TO CURE THEM)

online Face it—Windows 95 can be a pain. But we have just the right medicine, with tips to counter infuriating installations, slow start-ups, sloppy shutdowns, and lots of annoyances in between.

FEATURES

135 A GIG IN YOUR POCKET

REVIEW Want to lock up lots of data or haul huge files between home and office? These days, Zip drives are just one of a wide range of removable-media drives that hold up to 1.5GB per cartridge. We tested 12 models and picked two quick, compact Best Buys.

156 WEB SEARCHING: FASTER, *FASTER!*

online **HOW-TO** *Aaargh!* That's the sound of millions of people trying to find what they need on the Internet. We rate the search sites, take you step-by-step through shortcuts, reveal the secrets of professional cybersearchers, and more.

189 VIRUS KILLERS 1998

REVIEW Macro viruses are on the rise as the latest electronic threat to your system. *PC World* comes to the rescue with our pick of the best of eight antivirus packages.

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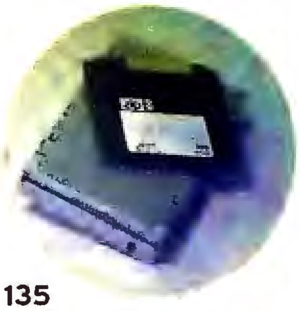

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207 RENT AN OFFICE ON THE WEB

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Intel 166MHz Pentium processor with MMX technology
256KB L2 pipeline burst cache
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2.1GB hard drive
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Powerdigm Xsu
September 1997

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Intel EtherExpress™ Pro 100 NIC
12X SCSI-2 CD-ROM drive
10 drive bays: 4 external 5.25"/1 external 3.5"/
2 internal 5.25"/3 internal 3.5"
Intel LANDesk® Server Manager v.2.8
Dedicated server technical support, 7x24
5-year/3-year Micron Power℠ limited warranty
1-year next-business-day on-site service*

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2GB Ultra-Wide SCSI-3 hard drive
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Bus. Lease $85/mo.

NetFRAME LV2000

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32MB ECC SDRAM
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Microsoft® Windows NT® Server 4.0 (10-user license)
NOS Support (3 incident resolutions/1st year), 7x24

$3,499
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*On-site service for the NetFRAME servers is provided by Digital Equipment Corporation and is optional.

NetFRAME MV5000 SERIES

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Memory: ECC EDO or SDRAM option
9 expansion slots: 6 PCI, 2 ISA, 1 shared ISA/PCI
Dual integrated Symbios Ultra-Wide SCSI-3 controllers
Intel EtherExpress Pro 100 NIC
Embedded RAID Upgrade option
I₂0 ready via embedded Intel i960-RD
5 Internal, hot-pluggable, hard drive array bays
(Upgradable to 10)
1 (one) 360 watt hot-pluggable power supply standard
(Upgradable to 3 for added redundancy)
Rack Adapter Option
Intel LANDesk Server Manager v.2.8
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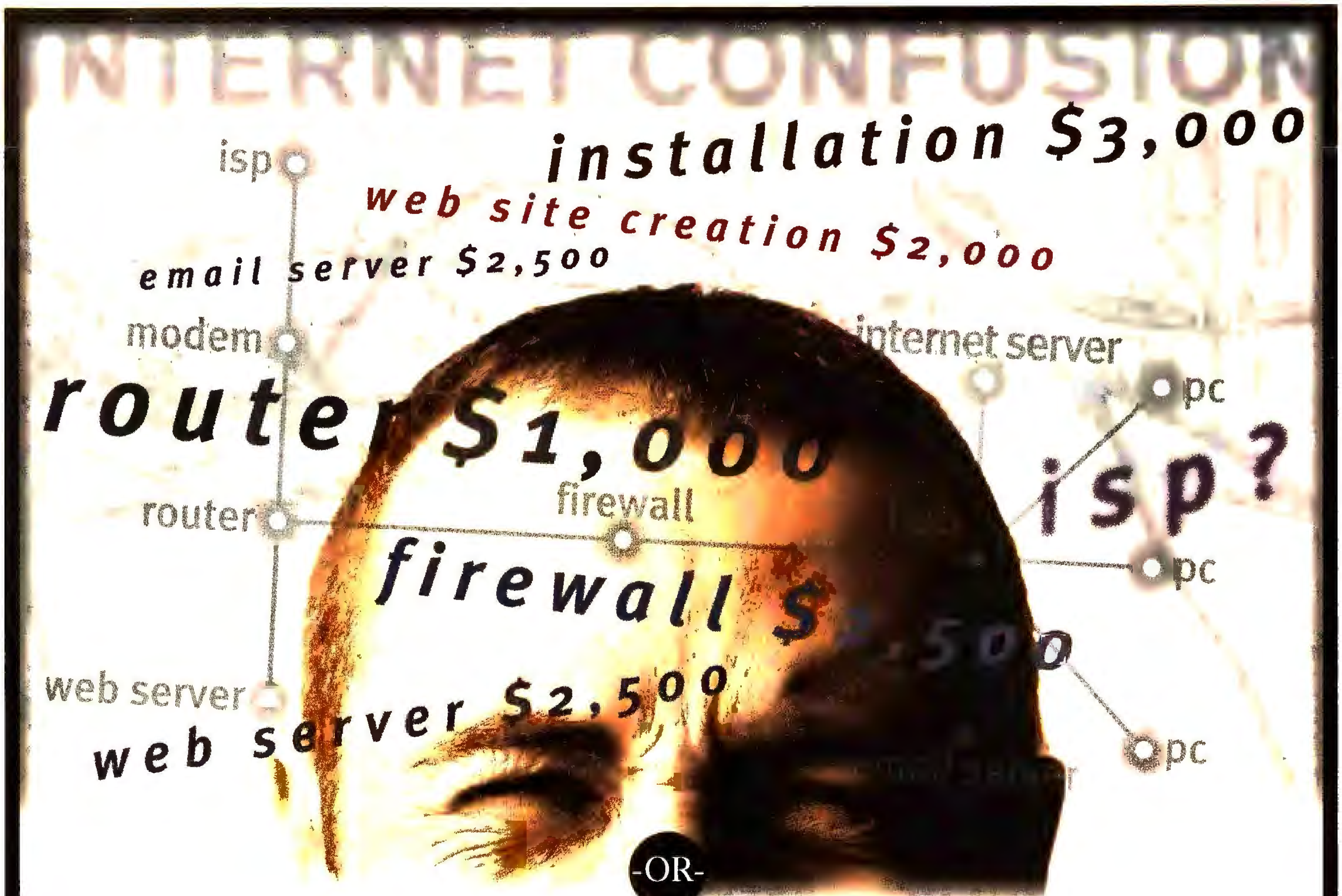

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Windows—and Bugs—Everywhere

A COLLECTIVE HOWL went up from most people I know who bought a PC or software this past holiday season. One person reported that to get his kids' games running on his Gateway PC, he had to reinstall Windows 95, and to do that, he had to reformat the hard disk. Another poor fool spent two precious vacation days getting a new SCSI-based scanner up and running. Myself? I drummed my fingers impatiently as I installed solitaire and baseball games on a couple of family members' machines, awed once more at the complexity and time an installation takes even when nothing catastrophic goes wrong.

PC hardware and software problems are so common that we've come to accept them as normal. Windows 95 is the single biggest culprit. Internet Explorer 4.0 gets the nod as Buggiest Product of the Year, with Netscape Communicator running a close second. Last year's batch of major office application suites was crawling with bugs. Even the latest version (3.0) of Norton Utilities, which is supposed to prevent and fix problems, trashed Zip disks.

Short of refusing to buy buggy products and loudly registering complaints, we often have little choice but to put up with shoddiness in PC products. Who in their right mind would tolerate these sorts of problems with cars, TVs, or telephones? Yet that may be exactly what's in store for us as hardware and software companies look for new markets.

We now put up with **PC problems** as **normal.** That may be just what's **in store for** us with TVs, cars, and phones.

"GET SMART" REVISITED

IT HAS ALREADY STARTED. Companies are now selling little gizmos that attach to your phone, not to your PC, and switch calls from the phone network to the Internet to save you money. Sounds straightforward, right? It took our testers 6 to 12 tries before they made successful cross-country connections (see *Top of the News*). When they finally did connect, the voice quality was appalling. What's worse, they could call only each other because these devices don't work with regular phones. This is progress?

And there's more to come. In early January Tele-Communications Inc. signed deals with both Microsoft and Sun Microsystems for software that will run on millions of digital set-top boxes for interactive TV. Expected to be available early next year (we PC users know what that really means), these boxes will run Windows CE and PersonalJava. They'll deliver more channels than you could ever watch, high-speed Internet access, Web content for TV shows, interactive advertising, programming guides, and other new services. Sounds great, right? Probably, if you like futzing with your TV more than watching it. And you think your cable company is unresponsive and overcharges you now? Just wait until you try reaching tech support because your Windows CE box crashed in the middle of *Monday Night Football.*

COMEDY OF ERRORS

IT GETS WORSE. In early January both Microsoft and Intel unveiled grand plans to put PCs in our cars. Microsoft's AutoPC, a small, voice-activated computer running Windows CE, will attach to a dashboard and talk back to you. This scaled-down PC will give you directions, let you access e-mail, play the radio and music CDs (what? no Mortal Kombat as you battle traffic?), and store addresses and phone numbers, but it won't let you browse the Web. Clarion, a car audio manufacturer, says it will ship its version of the AutoPC by June for about $1300.

Not to be outdone, Intel announced its Connected Car PC. The dashboard unit of this PC will talk to you too, issuing directions, traffic reports, news, and stock quotes and giving you voice access to e-mail. A second unit will let passengers browse the Web, play games, watch videos, and dash off memos. Slated to be out next year, Connected Car PCs will cost between $1000 and $2500, depending on options.

Combine vehicles moving at 65 miles an hour with drivers sending and receiving e-mail, and we're talking about a whole new scale of crashing. No thanks—not until PC problems are the exception rather than the rule.

Cathryn Baskin is editor in chief of PC World. ■

PHOTOGRAPH ERIK BUTLER

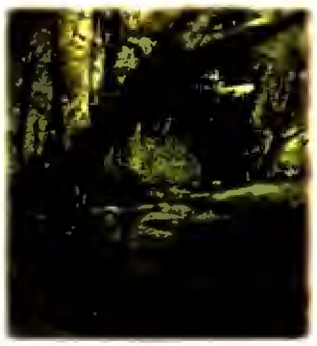
$10,000 for Your Thoughts

WE NEED YOUR HELP. We encourage all readers to take a moment to fill out our online survey. The information you provide will help us continue to produce a magazine that meets your needs and interests. As a thank-you for completing our survey, we offer you a chance to win a $10,000 grand prize—and great biweekly prizes, too. So if you don't win the first time, come back and try again. Just visit our Web site at www.pcworld.com/sweeps.

For complete rules and an alternate method of entry, see our sweepstakes ad on page 350. Thanks for your help—and good luck!

POLITICALLY CORRECT IN THE 90'S:

SAVE THE WHALES.



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Whether it's $349[1] for the 15" (13.9" VIS) DX15T or $699[1] for the 17" (16.0" VIS) DX700T, you save big over what you'd pay for a comparable Trinitron® monitor by Sony. And at $799[1], you save even more on the 17" (16.0" VIS) DX715T with its DIAMONDTRON™ CRT.

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PC MAGAZINE BEST OF 1996
DX700T

PC MAGAZINE EDITORS' CHOICE
DX700T
10/96

PC WORLD TOP 10 MONITORS
DX15T
8/96
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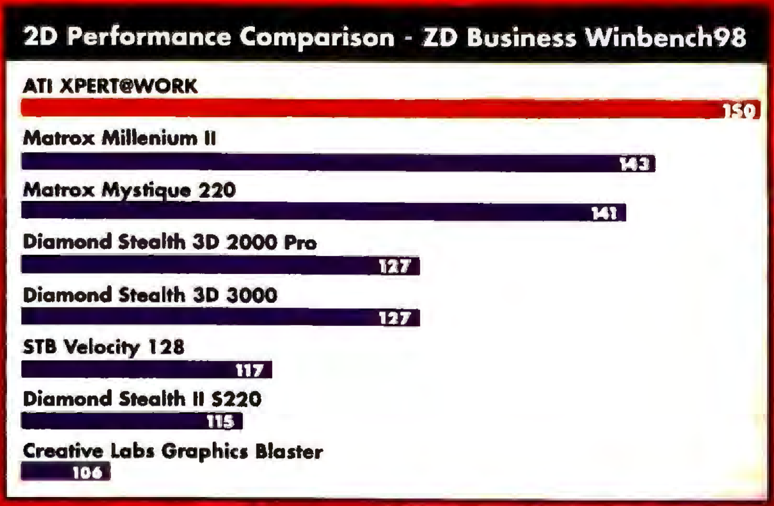
2D Performance Comparison - ZD Business Winbench98
ATI XPERT@WORK
150
Matrox Millenium II
143
Matrox Mystique 220
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Diamond Stealth 3D 2000 Pro
127
Diamond Stealth 3D 3000
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STB Velocity 128
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Diamond Stealth II S220
115
Creative Labs Graphics Blaster
106

YOUR TAKE ON: AGP graphics cards ◆ An OS for autos? ◆ Editing the Registry

WEB ADS THAT WON'T GO AWAY

YOUR ARTICLE ABOUT commercials on the Web struck a nerve [*Top of the News*, December]. The Web is more personal than television because it is more interactive, so ads that we might find mildly annoying on television become outright intrusive on the Net.

At one otherwise excellent Web site, the cost of visiting is that you must tolerate a so-called Petry ad. This is a small window that opens up every minute or so showing a banner. It forces you to stop everything because there is no way to avoid it.

If you minimize it, it pops back up shortly. If you close it, it comes back. It also slows down your system's performance. You have to notice it whether you like it or not.

In the end, the only way I could stop seeing the ads was to stop visiting the site.

Shawn R. Ahmed, Bedford, Nova Scotia

ONLINE AUCTIONS

DANIEL EMMANUEL SAYS that he was deceived in an online purchase [*Letters*, December]. I wonder if he paid by credit card. *That* is the key to buying sight unseen. When we purchase by credit card, we have the right to dispute any posted charges and not pay those that are based on fraud or deceit.

I have participated in a Web auction and found that the notebook I bid on and bought was exactly as advertised on the auction's Web site. We need to remember that what we find on the street is also what we find online.

Wes Johnson, Island Lake, Illinois

MORE ON 3D GRAPHICS CARDS

REGARDING THE EDITOR'S response to a reader asking about 3D graphics boards [*Letters*, December]: Perhaps the most important element in your review criteria should be the number of software titles written to a board's specs. If only a few take advantage of the board's 3D features, there's little benefit over a good 2D board.

Joel C. Don, Irvine, California

Editor's response: Interesting point. But most gamers want quality, not quantity–lots of software titles doesn't mean a board will produce the best images or performance. Moreover, we're seeing a new trend, with boards supporting only standards like Direct 3D so software developers don't need to write custom drivers. But we'll consider your suggestion as we update our graphics board tests for an upcoming issue. –**Tracey Capen** ▶

HOT BUTTON

DVD Versus Divx: Will the Real Grinch Please Stand Up?

PHIL LEMMONS LAMENTS the dearth of DVD-ROM media by a conspiracy among Hollywood lawyers, and even some electronics chains and media giants ["Will the Grinch Steal DVD?" *Up Front*, December]. DVD is but one of many immature technologies–like 56-kilobits-per-second modems and Accelerated Graphics Port–that were sprung on customers before being thought out.

The real villains in this scenario are not Hollywood lawyers or electronics chains but the chief protagonists: Matsushita, NEC, Philips, Sony, and Toshiba. Facing flat consumer-electronics sales, these companies have, with little success, been casting about for other ways to separate us from our money. Enter DVD, successor to 3DO, CDV, DiscoVision, and CD-Interactive, which were all introduced with similar fanfare but then vanished, unlamented, into the sunset.

Bruce Raphael
Framingham, Massachusetts

ILLUSTRATION: JOE CIARDIELLO

DIVX, THE PURPORTED THREAT to DVD, is not a new format–it simply builds on DVD. You'll still be able to play DVD media on a Divx player; DVD movies will continue to be made; and if you have a new DVD player, you'll still be able to use it.

Divx advantages: For less than $5, you can take a Divx disc home and view it for 48 hours, with no return afterward. You can rent it again for $3 at any time, or even buy the movie, without ever having to go back to the store.

Steven Anderson, Fort Worth, Texas

FROM A COST-BENEFIT standpoint, $5 for a single viewing of a Divx movie is a "rotten deal" (as your editorial puts it) compared with $20 for lifetime use only if you would have paid to see the movie on five separate occasions. Other than children's tapes, most videos are rented for this very reason.

Andrew T. Long, Brooklyn, New York

I CANNOT SEE HOW Phil Lemmons concludes that one studio's boycotting the DVD medium prevents millions of consumers from buying into it. Isn't it more likely people are awaiting either the long-promised recordable DVD or a critical mass in titles offered–or both? Neither CDs nor VCRs took the world by storm in six months; they matured over a few years. Consumers and publishers need to grow the new medium together.

Jeff Sikman, Toronto

Editor's response: We appreciate the comments. Regarding various assertions: DVD is no mere electronics industry scheme but a breakthrough in data storage capacity that will improve consumers' experience of entertainment as much as VCRs did. And Divx is indeed a new format: Divx discs won't play in DVD players. Consumers are also being made to pay for a copy protection technology that degrades image quality. Divx requires a phone jack near the player, adding expense and inconvenience. And Divx erodes privacy, essentially installing a ticket agent and market researcher that checks your viewing preferences in your home at your expense. It will be a great shame if Divx undermines a major advance like DVD. –**Phil Lemmons**

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NOW YOU TELL ME!

LAST MONTH I bought a new PC, thanks to your November article ["Can't-Miss Upgrades"]. My old 80-MHz 486 had fallen way below the power curve. I plunked down almost $2000 for a brand-new Pentium II-266 with a 440LX board and an Accelerated Graphics Port card.

Then I received your December issue featuring "AGP Graphics: A Bumpy Ride." The thumping you hear is the sound of my head repeatedly impacting my desktop. I had no idea that to use the AGP bus, the graphics card needs more than just to plug into the AGP slot on the motherboard. I would have loved to know whether my graphics board supported texturing. Worse, I had no idea Intel was redesigning the AGP bus and planned to render the current 440LX motherboard obsolete so soon. Thump, thump.

Michael Babischkin
Coral Springs, Florida

Editor's response: As we reported in October's *Top of the News*, our initial tests showed no performance difference between AGP and PCI boards. The December test results confirmed those findings. We recommend that you upgrade to a fully compatible AGP graphics card. Contact the system vendor—you may be able to swap out the card for the price of an upgrade. Failing that, save for a new graphics card down the road, when more AGP-optimized software is released. Such a card will provide better 3D performance than anything currently available. As for PCs with a 100-MHz system bus and 4X AGP, we doubt these will sell in the $2000 range until next year. Our conclusion: A PII PC with an AGP bus slot provides ample investment protection. –**Michael Desmond**

WINDOWS CE, A CAR'S OS?

IN YOUR STORY "Changing Channels: Will the Internet Become TV?" [November], experts claim that in a decade the Internet will revolutionize the way we use computers, TVs, phones, and cars. Most amusing is that Microsoft wants variations of Windows CE to be the "brains" of these devices.

I already deal with crashes of applications and operating systems much too frequently. I don't think I want to call ▶

technical support when my TV, my phone, and especially my car crash (yes, the double meaning is intended).

C. Gnech, Harrisburg, Pennsylvania

LEFT HAND, RIGHT HAND

THANKS TO *PC World* for demonstrating once again that the left hand doesn't always know what the right is doing. Steve Bass [*Home Office*, November] professed not knowing anyone crazy enough to even think of monkeying around with the Registry using Windows 95's RegEdit. Steve, meet fellow columnist Scott Spanbauer of *Answer Line*, who in the same issue told *PC World's* entire circulation how to delete Registry entries using RegEdit.

Earnest Deeds, Northridge, California

TIMELY HELP

HERE'S HOW USEFUL your publication is: My boss wanted me to price software for creating Gantt charts for project planning. We were shocked at the prices of these applications but thought we had no alternative. Not a day later came *PC World* with a detailed explanation of how to create Gantt charts using Excel [*Spreadsheets*, December]. We were able to start planning sooner—and saved money, too.

William C. Asbury Jr.
Richmond, Virginia

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

CORRECTIONS & CLARIFICATIONS

IN JANUARY'S "Winning the Web Server Wars," the chart on page 214 did not show the broad range of applications supported by O'Reilly & Associates' WebSite Professional. For full information on the new version 2.1, visit the company's Web site (www.ora.com).

In January's "ISPs You Can Count On," we incorrectly stated that EarthLink Network charges $4.95 extra for 56-kbps modem access. In areas where EarthLink offers a 56-kbps access number, it's free. If you live in an area without a local 56-kbps number, the fee for using the nationwide toll-free number is $24.95 per month for 5 hours, plus $4.95 for each additional hour.

PC World regrets the errors.

IT LOOKS LIKE A PC.
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(OK, ENOUGH ABOUT
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A WHOLE N
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Look Before You Lease

Leasing a PC might keep you on top of technology. But you could pay dearly for the convenience.

IT'S EVERY COMPUTER buyer's frustration: You pay $3000 for a new PC in January, only to discover in horror that it's already yesterday's technology by May. Even if you've still got plenty of room on the hard drive, and even if you can still run all the latest software, it's hard not to feel just a little bit put out by the speed at which PC technologies are introduced. No matter how hard you may have been trying, there's been no way to stay ahead of the game.

Until now, that is. Last fall Dell Computer began offering a lease option for consumers. Just select a machine from one of three Dell lines (Dimension desktop systems, Inspiron and Latitude LM notebooks), and with credit approval you can lease your new equipment for 24 months. The payments are low, and at the end of the lease you can either trade in your old workhorse for a newer model or purchase the leased PC for fair market value. (Dell uses the Orion Computer Blue Book, which is similar to the Kelley Blue Book for cars.)

The concept sounds pretty good—at first. When the announcement originally went out over the wire, in fact, several friends (including some pretty savvy computer magazine editors I know) contemplated taking Dell up on its offer. Low monthly payments and new technology every two years—that's not a bad combination.

But then they started crunching the numbers. It didn't take long before Dell's great deal had lost its appeal for them.

Consider this: A Dell Dimension XPS D300 fully equipped with 64MB of RAM, an 8.4GB hard disk, and a 14X–32X CD-ROM drive sold for $3399 (plus about $80 in shipping fees) at press time. With Dell's new lease option, you pay $151 a month for 24 months. At the end of the lease period, you've shelled out $3624 and have nothing but a full hard drive to show for it—unless you pay another $510 for purchase, bringing the total price to $4134, plus shipping. (See "Leasing PCs: Convenience at a Price.")

PAY NOW, BUY LATER

DELL SPOKESPERSON T. R. Reid acknowledges that the lease option isn't a good deal from a strictly financial perspective. "For someone looking at straight economics, there's no question that it's less expensive to buy than it is to lease," says Reid. Dell's lease, he explains, "is appealing to folks with different priorities"—specifically a desire both for lower up-front cash payments and for the ability to stay abreast of technological advances in computing.

Let's take each of these concerns in order and compare them with other available options.

Low initial cash outlay. With the Dell lease, consumers are required to make the first and last months' payment up front, then continue making timely payments for the remaining 22 months. In the case of the XPS D300 I referred to earlier, the initial outlay would be just $302 (excluding shipping and handling). Not bad, considering you'd have a state-of-the-art computer on your desktop. But a lease isn't the only way to get a new PC without spending a lot of money up front. Credit cards offer many of ▶

ILLUSTRATION GORDON STUDER

the same advantages as leases—and used wisely, they wind up being a more cost-effective alternative.

For comparison, we'll look at three different credit cards: Card number one has an annual interest rate of 19.9 percent, card number two has a 15.9 percent rate, and card number three has a 5.9 percent rate (a few credit cards do offer such a low interest rate for an indefinite period). As with the Dell lease, we'll compare payments for 24 months—after which time the initial purchase would be paid off. Remember, the cash price of the Dell system is $3399.

> Is **leasing** convenient? You bet. But most consumers—even **frequent upgraders**—are still better off **buying** a computer outright.

- *Card number one*: At 19.9 percent interest, buying the computer would cost you $172.83 a month for two years. Total cost, with interest, would be $4147.89—roughly $750 more than the original price but about the same as leasing the PC and buying it when the lease expires.
- *Card number two*: At 15.9 percent interest, your payments drop to $166.26 a month—slightly more than you'd be paying with the lease. The advantage: At the end of the 24 months, the computer is yours to keep, at a total price of $3990.32.
- *Card number three*: At 5.9 percent interest, you pay just $150.49 a month (slightly *less* than the lease payment). At the end of two years you will have shelled out $3611.82—again, slightly less than Dell's $3624 leasing cost.

So two of the three credit card options are pretty competitive on a month-to-month basis with Dell's lease. Credit cards offer one other important advantage: At the end of two years, you *own* the computer.

There are a few caveats, of course. Not everyone has $3400 available on a credit card (though Dell does allow consumers to split the cost between two cards). Another concern is that you may be very tempted to make just the minimum payment on a credit card, no matter how many times you swear to follow a set payment plan. When that happens, the calculated costs go out the window—and the higher your card's interest rate, the more you'll end up paying for the computer.

The obsolescence factor. The other big selling point of Dell's lease option is the hedge that it provides against early equipment obsolescence. At the end of the 24-month lease period, consumers have several choices: They can buy the PC outright, return it to Dell, or exchange it for a new PC and a new lease. Dell simplifies the transition by giving customers a 30-day grace period to transfer files and ▶

Leasing PCs: Convenience at a Price

IN MOST CASES, buying via credit card is cheaper than leasing—provided you make regular payments each month to complete the purchase in two years.

PENTIUM II-300	Dell lease	Credit card at 5.9% interest	Credit card at 15.9% interest	Credit card at 19.9% interest
System price[1]	$3399	$3399	$3399	$3399
Monthly payment	$151	$150.49	$166.26	$172.83
Total payments	$3624	$3611.82	$3990.32	$4147.89
Estimated purchase price after lease expires[2]	$510	n/a	n/a	n/a
Total cash outlay	$4134	$3611.82	$3990.32	$4147.89

n/a = not applicable

[1] Reference system is a Pentium II-300 with 64MB of RAM, an 8.4GB hard drive, a 14X-32X CD-ROM drive, a 17-inch monitor, a 56-kbps modem, and an internal Iomega Zip drive.

[2] Based on Orion Research projection on what computer would be worth.

COMING UP

IN APRIL

ONLINE AND FREE

We've uncovered the best online sources of free software for both business and fun. From dynamite utilities to Web sites that offer trial software to check out, the price is always right.

PC REPAIR CONSUMER ALERT

Is your PC repair or service shop ripping you off? We went undercover to see if repair shops correctly diagnose and repair simple-to-fix problems—plus tips to avoid being taken for a ride.

A WEB PAGE OF YOUR OWN

You don't need Java-scripting classes or a pricey Webmaster to get your own professional-looking Web site. We tested Web authoring tools—from the free to the pricey—and picked the best.

SUB-$1000 19-INCH SCREENS

A large monitor can save you scads of extra scrolling around, but a 21-inch screen can cost as much as $2000. We found a bevy of new 19-inch monitors priced well under a grand.

ALSO NEXT MONTH

▶**The PC World Top 100:** The top power desktops, budget desktops, notebooks, and home PCs, plus printers, monitors, graphics boards, and modems.

▶**Does Your Small Office's Internet Access Make Sense?** If you have a small business, you're probably already connected to the Internet, but are you doing it right? We'll show the best solutions for businesses of different sizes and needs.

▶**Here's How:** *Answer Line* on using batch files in Windows 95, *Hardware Tips* on moving huge files between PCs, *Windows Tips* on customizing that stubborn Control Panel.

PC WORLD

MultiSync® LCD400V™
The lowest-priced 14" active-matrix LCD monitor.

MultiSync® LCD400™
With XtraView™—160° viewing angle.

MultiSync® LCD2000™
The first 20" LCD monitor on the market.

The broadest line in the business is less than 23 inches wide.

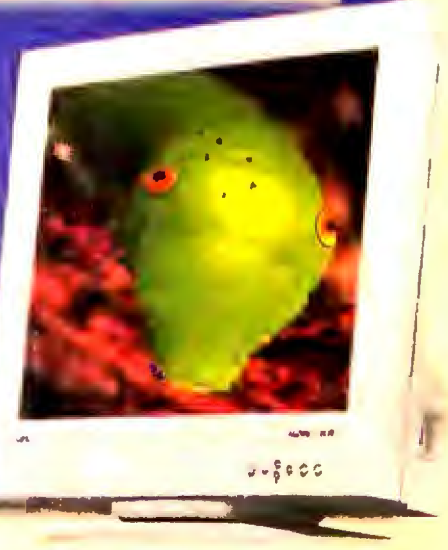
	MultiSync® LCD400V™	MultiSync® LCD400™	MultiSync® LCD2000™
Viewable Image Size	14.1"	14.1"	20.1"
Maximum Resolution	1024 x 768	1024 x 768	1280 x 1024
Weight	11.0 lbs.	11.5 lbs.	22.0 lbs.
Dimensions (wxhxd)	14.1" x 14.2" x 6.6"	14.1" x 14.3" x 6.7"	19.7" x 19" x 8.7"
Brightness	200 cd/m²	180 cd/m²	150 cd/m²
160° XtraView Technology	no	yes	yes

MultiSync

We've squeezed something for everyone into a line of monitors that are known for being thin.

At $1998, our MultiSync® LCD400V™ costs less than any other 14" active-matrix LCD monitor on the market. Yet it still offers eye-popping image quality.

For a little bit extra, the 14" MultiSync LCD400™ includes XtraView™ technology, which expands the viewing angle to an unprecedented 160°. And for those who believe that bigger is better, there's the MultiSync LCD2000™, the world's first commercially available 20" LCD monitor, also with XtraView. All of our monitors are misers. They take up at least 60% less space and consume at least 50% less energy than traditional CRT models. And all of our LCD panels are made by us—so we can make sure that the broadest line in the business is also the best. To find out more, call 1-800-NEC-INFO or visit www.nec.com.' For more on XtraView technology, visit www.xtraview.com. Expect more. Experience more.



NEC
NEC Technologies

Price references are based on estimated street price. Actual price may vary. Market data current as of 11/1/97. Price and specifications are subject to change without notice. MultiSync is a registered trademark and LCD400V, LCD400, LCD2000, XtraView, "Expect more. Experience more.", and the NEC Technologies icon are trademarks of NEC Technologies, Inc. All other trademarks or registered trademarks are the property of their respective holders. © 1998 NEC Technologies, Inc.

Circle 163 on reader service card

THE DELL DEAL

HERE ARE SOME basic facts on leasing a PC from Dell Computer:

- Leases available on the Dimension, Latitude LM, and Inspiron lines.
- Make fixed payments for 24 months.
- You can then purchase the PC for fair market value based on Orion Computer Blue Book listings.
- Shipping and handling costs are extra.
- No early lease termination.
- Choose between a three-year warranty (if you plan on buying the PC at the end of the lease) or a two-year warranty with next-business-day on-site service.

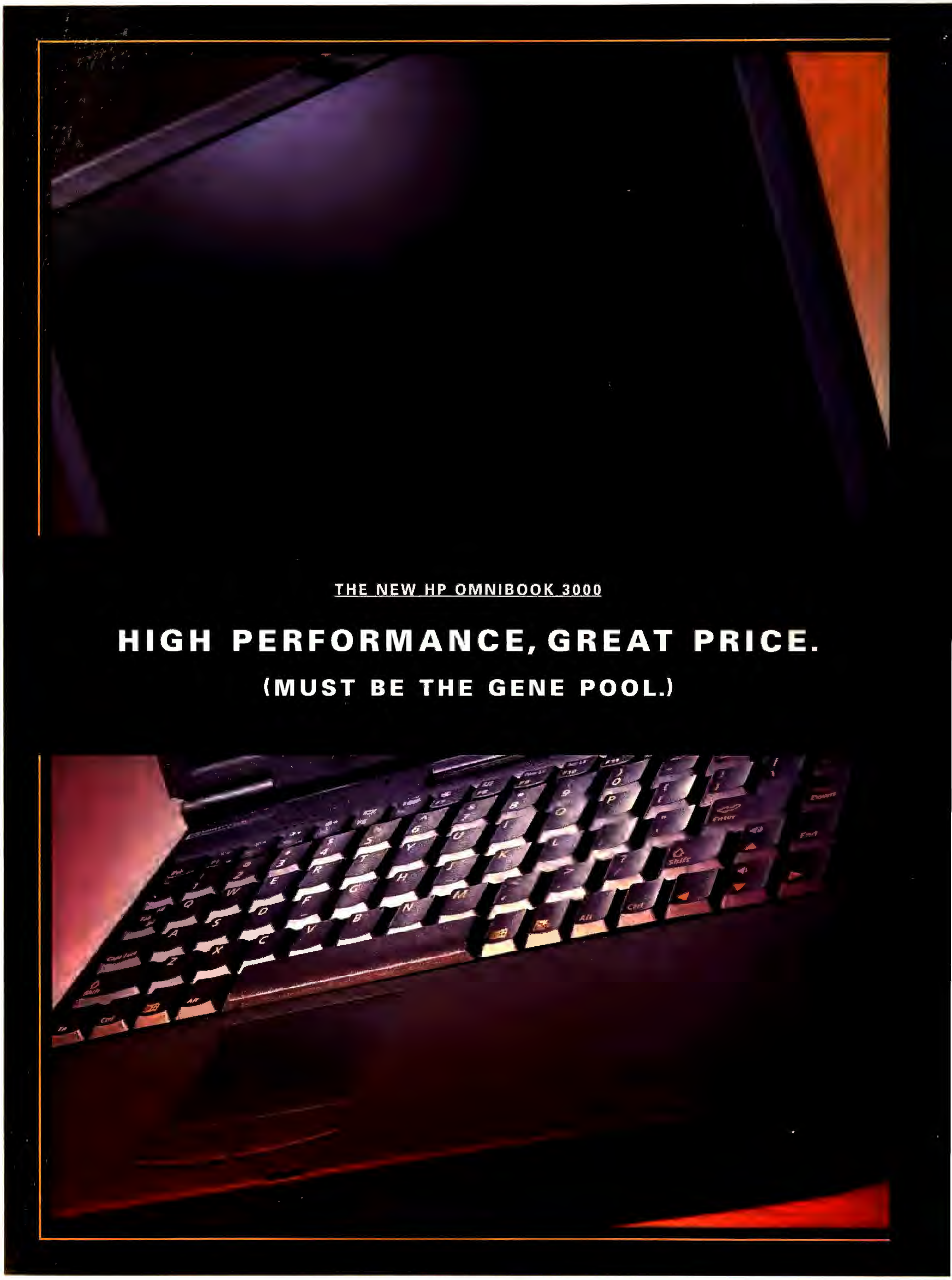
programs from the old PC to the new one.

Is it convenient? You bet. But the question is, how much are you willing to pay for convenience? Most consumers—even those who plan on upgrading regularly—are better off buying a computer outright. Then, at the end of two or even three years, you can resell it (albeit at a markedly lower price), donate it to a charitable organization and take the tax deduction, give it to your kids—whatever. The point is, you'll have options. Sure, it's a little inconvenient, but it makes a lot more sense financially.

Does that mean the lease is a raw deal? Not for everyone. Three groups stand to benefit from the Dell lease option: consumers with little credit, people who prefer not to load up on credit card debt, and those who demand the latest technology and value convenience over cost. For these individuals, the lease option's simplicity, its fixed monthly payment, and its low initial cash outlay may add up to an unbeatable combination.

If you don't fall into any of these categories, my advice is simple: Use a credit card to buy your new computer and save a little cash. Just think of all the ways you could put that money to use.

You can have your say on any consumer issue. Send e-mail to consumerwatch@pcworld.com. Roberta Furger is a PC World *contributing editor. Her first book,* Does Jane Compute? *(1997) is available from Warner Books.* ■


THE NEW HP OMNIBOOK 3000
HIGH PERFORMANCE, GREAT PRICE.
(MUST BE THE GENE POOL.)

MMX™
intel inside
pentium®
PROCESSOR

We're proud to announce a new addition to our family of highly acclaimed notebook PCs. The HP OmniBook 3000 is a high-performance notebook with something seldom found in a high-performance notebook: an affordable price. The OmniBook 3000 comes with the very latest Intel® 200 MHz or 233 MHz Pentium® processor with MMX™ technology, as well as an advanced 13.3" XGA TFT screen. And like its OmniBook siblings, the 3000 has inherited our unsurpassed reputation for quality and outstanding service and support. So if you've been thinking about getting an OmniBook, only one question remains. Which one? For more information, visit our quick link:

HP OmniBook 2000
Value

HP OmniBook 800
Light weight

HP OmniBook 5700
High performance

www.hpresource.com/omnibook3000

hp HEWLETT® PACKARD

Toshiba owners fear abandonment ◆ Sales tax policies ◆ Extended warranty—for free

Is Toshiba Support Back on Track?

THROUGHOUT THE summer of 1997, I got pelted with complaints about Toshiba's service. The problems varied, but one theme emerged: Customers felt they'd been abandoned. They couldn't reach support or get questions answered. The trouble began, says Toshiba, when the company launched its Infinia line of desktop PCs.

ILLUSTRATION: ADAM MCCAULEY

"The Infinia machines' popularity went way beyond our expectations," says Dan Ludwick, director of services marketing. The resulting flood of support calls was an even bigger surprise. Since calls for all Toshiba products go to the same call center, laptop owners were also left waiting on hold.

Since then, Toshiba has tripled the call capacity of its tech support center, stopped asking callers marketing questions, and installed a knowledge base to help techs provide fast answers. Is service improving? It's hard to tell. I'm getting less negative mail about Toshiba these days, but when we called its support lines we still ran into busy signals and long hold times.

TAXED BY THE INTERNET

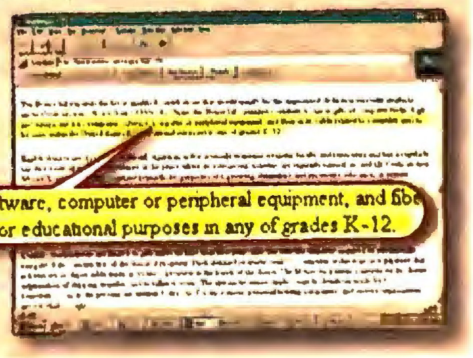
JERRY W. HULL writes from San Luis Obispo, California, to warn readers that he had to pay sales tax to Dell Computer when he bought a PC from www.dell.com. The problem arose when he entered his company name on the order form, even though he was buying the PC for home use. When businesses buy direct, Dell (and most other direct vendors) add sales tax. Dell doesn't collect the tax for home purchases, though. In Hull's case, Dell made a mistake—and the company says it's taking care of it.

Whoa, gentle reader: I see the dollar signs in your eyes, but beware. Even if merchants don't *collect* sales tax when you place your order, you're still responsible for paying that tax directly to your state.

THE FINE PRINT

MAKE MONEY OFF LAST YEAR'S TECHNOLOGY

THE SMALL PRINT on this year's new federal tax code is good news if you're a C ("regular") corporation and have donated computer hardware or software to a qualified K-12 school. Joe Parker, tax research specialist for H&R Block, says the change in tax law means that in most cases you can deduct whatever it cost you to acquire the equipment or software, *plus* half its fair market value. If the PC you're donating cost $3000 two years ago and is now worth $500 on the open market, under the new law you can deduct a total of $3250 (including full depreciation of the purchase price). So you can now take a $250 deduction—half the PC's market value—in addition to full depreciation. Deductions are allowed only for donations made after December 31, 1997, and before January 1, 2001.



and equipment (i.e., computer software, computer or peripheral equipment, and fib
be used within the United States for educational purposes in any of grades K-12.

CREDIT CARD BONUS

THANKS TO JOSEPH Massimino of Port St. Lucie, Florida, for offering his favorite piece of buying advice. He points out that if you purchase a PC or peripherals with the right credit card, you may get more than a little protection if the vendor fails to deliver—an additional warranty, for instance.

He's right. Consumers in the United States who buy a computer with, say, an American Express card automatically get an extra one-year warranty on purchases (if the manufacturer's warranty is five years or less). For example, if your hard drive fails two days after the manufacturer's warranty runs out, American Express will pay for your computer's repairs. So take a look at the back of your credit card and call that toll-free number before you buy your new system. Ask for details about the extended warranty program.

EXPENSIVE FREE TRIALS

I RECEIVE LOTS of mail from readers who can't escape an Internet service provider once they've taken its free trial for a spin. But when I got so many complaints from people who couldn't get Microsoft Network to stop billing them after canceling their accounts, I called MSN to see what was up.

Billing has been a major problem for MSN. For a long time, its billing procedures were so chaotic that subscribers were never billed at all. The company finally sorted out that backlog, but unfortunately some people who had canceled their accounts started getting billed, too.

Pamela Portin, MSN's senior manager for member policies, told me, "We are catching up with these errors." If you are being wrongfully charged, call 800/386-5550. However, readers tell me the hold times at that number are long. You can also send e-mail from MSN's Member Services area.

Think you've gotten a raw deal—or a great one? PCW Advocate *wants to hear the details at* advocate@pcworld.com. *We'll investigate complaints and publish items of the broadest interest. Christina Wood is a contributing editor for* PC World. ■

SUPRA SONIC II
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DIAMOND

Web Browser Woes

As consultant Kent MacNown discovered, upgrading to Internet Explorer 4.0 can be a pain in the @!#.

PHOTOGRAPH: MARK ALCAREZ

PROBLEM *Getting Microsoft Internet Explorer 4.0 to work.*

SOLUTION *Install it in the right place, mind your DLLs, and make sure you have the latest video drivers.*

IMAGINE THAT YOU JUST GOT a promotion, and with it comes a new assistant. Now imagine that your new assistant is so eager that he's taken over your desk, redecorated your office, and locked you out of your private bathroom several times a day.

Kent MacNown experienced that kind of unpleasant surprise when he installed Internet Explorer 4.0, Microsoft's latest salvo in its browser war with Netscape. "What I thought I was getting was a new Web browser," says MacNown, a management systems consultant in South Berwick, Maine. "But what I really got was a whole new operating system, one that changed the look and feel of my desktop, applications, and files; hogged about 50MB of hard disk space; and caused what was once a bulletproof computer to crash several times a day."

IE 4.0 officially debuted in September 1997, after being hyped for months by Microsoft as a breakthrough in the effort to make the Internet as easy to use and as commonplace as a TV set. Version 4.0 differs from its predecessors by offering an alternative to the Windows 95 desktop—an IE 4.0 desktop that promises tighter integration with the Internet.

But reports of problems and incompatibilities prompted Microsoft to release a service upgrade last December—Internet Explorer 4.01. Microsoft says the upgrade will fix the known bugs and installation glitches. However, many users continue to report problems with the new version (see *Bugs and Fixes*, February). Solving some of these bugs—such as system freezes, printing errors, and difficulty connecting to the Web—will require other precautions.

ONE PROBLEM: SYSTEM FREEZES

MACNOWN DOWNLOADED IE 4.0's standard version from Microsoft's Web site (the company offers three versions of the browser). Before installing the browser, he made a complete tape backup and closed all his open applications. Then IE's installation wizard took him through the process without a hitch.

MacNown has two hard drives, one 2GB and one 1GB. The 2GB drive is partitioned; the 1GB drive is not. During the IE 4.0 installation, MacNown directed the wizard to install the program on his 1GB drive. On the 2GB drive, Windows 95 is stored in one part, while his permanent Windows swap file is stored in another.

During the installation, MacNown chose the browser's Active Desktop option, which integrates IE 4.0 with Windows 95 so that users can access the Web as easily as they would open a file on their hard drive. But after the installation, MacNown says, he was unable to open most of his Windows applications and files. "I'd get these cryptic Windows 95 error messages like 'An attempt was made to illegally read' a file, or that Windows 'couldn't find the file it was looking for'. Then the system would freeze, and I'd reboot and try again."

MacNown reinstalled IE 4.0, but it still crashed regularly, as did Microsoft Word, Intuit Quicken, and other applications. He called ▶

Microsoft's IE 4.0 support line, where a technician told him his system problems could be a result of having installed the browser on a separate hard drive or partition from Windows 95 and the Windows swap file.

Although one Microsoft product manager says this arrangement shouldn't actually be a problem, MacNown took the technician's advice and advises others to do so as well: Play it safe and install IE 4.0 on the same drive or partition as Windows 95 and the swap file.

MORE PROBLEMS TO SORT OUT

OTHER IE 4.0 USERS have reported that when they try to connect to the Internet using the new browser, they get a message saying, 'An internal error occurred in Windows Internet Extensions'.

This problem, explains IE product manager Paul Balle, is "almost always caused by mismatched versions of Winsock-related files on the system." (Winsock files are used with TCP/IP, the communications protocol for the Internet.) Resolving the situation is relatively simple. Choose *Start•Find Files or Folders*, and then search for the winsock.dll and wsock32.dll files. Winsock.dll should be in the Windows directory, while wsock32.dll should be in Windows\System. If you have these DLL files anywhere else, Balle advises that you move them to the proper location, and if you find duplicates, rename them.

Still other IE 4.0 users have reported problems with printing browser documents. Printing problems, as well as system freezes that occur when scrolling through a Web page, are "classic symptoms of a video driver conflict," says Dave Fester, Microsoft's IE group product manager. "IE 4.0 pushes the video driver harder than Windows 95 and most applications, because it's so graphics intensive, and older drivers may not be able to keep up with it. If you don't have the latest video driver for your display, it can cause printing problems and system lockups."

To ensure that you have the latest driver, visit your graphics card vendor's Web site and download the current version.

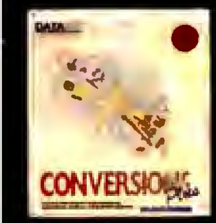
A MORE ELEGANT SOLUTION

RESOLVING MACNOWN'S predicament was a bit more complicated than just downloading a driver. The Microsoft technician told MacNown that to get his ducks in a row, he needed to move all his files off his C: drive, reformat his partitions, then reinstall IE 4.0 and the Windows 95 system files all in the same drive partition.

But MacNown has come up with a different solution. "I've been using Netscape Navigator 4.0 without any problems," he says, "and that's how I want to keep it."

James A. Martin is a PC World *contributing editor. If you're having trouble resolving a PC-related hardware or software problem, we'd like to hear about it. See page 14 for contact information.* ■

@*?#!
microsoft office 97
everything else


CONVERSIONS Plus

Norton Utilities 3.0 bug spree ◆ IE 4.01 ain't done ◆ WordPerfect ever more so

Norton 3.0: New, Improved, Buggy

THE LATEST VERSION of Symantec's Norton Utilities is already making a name for itself. Though a Symantec spokesperson told me that NU 3.0 is no buggier than previous versions, it's clear from messages in the company's public technical support discussion groups (and from *Bugs and Fixes* reader mail) that the utility is causing serious problems for its customers.

Many users report that the program's vaunted new Zip rescue feature deletes partition information from Zip drive disks, rendering the media permanently unusable. Others say their rescue Zip disks simply don't work. Customers also report conflicts with drivers for Diamond's Stealth 3D graphics board, and have encountered Windows Registry corruption that can prevent Windows from loading. Symantec released two LiveUpdate patches in December and January that fix these and other serious problems.

As we go to press, the 860KB LiveUpdate 2 is the most recent patch; it also includes the fixes in LiveUpdate 1. Users without a modem or an Internet connection can order the patch on disk through Symantec Customer Service at 800/441-7234. The company will also replace your wrecked Zip disks. For a Zip rescue troubleshooting and work-around guide, as well as information on solving and working around other problems, see Symantec's Knowledgebase at service.symantec.com/nu/kbase_nu.html.

Other snafus: A conflict with Norton AntiVirus may cause your A: drive to freeze. Solution? Update your NAV virus database. Symantec says it is still working with Microsoft and America Online to solve a problem that causes freeze-ups when exiting AOL's browser.

INTERNET EXPLORER 4.01: STILL BUGGY

MANY REVIEWERS LOVE IT, and lots of people find Microsoft's star-crossed browser to be trouble-free. But the bug reports on IE 4.0 and 4.01 keep pouring into our mailbox. *Bugs and Fixes* readers are reporting a wide range of glitches: pointers that seize up, Active Desktop errors, ignorance of the IntelliMouse's scroll wheel, print problems, frozen floppy drives, and the usual spate of exception errors, fatal errors, and General Protection Faults.

So far Microsoft has been mum about the exact bugs that IE 4.01 fixes, and about how soon the company will get around to tackling the rest, including new problems introduced in version 4.01. In published reports Microsoft's second-in-command, Steve Ballmer, has even admitted that the company compromised on fixing IE 4.0's bugs to meet the program's scheduled ship date.

So what's a faithful IE fan to do? You could switch to Netscape Navigator 4.04, but that browser has a long bug history, too. My advice: Stick with Internet Explorer 3.02 or Navigator 3.04. They may not include all the latest bells and whistles, but at least they're relatively stable.

KEEP YOUR OLD WORDPERFECT IN SHAPE

HEY, IT'S NOT all bad news. If you're a regular *Bugs and Fixes* reader, you know that Corel has been trying hard to squash the bugs in its WordPerfect Suite 8. To its credit, the company also continues to update earlier versions:

WordPerfect Suite 7 for Windows 95 and Windows NT. The latest 3.5MB patch (ftp.corel.com/pub/wordperfect/wpwin/70/wps7_03p.exe) contains all previous patches, plus new file-save, password, and macro fixes.

WordPerfect Suite 7 for Windows 3.1. The 600KB patch (ftp.corel.com/pub/wordperfect/wpwin/7-31/wp731b.exe) solves incompatibilities with OS/2 and HTML.

WordPerfect 6.1. The latest patch (ftp.corel.com/pub/wordperfect/wpwin/61/wps61_07.exe) packs everything from the preceding seven patches into its 5MB-plus and adds new file-conversion fixes. It doesn't work with Novell WordPerfect, though.

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

IN BRIEF

Tomb Raider II, Patch 1

THE LATEST ADVENTURES of Lara Croft suffer from a glitch that accesses the CD-ROM continuously on some PCs, degrading 3D video playback quality. Eidos Interactive offers a 352KB patch (ftp.eidosinteractive.com/pub/pc/TombRaider2/patches/tr2p1.exe); more fixes may be on the way.

Drive Image 1.01

THOUGH VERSION 1.0 of PowerQuest's drive-copying utility supported Jaz, Zip, and SyQuest removable-media drives, it didn't allow spanning backups across multiple disks. The 200KB version 1.01 patch (ftp.powerquest.com/pub/updates/driveimage/em100101.zip) adds the missing support. For Drive Image Professional, get ftp.powerquest.com/pub/updates/driveimage/ep100101.zip instead.

BUGGED?

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

ICON: JEFFREY PELO

DELL® INSPIRON™ 3000 NOTEBOOKS

Common Features: ◆ 512KB L2 Pipeline Burst Cache ◆ Modular Options Bay accepts 20X Max°° Variable CD-ROM, 3.5" Floppy Drive (both included) or optional 2nd Smart
Wavetable ◆ Smart Lithium Ion Battery ◆ Zoom Video and USB Ports ◆ Cardbus Ready/Fast IR1.1 ◆ Touchpad ◆ MS® Windows® 95 ◆ MS Internet Explorer ◆ Extendable 1

***NEW* DELL INSPIRON 3000 M266XT** **266MHz PENTIUM® PROCESSOR** WITH MMX™ TECHNOLOGY	***NEW* DELL INSPIRON 3000 M266XT** **266MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY	***NEW* DELL INSPIRON 3000 M266XT** **266MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY	***NEW* DELL INSPIRON 3000 M266XT** **266MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY
Common features listed above plus: • 13.3" XGA Active Matrix TFT Display • 96MB SDRAM Memory • 4GB Ultra ATA Hard Drive • 128-bit Graphics Accelerator with 65K Colors at 1024x768 • 56K Capable^π^ K-Flex Cellular Modem • 2nd Smart Lithium Ion Battery • MS Office 97 Small Business Edition • 6.9 Pounds* ★ *Upgrade to 144MB SDRAM, add $300.* ★ *Leather Carrying Case, add $99.* ★ *Inspiron Port Replicator, add $159.*	Common features listed above plus: • 13.3" XGA Active Matrix TFT Display • 80MB SDRAM Memory • 4GB Ultra ATA Hard Drive • 128-bit Graphics Accelerator with 65K Colors at 1024x768 • Leather Carrying Case • MS Office 97 Small Business Edition • 6.9 Pounds* ★ *56K Capable**x2 Modem, add $149.* ★ *2nd Smart Li-Ion Battery, add $169.* ★ *3Com® 10/100 Fast Ethernet Adapter, add $169.*	Common features listed above plus: • 13.3" XGA Active Matrix TFT Display • 32MB SDRAM Memory • 3.2GB ATA Hard Drive • 128-bit Graphics Accelerator with 65K Colors at 1024x768 • 56K Capable π K-Flex Cellular Modem • Deluxe Nylon Carrying Case • MS Office 97 Small Business Edition • 6.9 Pounds* ★ *Upgrade to 64MB SDRAM, add $199.* ★ *Upgrade to a 4GB Ultra ATA Hard Drive, add $99.*	Common features listed above plus: • 13.3" XGA Active Matrix TFT Display • 32MB SDRAM Memory • 3.2GB ATA Hard Drive • 128-bit Graphics Accelerator with 65K Colors at 1024x768 • MS Office 97 Small Business Edition • 6.9 Pounds* ★ *Upgrade to 80MB SDRAM, add $299.* ★ *Upgrade to a 4GB Ultra ATA Hard Drive, add $99.* ★ *56K Capable** x2 Modem, add $149.* ★ *Deluxe Nylon Carrying Case, add $69.*
$3899	**$3499**	**$3299**	**$2999**‡
Business Lease◊: $138/Mo., 36 Mos. Order Code #890201	Business Lease◊: $124/Mo., 36 Mos. Order Code #890203	Business Lease◊: $117/Mo., 36 Mos. Order Code #890205	Business Lease◊: $109/Mo., 36 Mos. Order Code #890207

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Common features: ◆ Modular Bay accepts 20X Max°° Variable CD-ROM, 3.5" Floppy Drive (both included) or optional 2nd Smart Li-Ion Battery ◆ 3 Year Limited Warranty† with
Wavetable ◆ Cardbus Ready/Fast IR1.1 ◆ Smart Lithium Ion Battery with ExpressCharge™ ◆ USB & IrDA 1.1 Standard Compliant ◆ MS Windows 95 ◆ MS Internet

***NEW* DELL LATITUDE CP M233XT** **233MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY	***NEW* DELL LATITUDE CP M233XT** **233MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY	***NEW* DELL LATITUDE CP M233XT** **233MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY	**DELL LATITUDE CP M233ST** **233MHz PENTIUM PROCESSOR** WITH MMX TECHNOLOGY
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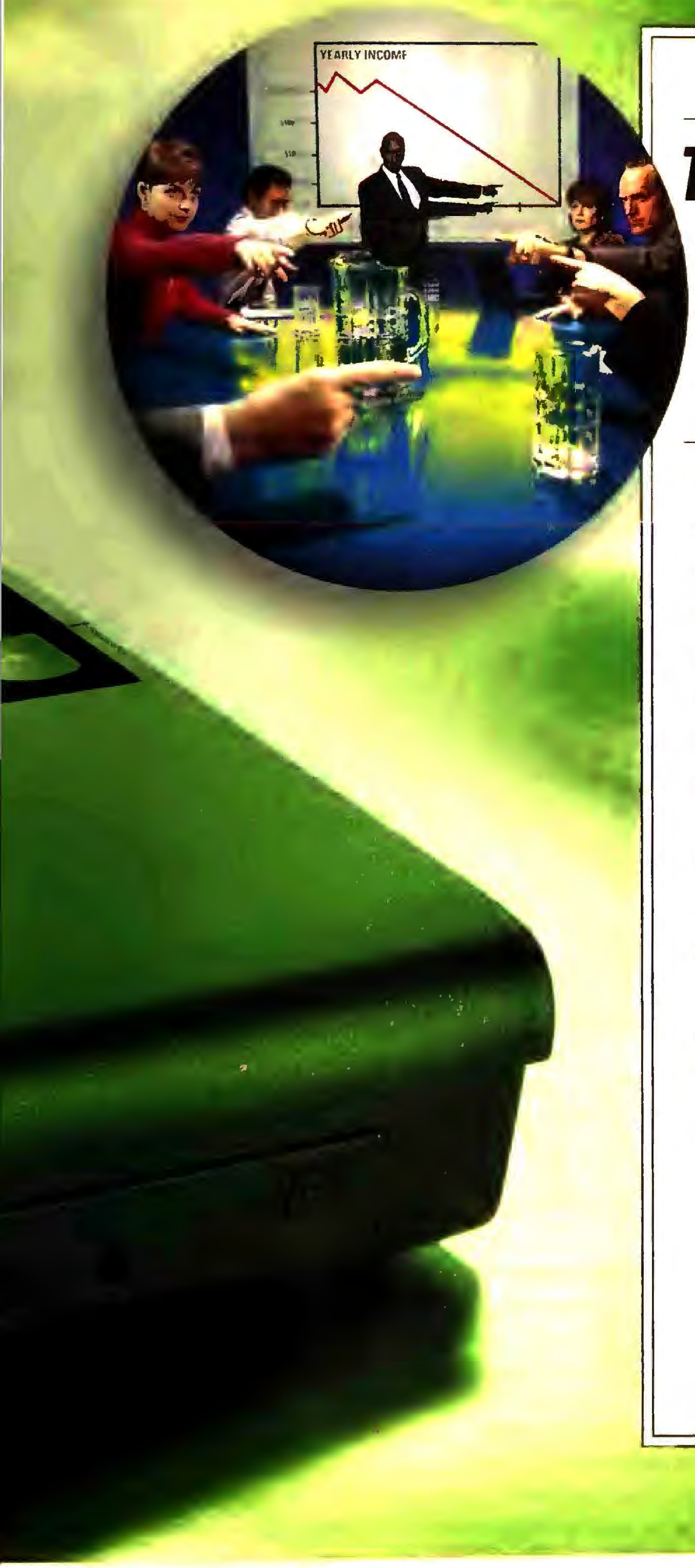
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TOP OF THE NEWS

Pentium II-333 Powers New

Intel's Deschutes CPU outraces Pentium II-300s...ever so slightly. But systems using the 333-MHz chips cost only a little more. Should you bite?

A LITTLE FASTER THAN FAST: Dell's new Pentium II–based 333-MHz PC squeaked past competing systems from Gateway 2000, Hewlett-Packard, and NEC, respectively, in our PC WorldBench performance tests (PCs shown left to right).

BETA

YOU'VE HEARD the song before: Intel launches its Fastest Processor Ever, and PCs are suddenly breaking speed records. But then comes the refrain—the new computers are only a tiny bit faster, yet a whole lot more expensive. But with the January release of the Pentium II-333, Intel has varied the tune: The new, slightly faster processor is also only slightly more expensive.

Here's the score. Last October, when we looked at the brand-new Pentium II-300s, the NEC Direction SPL300 was going for $3429. This time around, the NEC Direction SPL333 is selling for only $2487. Moreover, two of the PII-333 systems we looked at will sell for only about $80 more than comparably equipped PII-300 siblings.

The irony is that for the average business user, the performance gain isn't worth even

PHOTOGRAPH: KEVIN CANDLAND; PHOTO ILLUSTRATIONS: JEFF BERLIN

Speed Champs

an $80 increase. On our PC WorldBench business application–based benchmarks, the new 333s performed on average only 3 percent faster than the 300s. If you can notice that difference, you're probably on Intel's payroll.

However, if you're doing heavy graphics, either at work or at play, that $80 could be well spent. When we timed the systems redrawing 3D scenes in Ray Dream Studio, the 333s performed about 10 percent better than the same systems running PII-300s. Not a spectacular improvement, but worth a modest price increase if you spend a lot of time watching graphics redraw.

We tested preproduction models of four Pentium II-333 computers for this review. The test machines were a Dell Dimension XPS D333, a Gateway 2000 GP6-333, an HP Vectra VL 333, and an NEC Direction SPL333. All four came with 64MB of RAM, 6GB to 9GB hard drives, and 17-inch or larger monitors.

Speed may be the reason to buy a PII-333, but not to buy one company's PII-333 instead of another's. When we put these systems through their paces, the performance differences between them were slight. If you buy one of these, consider the NEC's low price or the Gateway's 19-inch monitor rather than simply the Dell's record-breaking WorldBench score of 281. (Should you upgrade? For help, see "One-Step Guide: Find Power You Can Afford.")

SHRINK TO FIT

THE NEW CHIP is the first in a line Intel has been calling Deschutes, named after yet another Oregon river. What separates Deschutes from earlier Pentium II chips is size. Transistors in the original PIIs are about .35 micron wide; with Deschutes, that width has been reduced to .25 micron. This is wonderful for Intel, since smaller transistors allow for smaller chips, which can be mass-produced in larger quantities, cutting costs.

For you, the PII-333 is just another slightly faster chip. But Intel is planning a whole line of these chips, some of which will likely make a real difference. For ▶

EDITED BY
Charles Piller, Randy Ross, and Bill Snyder

ICONS: JEFFREY PELO

JUST IN

Microsoft, Feds Settle Contempt Case

MICROSOFT AND the U.S. Department of Justice reached a settlement on the contempt-of-court charge against the software company. Under the agreement, Microsoft will provide computer manufacturers with two additional Windows 95 installation options that leave all or nearly all of the Internet Explorer files in Windows 95 but remove or hide customer access to the browser. One new version of Windows 95 OSR2 will have Internet Explorer uninstalled. The other version has no Internet Explorer icon on the desktop or in the Programs list under the Start menu. Meanwhile, the government is still examining the larger issue of whether Microsoft has violated its 1995 consent decree with the Justice Department by bundling Internet Explorer with Windows.

Netscape Offers Free Licenses

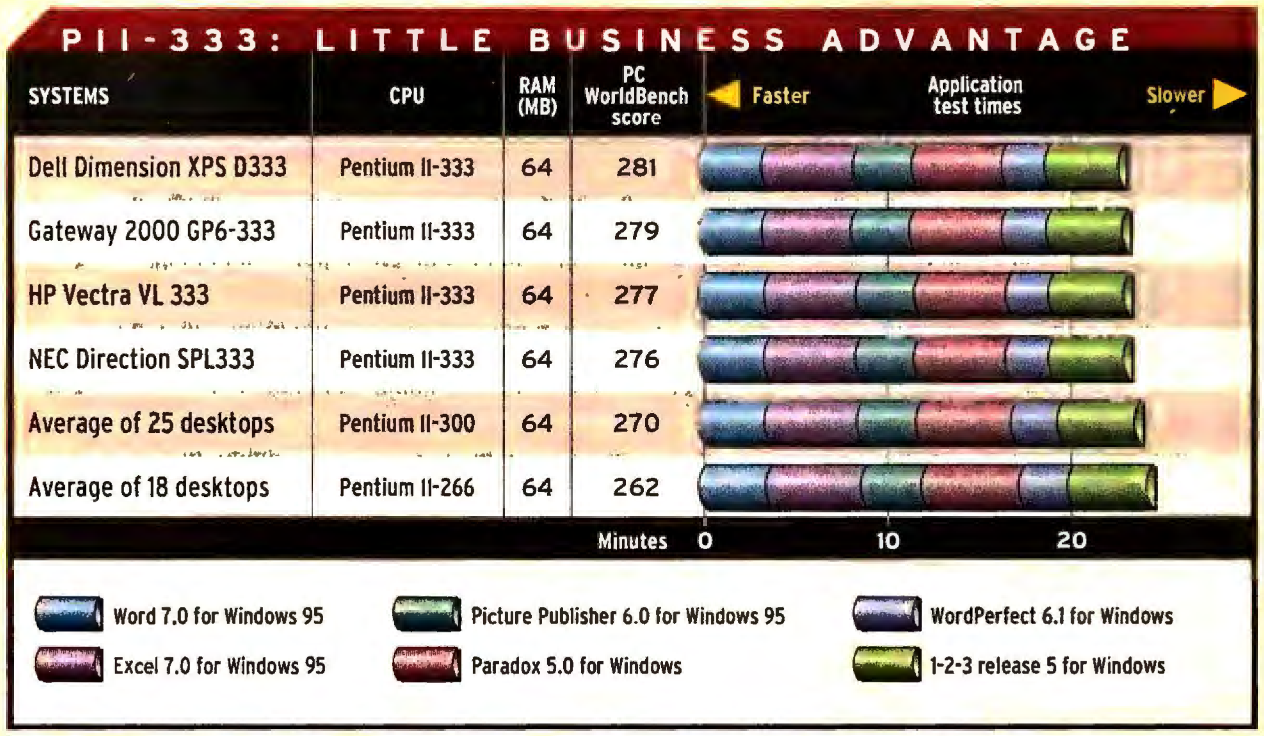
NETSCAPE HAS made licenses for its Navigator and Communicator software free. Not only will the move allow you to download the products and receive support without charge, but it may encourage PC makers to bundle the browser on new systems. Netscape will continue to ▶

INTERNET

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

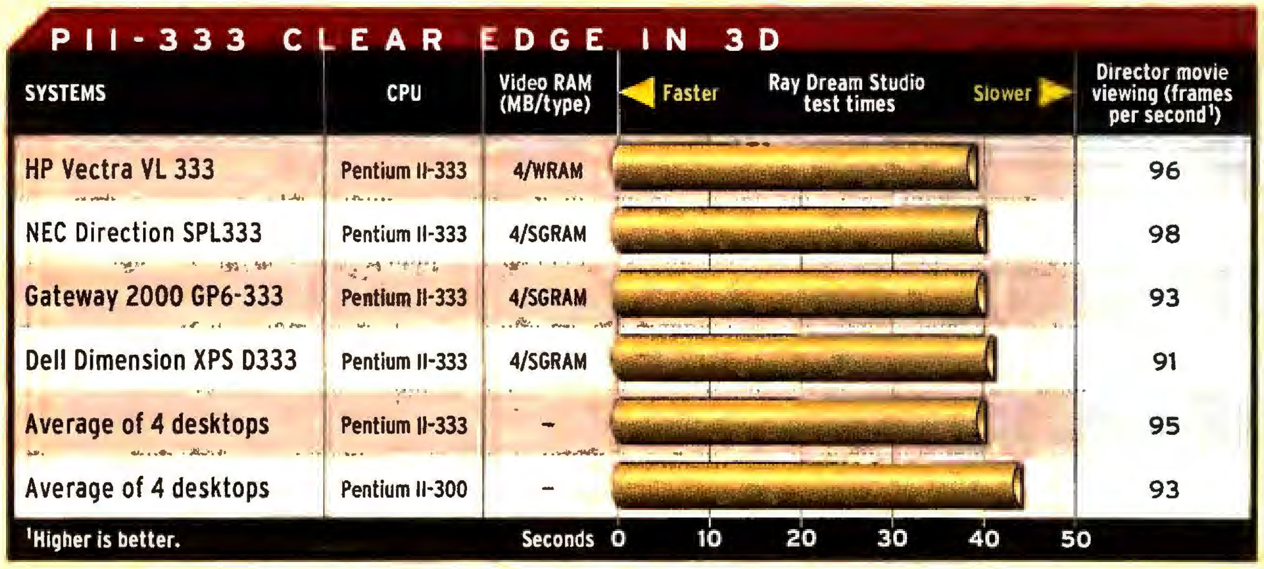
Running Neck and Neck, New Systems Rise to Top Spots

PII-333: LITTLE BUSINESS ADVANTAGE



SYSTEMS	CPU	RAM (MB)	PC WorldBench score
Dell Dimension XPS D333	Pentium II-333	64	281
Gateway 2000 GP6-333	Pentium II-333	64	279
HP Vectra VL 333	Pentium II-333	64	277
NEC Direction SPL333	Pentium II-333	64	276
Average of 25 desktops	Pentium II-300	64	270
Average of 18 desktops	Pentium II-266	64	262

PII-333 CLEAR EDGE IN 3D



SYSTEMS	CPU	Video RAM (MB/type)	Director movie viewing (frames per second[1])
HP Vectra VL 333	Pentium II-333	4/WRAM	96
NEC Direction SPL333	Pentium II-333	4/SGRAM	98
Gateway 2000 GP6-333	Pentium II-333	4/SGRAM	93
Dell Dimension XPS D333	Pentium II-333	4/SGRAM	91
Average of 4 desktops	Pentium II-333	–	95
Average of 4 desktops	Pentium II-300	–	93

[1] Higher is better.

How We Test

Business applications: We tested all systems with PC WorldBench, PC World's Windows 95 application-based benchmark. Higher PC WorldBench scores are better. For a description of PC WorldBench 1.0 tests, see PC World Online (www.pcworld.com/testing).

Multimedia applications: We tested each system using a pair of MMX-enabled applications. In Fractal Design Ray Dream Studio 4.1, we time how long it takes to redraw rendered 3D scenes at two levels of complexity. In Macromedia Director 5.0, we play a graphics-intensive Director executable file. After testing the systems with their original PII-333 processors, we downgraded them by installing PII-300 processors and adjusting the BIOS appropriately. Then we tested the systems again to get comparative performance.

Data based on testing conducted by the PC World Test Center. All rights reserved.

instance, the Pentium II-350, due to become the Fastest Processor Ever in late spring or early summer, is expected to boost performance considerably, thanks to a faster system bus. By year's end, Deschutes CPUs in one form or another will be standard in everything from sub-$1000 cheapies to high-end servers.

THE PRICE IS RIGHT

NEC EXPECTS TO BE selling the Direction SPL333, in the configuration we reviewed, for $2487 as you read this. An identically configured SPL300 will go for $2416, a difference of only $71. Likewise, Dell will be charging only $80 more for a PII-333–equipped machine. HP would say only that a PII-300 will cost "slightly less" than a similarly equipped 333.

Not everyone is selling the new chip at such a bargain price. At press time Gateway expected to sell PII-333s for about $220 more than similarly equipped PII-300s.

Why such a slight price difference—at least for most companies? One reason is the ease of redesigning the machines. The Deschutes chip may be smaller, but it comes in the same cartridge as the original PIIs and plugs into the same motherboard slot, known as Slot 1. To turn a PII-300 system into a PII-333, a manufacturer just has to replace the cartridge and update the BIOS.

The upcoming PII-350 will not be so easy an upgrade, and that's another reason prices are low this time around. Today's motherboards will soon be obsolete, and vendors may want to clear out the old product inventory.

A final issue is the price of the chips themselves. Intel launched the 333 at an amazingly low price of $722 per chip. By comparison, when the PII-300 premiered last May, it cost $1981. Even as recently as December, the seven-month-old 300 was selling for $738. (These prices are for individual chips purchased in lots of 1000.)

PHOTO FINISH

PII-333 PCS MAY BE the fastest ever built, but not by much. In our PC WorldBench tests, which gauge a PC's performance running Word, Excel, Picture Publisher, Paradox, WordPerfect, and 1-2-3, these systems scored between 276 and 281 points, with an average of 278. The average score for similarly equipped Pentium II-300 machines was 270—only 8 points less (see "PII-333: Little Business Advantage" at top of page). This is hardly surprising. The PII-266 averaged a score of 262, and the PII-233 averaged 244.

But as the overall speed improves, another 8 points mean less and less. Add $8 to a kid's allowance, and you're likely to get a big smile. Give the same raise to a college senior and you'll be lucky to escape with a dirty look. At the

PII-300's already blazing score of 270, those 8 points come to only a 3 percent gain.

Why such a diminishing return? For one thing, the old bus takes its toll. Internally, the chip may be processing data at 333 million clicks a second, but it's communicating with the rest of the motherboard at a stately 66 MHz. And when data can't get in and out very fast, it's going to gum up the works.

The differences between one PII-333 and another are even less significant. The fastest machine we tested, the Dell Dimension XPS D333, scored 281. Amazing, except that's less than 2 percent faster than the slowest PII-333, the NEC Direction SPL333, which came in at 276.

If you want a **fast multimedia machine** and want it now, the PII-333 is a good buy. But if you want a **fast machine for business apps,** the PII-300 is better.

Clearly, if you're going to choose among these systems, the price, features, and support policies should count for more than sheer speed. On price, the NEC wins handily: It's nearly $300 less than the next least expensive system, the $2779 Gateway. But Gateway's review unit came with an 8.4GB hard drive and a 19-inch monitor, options that more than justify the cost difference.

QUICK-DRAW DESCHUTES

IF YOU'RE DESIGNING real airplanes or pretending to shoot down fake ones, a faster processor makes sense.

To find out how the Pentium II-333 handles multimedia and graphics, we ran a set of two MMX tests. In Ray Dream Studio, we timed how long it took to redraw a set of 3D images. Then we played a Macromedia Director–animated movie and counted how many frames the computer displayed per second. After we tested the PII-333s, we replaced the CPUs with PII-300s and tried again. (Our MMX tests no longer include a Photoshop component, a change that allows us to better judge the impact of a new CPU on system performance.)

Few tasks will stress a PC like 3D modeling, so it's hardly surprising that in Ray Dream Studio we saw our one noteworthy improvement. The systems performed from just over 8 to not quite 10 percent better with the PII-333 chip than with the PII-300. Once again, performance from PC to PC hardly varied at all, although the winning machines were different than with the business apps. If you work with complex 3D models, designing skyscrapers or automobiles, that extra $80 could be well spent. A PII-333 should also improve performance in Direct 3D applications and games.

But don't expect the new chip to improve every graphics application significantly. In our Macromedia Director tests, the average score for our PII-333s was 95 frames per second, barely 2 percent faster than the average PII-300's 93. For Shockwave files you find on the Web or applications developed using Macromedia Director, this chip won't make much difference.

Judging from our Director test, at a clock speed of 333 MHz the processor is not the major bottleneck in 2D animation. It's doing pretty much all it's being asked. This was the only test where we saw notable performance differences between systems, and that was probably due to the graphics cards. The slowest machines in our Director test, the Dell and the Gateway, both use a variation of the STB Velocity 128; the faster HP and NEC systems came with a Matrox Millennium II and a Diamond Viper V330, respectively. This difference appeared in both the PII-333 and the PII-300 tests.

DESCHUTES DOWNSTREAM

FOR MOST USERS, the Pentium II-333 does not represent a significant improvement over its predecessor. But the Deschutes PII-333 is just the beginning. We saw the demise of the Pentium "classic" last year, and even the Pentium MMX—introduced in 1997—won't see the end of 1998. By May the Pentium II will be common in entry-level systems. And Intel would far rather be selling the cheaper-to-make Deschutes chips than their larger, older siblings.

To make Deschutes the chip of choice for all users, ▶

charge for its Communicator Pro package, which includes calendaring and other enterprise-related enhancements, but is cutting the price to $29 from $79. Also, Netscape reduced the price of boxed versions of Communicator sold at retail with a rebate—from $39 to $29.

1.5-Megabits-per-Second Modems

LUCENT TECHNOLOGIES' new WildWire digital subscriber line technology could simplify the installation and deployment of high-speed modems. WildWire obviates the need for special hardware and wiring on the user's end that is required by existing DSL modems that run at higher speeds. Modems with WildWire chips could hit retailers' shelves by year-end.

Tidbytes

Find People and Businesses With AltaVista: The new People Search and Business Search features appear as tabs on the AltaVista search page (www.altavista.digital.com) and can find phone numbers and addresses. Business Search even produces maps and directions, though in our tests some were of questionable value. **All-You-Can-Eat E-Mail for $10 a Month:** If you live in the New York City area and want low-cost e-mail at a flat rate but don't want the annoying ads found in free services like Hotmail, Interport Communications (www.interport.net) is offering an alternative: e-mail-only accounts for $10 per month.

Faster Notebooks on Tap

Notebooks traditionally lag behind desktops when it comes to processor speed. And with Deschutes, that situation won't change a whole lot. Expect major notebook vendors to launch the first Deschutes notebooks this spring or early summer. These early birds will likely sport processors that run at 266 MHz. We'll see 300-MHz notebooks a few months later–probably just before 400-MHz desktops begin to appear.

With a faster CPU should come faster video processing, which means you may be able to satisfactorily teleconference while on the road (well, sort of satisfactorily–phone lines will still be the major bottleneck). Also, Windows NT gets a real boost from the PII architecture.

But the speed improvements may not be evident early on. Performance predictions for the 266-MHz Deschutes vary wildly, ranging from 5 to 30 percent faster than the fastest existing mobile chip, the Pentium MMX-266. We won't know for sure until the products arrive at the PC World Test Center.

Pricing Questions

AS WITH ANY new technology, don't expect to see Deschutes notebooks in the bargain basement. The first offerings are unlikely to dip below $4000. To make such prices easier to take, expect vendors to include spacious active-matrix screens, large hard drives, and plenty of RAM.

The first PII notebooks will be comparatively large, certainly no thinner than 1.5 inches or lighter than 5 pounds. In part this is because of the Mobile Module, Intel's primary packaging option for mobile Deschutes. This 4-inch-by-2.5-inch daughterboard, while smaller than the Slot 1 cartridge used in desktop systems, is still too bulky for anything thinner. Heat problems are also likely to keep the PII out of subnotebooks initially. (Notebooks measuring less than 1 inch thick are expected this spring, most likely powered by mobile PMMX processors.)

Another drawback: The chip may use as much as 30 percent more power than the mobile version of the PMMX. All else being equal, that would result in an 8 to 10 percent decrease in battery life.

But engineers will find ways to shrink the systems and keep the batteries running longer. Until then, notebooks will be either fast or small, but probably not both.

Intel is planning four variations, each aimed at a different segment of the market.

For your basic desktop computer, there is the Pentium II-333, to be followed by faster chips such as the Pentium II-350. The latter are expected to appear in the second quarter. Thanks to a new 100-MHz bus, they may offer significant speed improvements. Though still far below the internal speed of the chip, 100 MHz will be a big improvement over the 66 MHz that we have been tolerating since the dawn of the Pentium.

UBIQUITOUS CPU

INTEL ALSO HOPES to make Deschutes the standard chip for notebooks—expect a mobile line this spring (see "Faster Notebooks on Tap").

For the high-end server and workstation market, Intel plans yet another Deschutes line. These chips—which will require a new type of slot on the motherboard—will sport larger, faster caches.

Finally, for PCs selling for under $1000, Intel hopes to offer 233- and 266-MHz Deschutes chips. The catch? No cache—at least, no secondary cache built into the cartridge.

Since the built-in secondary cache is one of the primary advantages of the Pentium II (and of its predecessor, the Pentium Pro), it's possible that these systems won't deliver much more performance than a Pentium MMX.

Meanwhile, if you want a fast multimedia machine and want it now, the Pentium II-333 is a good buy. But if you just want a fast PC for standard business apps, the PII-300 is better. And if you absolutely must have the most amazingly fast image cruncher imaginable, wait a few months; it's on the way.

—Lincoln Spector

- **Dell Dimension XPS D333** $2929; 800/388-8542; www.dell.com

READER SERVICE NO. 746

- **Gateway 2000 GP6-333** $2779; 800/846-2000; www.gateway.com

READER SERVICE NO. 747

- **HP Vectra VL 333** $3265; 800/839-6854; www.hp.com

READER SERVICE NO. 748

- **NEC Direction SPL333** $2487; 888/863-2669; www.necnow.com

READER SERVICE NO. 749

One-Step Guide: Find Power You Can Afford

PROCESSORS	Average PC WorldBench score[1]	Price range[2]	Upshot
Pentium II-333	278	$2487-$3265	Fastest machine–barely, good for heavy graphics.
Pentium II-300	270	$2416-$3185	Slightly less speed for slightly less money than PII-333.
Pentium II-266	262	$1799-$2670	Excellent choice for the average user, fast and inexpensive.
6x86MX-PR233	254[3]	$2162	Competitive Pentium II alternative, available on only a few systems.
K6-266	251	$1899-$2439	Not many systems yet, but worthy price/performance.
K6-233	247	$1499-$2074	Less expensive entry-level option, but less widely available.
Pentium MMX-233	239	$1569-$2265	Ideal choice for entry-level systems.

[1] For tested systems with 64MB of RAM and 512KB of secondary cache. [2] From vendor price quotes for shipping systems with 64MB of RAM, 17-inch or larger monitor, and 6GB or larger hard drive. [3] Average of 32MB and 64MB systems tested. Price shown is for single 64MB system.

Windows 98 Edges Closer: Latest Beta Improves Performance, Support

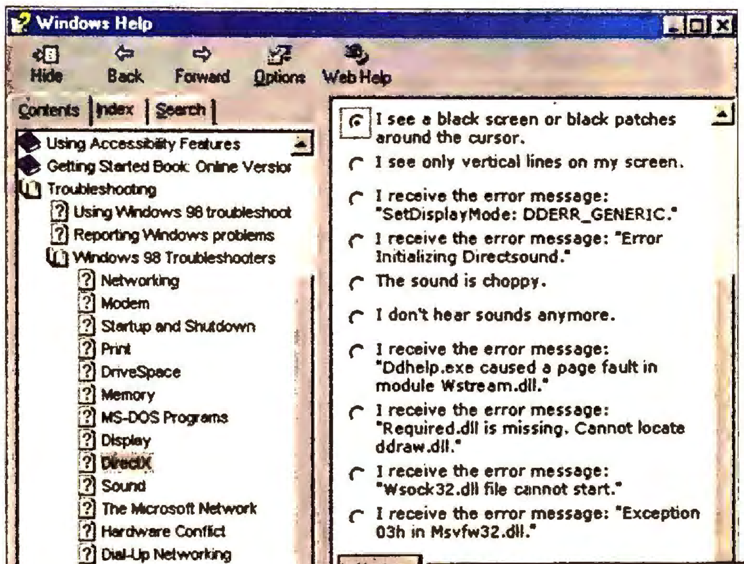
BETA

GETTING ANTSY TO replace Windows 95? When we looked at the first beta of Windows 98 last year (see *Top of the News*, September 1997), we were not exactly champing at the bit. Beta 3, released to testers last December, fine-tunes and polishes the same basic feature set, adding just a few new wrinkles. But these improvements, focused primarily on enhancing performance and on-screen help, make Windows 98 more attractive.

DÉJÀ VU

A QUICK RECAP: Basically, Windows 98 equals Windows 95 plus Internet Explorer 4.0 plus a variety of bug fixes that were added over the years and are mostly available online for free. Beta 3 adds only a few features, including the ability to upgrade a Windows 3.1 installation, new troubleshooters, and a long-needed Registry scan and repair tool.

The wizardlike troubleshooters guide you through common hardware and software snafus to find a solution and may save users significant time spent on phone support. The Registry Checker scans the Registry for problems, replaces your bad Registry with a backup copy (if you have one), and offers you the chance to create a new backup if all is well. Unlike Windows 95's minimal checking at start-up, the new Registry Checker automatically repairs corrupted Registries, maintains more than one backup copy, and keeps the Registry more compact.



● I see a black screen or black patches around the cursor.

○ I see only vertical lines on my screen.

○ I receive the error message: "SetDisplayMode: DDERR_GENERIC."

○ I receive the error message: "Error Initializing Directsound."

○ The sound is choppy.

○ I don't hear sounds anymore.

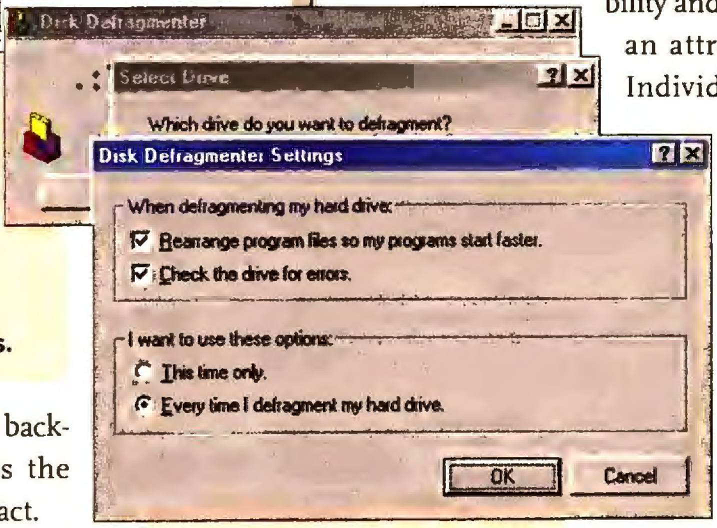
○ I receive the error message: "Ddhelp.exe caused a page fault in module Wstream.dll."

○ I receive the error message: "Required.dll is missing. Cannot locate ddraw.dll."

○ I receive the error message: "Wsock32.dll file cannot start."

○ I receive the error message: "Exception 03h in Msvfw32.dll."

WINDOWS 98'S HELP SYSTEM now includes new and improved troubleshooters to guide you through common configuration problems.



Which drive do you want to defragment?

When defragmenting my hard drive:

☑ Rearrange program files so my programs start faster.

☑ Check the drive for errors.

I want to use these options:

○ This time only.

● Every time I defragment my hard drive.

BETA 3'S IMPROVED disk defragmentation utility now automatically optimizes your applications for faster loading.

PUMP UP THE SPEED

FOR MONTHS, Microsoft has been saying that Win 98 will be the fastest version ever. Beta 3 suggests the company might be right. To begin with, Win 98 starts up and shuts down faster than Win 95 by skipping unnecessary drivers and the 2-second 'Starting Windows 95' delay. Systems built to the PC 98 hardware specification will also skip most of the interminable Power-On Self Test diagnostics, cutting boot-up time to 5 seconds or less. However, bypassing start-up diagnostics requires a new, PC 98–compatible system BIOS, which means current PCs will not see the full benefit.

The lengthy shutdown process in Win 95 is due mostly to its waiting for drivers to cut connections and remove themselves from memory. Win 98 shuts down faster by pulling the plug on drivers without waiting for them to close down, a shortcut that should work on any PC.

Win 98's enhanced disk defragmenter cranks up even more speed than the version that shipped in Beta 2, and unlike that version, which required extensive user intervention, the Beta 3 defrag tool works automatically in the background, noting which applications you use most frequently, which files they load, and in what order. Microsoft says that rearranging your most frequently used application files in sequential order and moving them to the more quickly accessible outer cylinders of your hard disk will reduce load times by 30 percent or more. Judging from the latest beta, they're right.

TOO LITTLE, TOO LATE?

BUT THESE improvements may not be enough to entice buyers. Corporate users may delay upgrading to avoid being bitten by the bugs and incompatibilities that can come with new software. If they wait long enough, Windows NT Workstation 5.0 should soon be available, and its vaunted stability and security may prove an attractive alternative. Individual users may not want to spend money on an OS upgrade whose biggest enhancement—IE 4.0—is a free download.

One more shadow hangs over Windows 98: the Department of Justice's action against Microsoft for requiring PC makers to bundle Internet Explorer with Windows 95. Although Win 98 is not yet part of the investigation, if the judge decides IE isn't an integral part of Windows, the company may have to provide an IE-free Windows 98 to PC makers who prefer to preinstall Netscape's browser. But Microsoft says that no matter how it turns out, the verdict won't apply to the retail version of Win 98, which will definitely ship with an integrated IE 4.0.

—*Scott Spanbauer* ▶

PDA Wars: Microsoft Challenges PalmPilot

BETA

IF YOU'VE BEEN thinking of buying a PalmPilot, consider waiting a few months. By early spring, companies like Casio, Everex, Philips, and Samsung will be selling similar devices based on a new version of Microsoft Windows CE 2.0 designed for these shirt-pocketable PDAs—Palm PCs in Redmond-speak. Judging from the prototypes we've seen, they may be worth the wait.

Every feature—from the display to the ease of synchronization with desktop PCs—appears to have been designed to convince prospective PalmPilot buyers (or current owners) to change their tune.

The only area where Palm PCs seem to trail PalmPilots is in power consumption. Microsoft estimates you'll have to replace the batteries (AA or AAA, depending on the model) every two to four weeks, compared with two or three months for the PalmPilot. Most Palm PC vendors will address this shortcoming by offering rechargeable batteries.

COSTLIER, BUT FEATURE RICH

ABOUT THE SIZE of a PalmPilot (and sharing the same deck-of-cards shape), Palm PCs will cost from $300 to $500. Like the PalmPilot, Palm PCs will come with address books, calendars, memo pads, to-do lists, and the software and hardware required to connect it to the desktop (but no expense tracker, a handy PalmPilot fixture).

> Everything – from the display to the **ease of synchronization** – appears designed to convince **PalmPilot buyers** to change their tune.

Pictured: The Philips Nino (front) is one of several Palm PCs aiming to take a bite out of the PalmPilot's market share.

All Palm PCs will also have built-in or optional modems as well as support for two-way wireless communications.

But even the cheapest Palm PCs will sport features that current PalmPilots do not, including more memory, a voice memo recorder, an infrared port, and a slot for adding modems, ethernet cards, bar-code scanners, or extra storage via compact flash memory cards. They will also have side buttons for single-handed navigation as an alternative to a PalmPilot-like stylus. We've found that after a few tries, one-handed operation becomes fairly easy.

When a Palm PC is turned off, its touch screen looks like that of a PalmPilot. But the Palm PC's screen can become significantly larger. With a Palm PC, the data-entry area at the bottom of the screen turns into normal screen real estate when not in use. With a PalmPilot, however, that 3/4-inch strip is permanently lost to input functions, whether you're using it or not. Moreover, the Palm PC's 240-by-320-pixel resolution makes for a much finer, more attractive display than the PalmPilot's 160-by-160 screen. For example, you can easily see a full year's calendar that looks like

Palm PC Features: The Look of a Winner

PDA	Price	Dimensions/weight	Battery	Modem	Memory
Palm Computing PalmPilot Pro 800/881-7256; palmpilot.3com.com	$369	4.7" x 3.2" x 0.7"/ 5.7 ounces	2 AAA	Optional $129 accessory	1MB
Casio Cassiopeia E-10 888/204-7765; www.casio.com	$399	4.9" x 3.2" x 0.7"/ 5.5 ounces	2 AA; AC adapter optional	Optional $100 modem adapter	4MB
Everex Freestyle 800/383-7391; www.everex.com	$299	4.8" x 3.2" x 0.7"/ 5.3 ounces	2 AAA or optional NiMH battery pack	33.6-kbps modem in optional battery pack	2MB
Philips Nino 300 888/367-8356; www.mobile.philips.com	$399 (4MB RAM)/$499 (with modem, 8MB RAM, phone cable, NiMH battery)	5.3" x 3.4" x 0.8"/ 7.3 ounces	2 AA or NiMH battery pack; AC adapter in unit	19.2-kbps software modem; requires modem attachment and phone cable	4MB/8MB
Samsung PalmPC 800/993-4110; www.sosimple.com	$399	5.1" x 3.4" x 0.8"/ 5.5 ounces	2 AA or NiMH battery pack; AC adapter in unit	14.4-kbps chip set, needs optional 10-pin modem connector	4MB

PHOTOGRAPH: KEVIN CANDLAND

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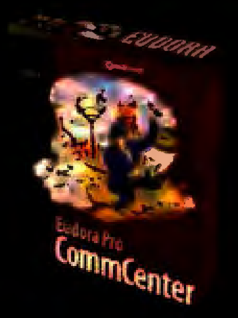

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- 56K Telephony Modem
- **Iomega Zip 100MB IDE Internal Drive w/One Cartridge**
- Subwoofer Sound System w/Amplified Stereo Speakers
- **MS IntelliMouse**
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- MS Windows 95
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Palm PCs will convert to text either unistroke characters similar to PalmPilot's Graffiti, or traditional handwritten characters. As with the PalmPilot, there's also an on-screen keyboard for hunting-and-tapping with your stylus. Finally, you can use a Palm PC as a conventional notepad simply by scribbling away on the touch screen and saving your scrawl as an image file.

SYNCH THIS

PALM PCS BRING other advantages to the table, including Windows CE 2.0's ability to synchronize automatically and continuously with your desktop applications while the device is in its cradle. In contrast, the PalmPilot requires you to initiate synchronization by hitting a button. And if you use one of Microsoft's PIMs—Outlook or Schedule Plus—on your desktop system, you won't have to buy a third-party program to synchronize, which you must do to use a PalmPilot with anything but its own desktop software.

Palm PCs also have that familiar Windows 95 look and feel. The opening screen offers a useful and customizable display of information such as the day's appointments and tasks. In addition to e-mail capability, Palm PCs have an offline browser for viewing Web pages that have been saved in Internet Explorer 4.0 and downloaded to the Palm PC in a special mobile format.

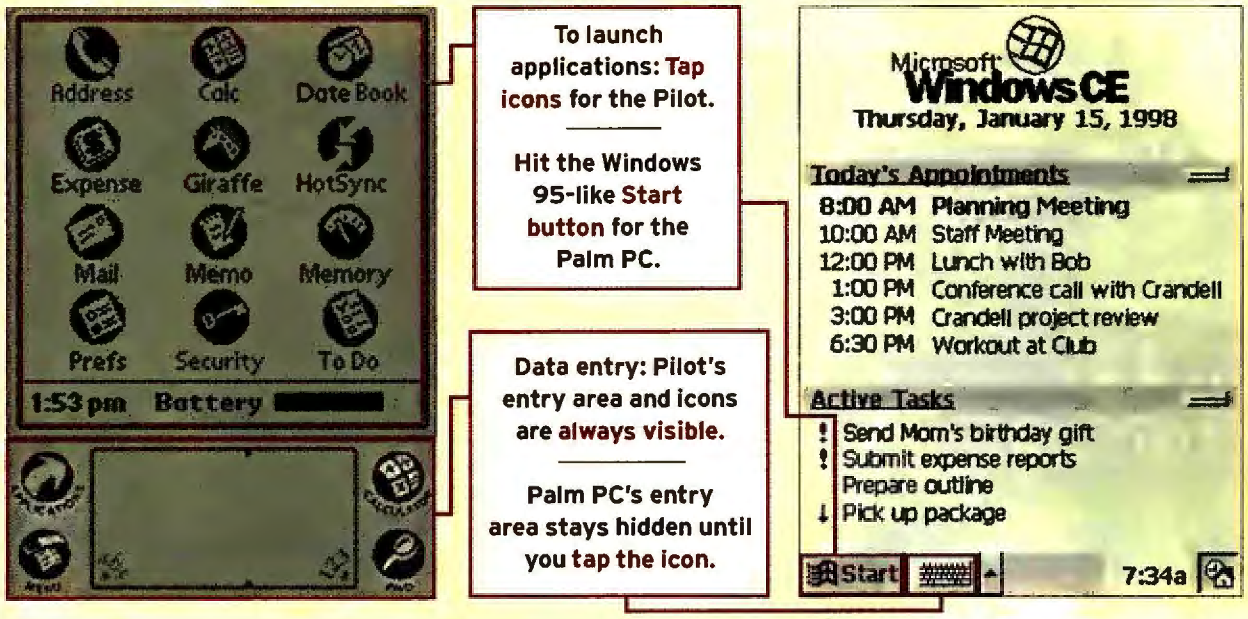
Palm Computing expects Palm PCs to be slower and more difficult to use than its PalmPilot. We found the prototypes slightly slower in some instances, but not horribly so. And they weren't hard to use, although some tasks required more stylus taps. But at least you could perform some complicated chores. For example, you can't use a PalmPilot to schedule a meeting on a calendar and invite people using your contact and e-mail apps.

Although Palm PCs aren't the first PalmPilot imitators—Texas Instruments' Avigo and Sharp's SE-500 came first—they're by far the most impressive alternative to date. If the shipping units live up to the prototypes, your next PDA may be a Palm PC. But Palm Computing isn't standing still: The firm says it's working on a successor to PalmPilot.

—*Yardena Arar* ▶

Palm PC Expands Screen Show

DIVERGENT APPROACHES to the user interface show on the main screens of a PalmPilot (left) and a Palm PC (right). The PalmPilot's lower screen resolution offers a simple, icon-based interface; Palm PCs boot up in a higher resolution to show a customizable, text-based snapshot of the user's appointments and to-do list.



To launch applications: Tap icons for the Pilot.

Hit the Windows 95-like Start button for the Palm PC.

Data entry: Pilot's entry area and icons are always visible.

Palm PC's entry area stays hidden until you tap the icon.

Microsoft Windows CE
Thursday, January 15, 1998

Today's Appointments
8:00 AM Planning Meeting
10:00 AM Staff Meeting
12:00 PM Lunch with Bob
1:00 PM Conference call with Crandell
3:00 PM Crandell project review
6:30 PM Workout at Club

Active Tasks
! Send Mom's birthday gift
! Submit expense reports
Prepare outline
↓ Pick up package

Start 7:34a

It's the Software, Stoopid

A PALMPILOT CAN hold the text of an entire book, keep a golf score, or negotiate with a shop clerk in a foreign country, thanks to a large community of software developers. But will Palm PCs accomplish similar feats? The prospects look good.

Lots of Support

AT THE PALM PC launch in January, Microsoft announced the names of nearly 70 third-party Palm PC applications. Some software developers will be writing original Windows CE 2.0 software; others will be porting their PalmPilot programs to the Palm PC platform.

Advanced Recognition Technologies is writing a new Windows CE title that will let you operate your Palm PC using spoken commands. Bsquare is building a time, expense, and mileage tracking package it calls BTrack, and a fax program dubbed BFax Express.

Some of the applications that Microsoft announced are already available for the PalmPilot. For example, Concept Kitchen will be coming out with a Windows CE version of Small Talk, a program that allows you to communicate in foreign languages (French, German, Italian, and Spanish, with more coming) by choosing from a library of common phrases. The person you're talking to looks at the on-screen translation and replies by selecting from a list of responses, which Small Talk also translates.

Wait and See

NOT ALL PalmPilot developers will be supporting the Palm PC immediately. For example, Aportis, which makes the AportisDoc software that lets you carry a book or two's worth of compressed text in a PalmPilot, will not be supporting Palm PCs until the devices ship and show signs of healthy sales, according to Frank Colin, an Aportis spokesperson. Even with Microsoft behind it, the Palm PC has to prove itself in the market in order to match the PalmPilot's breadth of support.

ILLUSTRATION: JEFFREY PELO

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Net Phones Still Wrong Number

DON'T HANG UP YOUR PHONE: Internet devices like the Aplio/Phone and InnoMedia InfoTalk do not impress us.

WHEN INTERNET telephony software first appeared in 1995, using a microphone and your PC's sound card to send voice over the Internet seemed like a great idea. The promise: low-cost, long-distance conversations with other, similarly equipped users that would let you tell the phone companies where to stick those bloated bills. Two and a half years later, it still seems like it will be a great idea. Someday.

BAD CONNECTION

OUR TESTS OF the latest wrinkle in voice over the Net—stand-alone Internet telephones—show that making Internet phone calls remains a difficult proposition. If you do get connected, the traffic on the Internet often makes the conversation sound like a ham radio call to Siberia.

The Internet telephone, basically a device that reroutes your call from the phone network to the Net, was designed to be easier to use and to sound better than PC-based calling devices. The Aplio/Phone ($199) and the InnoMedia InfoTalk ($299) are indeed PC-free. You attach them to your regular phone as you would an answering machine. But you can call only people who have the same system. (Aplio says the next version, due in May, will connect to a regular phone or a PC.)

Setup is tricky for either unit because you must use your telephone's touch-tone buttons to enter information. Using case-sensitive passwords is a nightmare. (To be fair, the Aplio units were prototypes, though the InfoTalk units were final versions.)

CAN'T HEAR YOU

CALLS ON EITHER the Aplio/Phone or InfoTalk are initiated by first making a regular—albeit brief—long-distance call to the other party. After they answer, you press a button and the Internet phones on both ends automatically connect both parties via their own ISP and the Internet.

That sounds simple, but in tests between three cities—Boston; Peterborough, New Hampshire; and San Francisco—we found that it often took 6 to 12 tries before we connected. Even when we were successful, the quality of both systems was mediocre, with long delays and silences that made a smooth conversation impossible.

But hope is on the horizon. New players—see the chart below—are entering the market with plans for a wide range of low-cost telephony services, most designed to let you make calls through the Net from any phone to any other phone, with high-speed data links to improve quality.

For now, though, unless you're willing to put up with a high degree of frustration and low quality, Internet phones are a wrong number.

—*Stan Miastkowski*

Aplio/Phone, $199 list; Aplio; www.aplio.com
READER SERVICE NO. 740
InfoTalk, $299 list; InnoMedia; www.innomedia.com
READER SERVICE NO. 741 ▶

Internet Calling Choices Proliferate, But Need Work

PRODUCT	Cost	Technology	Availability	Comments
VocalTec Internet Phone 5.0 www.vocaltec.com	$49.95	PC-to-PC	now	Requires PCs with sound cards and microphones; difficult setup; mediocre quality.
Aplio/Phone www.aplio.com	$199 [1]	Internet telephones	now	No PC needed; difficult setup; mediocre sound.
InnoMedia InfoTalk www.innomedia.com	$299 [1]	Internet telephones	now	No PC needed; difficult setup; mediocre sound.
IDT Net2Phone Direct www.idt.com	8¢/min. domestic 18¢-29¢/min. international	gateway calls	now	Standard phone using high-speed pipelines; call anyone; good quality. [2]
ITXC WWeXchange www.itxc.net	75% below standard long-distance rates [3]	ITSP gateway calls	late 1998	Internet telephone service providers; standard phones; high-speed connection with many local access numbers; call anyone. [2]

[1] Must also pay carrier for initial long-distance call.

[2] Limited testing by PC World.

[3] According to vendor.

PHOTOGRAPH: KEVIN CANDLAND

Microsoft, Novell Bolster Business LANs

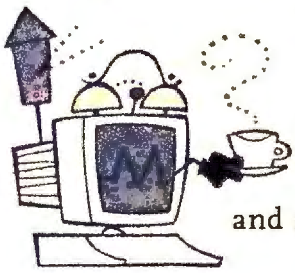
THERE CAN BE no doubt: The more things change, the more they become alike. Here's the definitive proof. We examined preproduction versions of major network operating system upgrades from Novell and Microsoft and found that instead of adding revolutionary new features, each has attempted to address its own drawbacks—and become more like the other.

COMING CONNECTIONS

IN THE SECOND half of 1998, Novell will introduce NetWare 5 with improved support for Internet and server-based applications—historically a strength of Microsoft's NOS, Windows NT Server. At the same time, Microsoft will ship NT Server 5.0, which improves its ability to manage networked resources across multiple servers—historically a key feature of NetWare.

Pricing for both products had not been announced at press time, but expect shipping versions to cost about the same as their current versions: for NT Server 5.0, $739 for five users, and for NetWare 5, $1095 for five users.

You may find that these new products offer more power and complication than you can handle. (Both require a dedicated server PC and a skilled technician to manage them.) So we also examined two simpler shipping products that are ideal for small offices and departments. Microsoft's new Back Office Small Business Server bundles NT Server 4.0 e-mail, Web hosting, and other LAN applications into one package ($1499 for five users). This product, which shipped in late 1997, requires a dedicated server, but an experienced PC user can set up and manage it. For people with less patience and money, MangoSoft's Medley97 ($899 for five users) lets you share files without the need for a dedicated server. We installed all products on a 133-MHz Pentium system with 64MB of RAM.



NetWare 5 includes **a Web server and TCP/IP support,** which simplifies life for LAN managers.

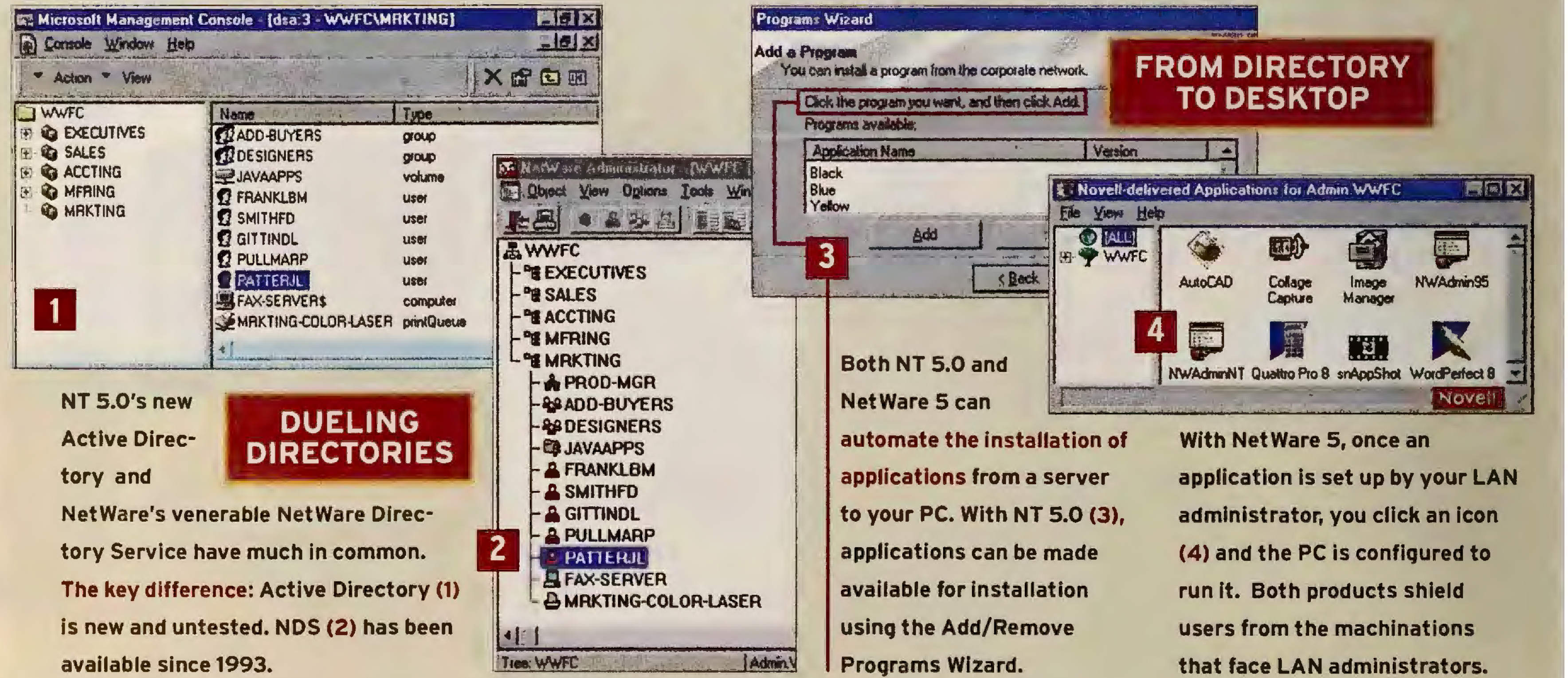
FILLING THE GAPS

NETWARE'S STRENGTH has always been its NetWare Directory Service. NDS makes it easier to manage and use networked resources, such as file servers and printers, on a large, extensive LAN—one that may connect hundreds of users and span multiple company locations. That situation hasn't changed. However, NetWare has traditionally lagged behind products like NT Server when it came to hosting Web sites, running groupware products like Lotus Notes, and supporting TCP/IP. NetWare 5 is intended to rectify these deficits.

NetWare now includes built-in TCP/IP support, which simplifies life for your LAN manager. With earlier versions of NetWare, if you needed access to both NetWare servers and a shared Internet connection, your LAN manager had to configure the network and attached PCs with multiple protocols. This hassle is history. For Web hosting, NetWare 5 comes bundled with a ▶

ILLUSTRATIONS: TERRY COLON

NT 5.0 and NetWare 5 Diverge on Path to Easier Management



DUELING DIRECTORIES

NT 5.0's new Active Directory and NetWare's venerable NetWare Directory Service have much in common. **The key difference:** Active Directory **(1)** is new and untested. NDS **(2)** has been available since 1993.

FROM DIRECTORY TO DESKTOP

Both NT 5.0 and NetWare 5 can **automate the installation of applications** from a server to your PC. With NT 5.0 **(3)**, applications can be made available for installation using the Add/Remove Programs Wizard.

With NetWare 5, once an application is set up by your LAN administrator, you click an icon **(4)** and the PC is configured to run it. Both products shield users from the machinations that face LAN administrators.

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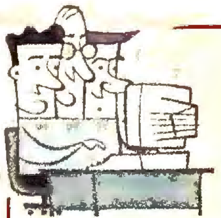


Netscape's SuiteSpot Looks Like Promising Start

TO GET THE most out of your LAN, you need more than just the right network operating system, you also need the right network apps. By midyear, expect to see a significant upgrade to Netscape's SuiteSpot. We did not test it, but we were impressed by what we heard from Netscape product management.

SuiteSpot currently includes the widely used Enterprise Web server, an e-mail and messaging server, the Collabra groupware server, a calendaring server, and a directory server.

Its next release, code-named Apollo, includes new features that further differentiate it from competing products. Apollo will enable you to store your application preferences, desktop configuration, and settings in SuiteSpot's directory server. This setup will simplify working remotely, particularly if you are using someone else's PC.

For example, you could log in to the SuiteSpot server from a coworker's PC at a branch office, or from an airport Internet kiosk, and read and send e-mail, participate in discussion forums, or make changes to your personal calendar with the same ease as if you were using your own PC at the office.

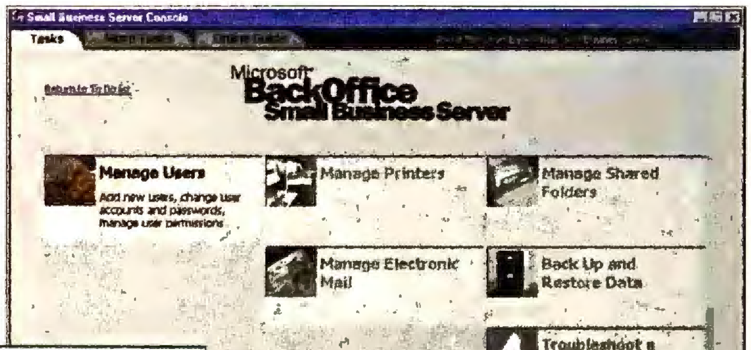
Netscape also plans to increase SuiteSpot's scalability, so that it can also be used to host larger Internet apps, such as one that markets your company's products over the Web.

version of Netscape's FastTrack Web server. This product was not available for testing at press time.

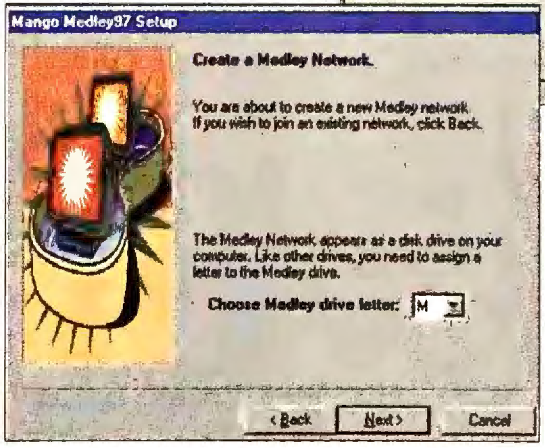
Now the bad news. Though NetWare 5 will run some server-based applications, this capability is limited to programs written either in Java (a new capability) or Novell's proprietary NetWare Loadable Module format. While many companies produced NLM versions of server-based apps when NetWare was the only server game in town, new NLM applications are not appearing anywhere near as fast as new NT-based applications. Java's future prospects are probably better, though the current universe of Java applications is very limited. This could change soon. Both Corel and Lotus have announced Java variations of their popular office suites, which we expect to examine later this spring.

SERIOUS SERVICES

NT SERVER 5.0 will be the first NT version to offer a viable competitor to NetWare's Directory Service. We found NT 5.0's new Active Directory easier to set up than its Novell rival. Also, Active Directory offers some features not found in NetWare. Active Directory can combine your Internet e-mail and NT server identities—your LAN administrator can structure the NT 5.0 server environment so your NT user name and Internet e-mail address can be the same, giving you one less ID to remember.


Small Business Server Console
Tasks
Microsoft BackOffice Small Business Server
Manage Users
Add new users, change user accounts and passwords, manage user permissions
Manage Printers
Manage Shared Folders
Manage Electronic Mail
Back Up and Restore Data
Troubleshoot a Problem

SMALL BUSINESS SERVER provides one screen for managing NT server and related apps.



You are about to create a new Medley network. If you wish to join an existing network, click Back.

The Medley Network appears as a disk drive on your computer. Like other drives, you need to assign a letter to the Medley drive.

Choose Medley drive letter: M

NO-NONSENSE NETWORK: We had Medley97 up and running on two PCs in about 20 minutes.

NT 5.0 will attempt to make it easier to add new applications to your PC. Your network administrator will be able to add an application to an NT server and then use a new tool called the Group Policy Editor to "assign" or "publish" applications to your PCs. Applications assigned to your PC appear as options in your Start Menu or on your desktop. Assigned programs are self-installing—the first time you click an assigned application's icon, it installs itself on your PC. Applications that are published appear as installable options when you use Windows' Add/Remove Programs option. These features could be demonstrated but not thoroughly tested in our beta version.

NetWare 5 achieves the same end with a different approach. It provides your LAN manager with a relatively simple tool called SnAPPShot that creates a profile to automate the installation of applications on your PC. Once this installation profile is created, your LAN manager uses NetWare's Directory Service to assign applications to you. The first time you click an assigned application's icon, your PC is automatically configured to run a server-based copy of the corresponding application. While NetWare's solution is relatively mature (it has been available for NetWare 4 users since late last year), we found it a little clumsy to use.

SIMPLER SOLUTIONS

IF YOU NEED only the basics, such as sharing files and printers, better options exist. Windows 95 and NT Workstation both offer built-in file and printer sharing. These basic sharing capabilities work well but leave you vulnerable if you've stored a file folder on a coworker's PC and that person deletes the folder or goes on vacation.

For only a little more effort and money ($899 for five users, with no dedicated server needed), you can implement more robust and secure disk sharing by installing MangoSoft's Medley97 on your networked PCs. ▶

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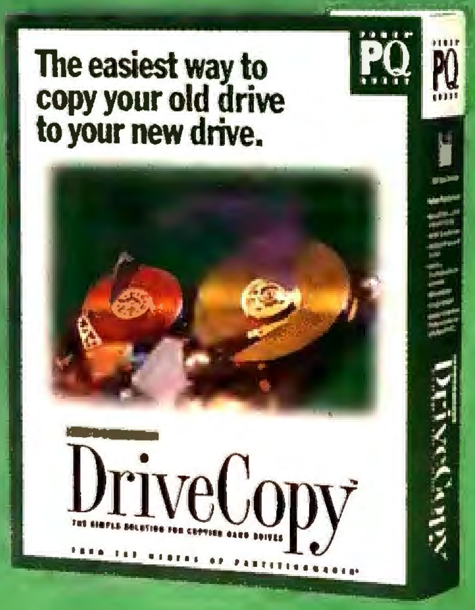

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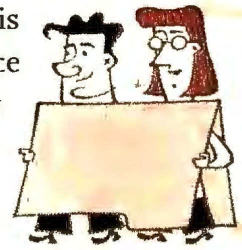
With Medley97, every shared file is kept in the shared disk space on at least two PCs. The product also lets you set access rights to files with features that rival NT or NetWare. Moreover, Medley97 is easy to set up. Once you complete the only required preparatory step—installing and activating network interface cards in your PCs—the rest is simple. We had two PCs sharing files with Medley97 in 20 minutes.



If you only need to share files, **Medley97** offers simplicity for **shoestring budgets.**

If you need more features and have more technical skills, consider Microsoft's Small Business Server ($1499 for five users). In addition to NT Server 4.0, this product includes Exchange Server and Outlook (e-mail), Internet Information Server (Web server), FrontPage (Web page creation), Proxy Server (tool for managing Internet access from your network), and SQL Server (a database server). In our evaluation, the package installed its components almost perfectly.

Even with all those apps, installation is automatic to the point that it rivals Medley97 for simplicity. Generally, your role in the process is little more than loading the software onto the server; the only time we intervened was to manually enter our server's network adapter and VGA card settings. (You'll similarly need to reconfigure Small Business Server manually if you're installing it where a network already exists.) After installation, Small Business Server provides a comprehensive and easy-to-use management screen for performing administration tasks.

With all these new LAN products here now or coming soon, what should you do? If you're a content NT or NetWare user, you may want to consider the next release of your current product. But be wary of the major new features discussed here. Novell's NetWare Directory Service was not completely reliable in its first release, and we anticipate the same kind of immaturity from NT's Active Directory.

Likewise, don't expect NetWare's new Java engine to let you run all the LAN apps you crave. Until Java versions of your favorite programs are widely available, NT will remain the best platform for server-based applications.

Small offices have it easier. If you want server applications and a NOS in one package, consider Microsoft's Back Office Small Business Server. If your network is small and you only need to share files, Medley97 offers simplicity for shoestring budgets.

—Bill Lawrence

- **Medley97** $899 for five users; dedicated server not required; MangoSoft Corp.; 888/886-2646; www.mango.com

READER SERVICE NO. 742

- **Microsoft Back Office Small Business Server** $1499 for five users; includes LAN applications; Microsoft Corp.; 800/426-9400; www.microsoft.com/backofficesmallbiz

READER SERVICE NO. 743

- **NetWare 5** $1095 for five users (estimated); Novell; 800/638-9273; www.novell.com

READER SERVICE NO. 744

- **Windows NT Server 5.0** $739 for five users (estimated); Microsoft; 800/426-9400; www.microsoft.com/ntserver

READER SERVICE NO. 745 ■

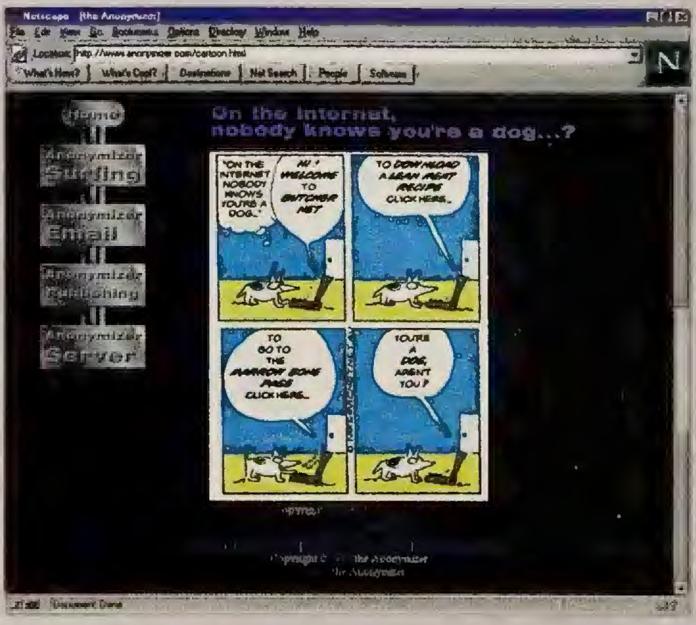
WEB BROWSER

Bugged by Internet Snoops? Fight Back

THINK IT'S SAFE to post personal information on the Net? Check out the recent case of a Navy enlisted man who claims he is being discharged because his America Online profile suggested he might be gay.

You can find out about that case, and the latest news on privacy and computers, by visiting the Electronic Privacy Information Center (www.epic.org). The site has regular updates on legislation and regulations and offers a range of resources, including a bookstore with a large collection of privacy-related books you can order from Amazon.com. It also has information on tools such as encryption programs, anonymous remailers, and cookie busters.

One such tool, The Anonymizer (www.anonymizer.com/main.html), is a Web site that helps you stay, well, anonymous, by acting as an intermediary between you and any other Web site you happen to visit. When you surf, you don't leave that telltale trail of cookies that give away your secrets (like sites you've recently visited), and when you send e-mail, your address is hidden from marketers who might like to add you to their lists. The service costs $15 for three months.


Netscape - [the Anonymizer]
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Location: http://www.anonymizer.com/cartoon.html
What's New? What's Cool? Destinations Net Search People Software
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Anonymizer Email
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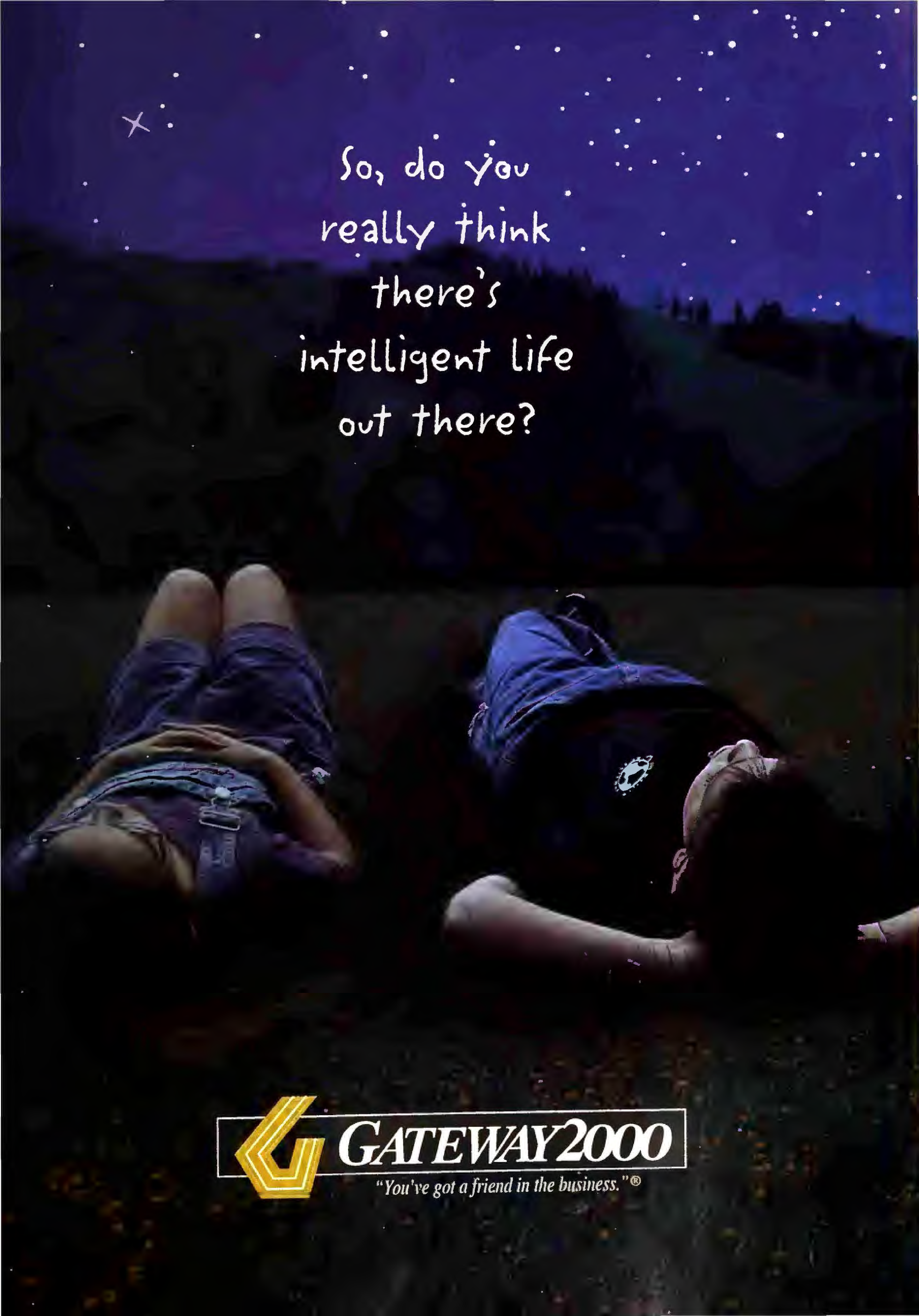
Document: Done

INVASIONS OF PRIVACY aren't funny, but The Anonymizer leavens its service-oriented site with some humor.

Another site devoted to cyberprivacy, Truste, (www.truste.org), takes an activist approach. It publishes an online privacy petition (which can easily be forwarded) asking Web publishers to disclose what information they collect and how they use it. Truste surveys sites for alleged privacy violations, publishes a periodic online newsletter, and issues a seal of approval to sites that comply with the organization's guidelines. To date, only a handful of sites have qualified, but some big names, including Excite, are expected to be on board by the time you read this.

—Theodora Tongas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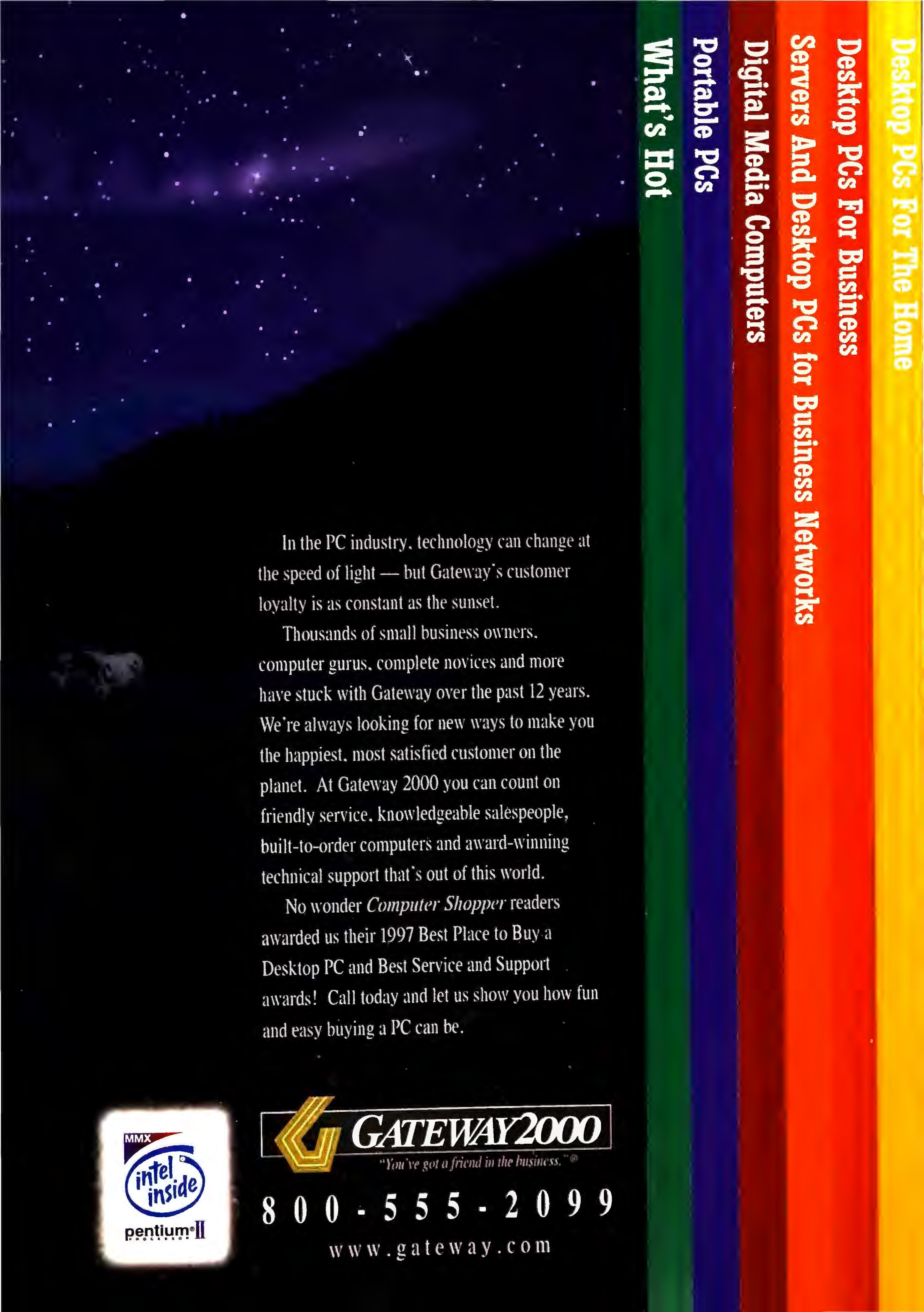
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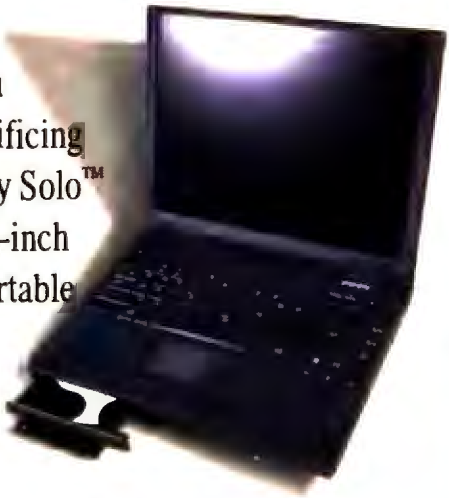

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- 7-Bay New-Look, Charcoal-Colored PC Case
- Cordless Keyboard w/ EZ Pad® Pointing Device
- Cordless Field Mouse Remote
- Microsoft® Windows® 95
- **Microsoft Choice Softwarw**
- Gateway Gold℠ Service & Support◆ for DMCs

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a PC.)

Visioneer® PaperPort® 3000 Color Scanner	**$149**
harman/kardon High-Fidelity Sound System Upgrade	**$250**
31-inch SVGA Color Monitor	**$699**
Learning 2000™ Lifetime Library	**Call for pricing.**

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At Gateway 2000, we know it sometimes takes burning the midnight oil to keep your business on the cutting edge. That's why our dedicated sales and service representatives are here at all hours too, working to help you run your organization efficiently and effectively. Gateway Business Direct is your one-stop shop for network solutions — including flexible financing options, compatibility-tested PCs ready to be integrated into your network, and a complete line of NS-Series servers.

Based on proven technology from ALR, a Gateway subsidiary, these servers deliver the reliability, manageability and scalability your network demands. Cables, printers, hubs and scanners are also available to round out your network. And trained technicians are here around the clock to keep everything running trouble free. Call Gateway Business Direct today.

GATEWAY™ NS-Series Servers

NS-7002

- Intel® 233MHz **Pentium® II** Processor with 512K ECC Cache
- SMP-Compliant (Dual-Processor Ready) Supporting Up To Two Pentium II Processors (upgradable to 266MHz, 300MHz & 333MHz)
- 32MB EDO Memory (expandable to 512MB)
- ECC Memory System
- 4GB Ultra Wide SCSI-3 5,400 RPM Hard Drive
- Integrated Ultra Wide SCSI-3 Controller
- 12X SCSI CD-ROM Drive & 3.5" Diskette Drive
- 3Com® 10/100 Twisted Pair Ethernet Adapter
- Three 32-Bit PCI, Two EISA, One PCI/EISA Slots
- 4 DIMM Slots
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- Integrated 32-Bit PCI Graphics with 2MB DRAM
- Seven-Bay NS-7000 Server Tower Case with 325-Watt Power Supply, Includes five External Bays (three 5.25" and two 3.5") and two 3.5" Internal Bays
- 104⁺ Keyboard & Mouse
- Microsoft® Windows NT® Server 4.0 (1-4 CPUs, 10 User Licenses)
- ALR InforManager™ Server Management System with ActiveCPR™ Processor Protection

$3559 **Gateway GoldValue Lease† $125/mo.**

Gateway GP-Series PC

GP5-200E

- Intel 200MHz Pentium Processor with MMX™ Technology
- 32MB SDRAM
- 256K Pipelined Burst Cache
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- Integrated PCI Video with 2MB DRAM
- 2GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive & 3.5" Diskette Drive
- Integrated 16-Bit Business Audio
- Integrated 10/100 Ethernet Twisted Pair Adapter
- Low Profile Desktop Case
- 104⁺ Keyboard & Mouse
- MS Windows® 95 & MS Office 97, Small Business Edition plus Bookshelf® 98
- Intel LANDesk® Client Manager 3.01
- Desktop Management Interface (DMI) 1.1 Compliant
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E-Series Systems

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NS-8002

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- SMP-Compliant (Dual-Processor Ready) Supporting Up To Two Pentium II Processors (upgradable to 266MHz, 300MHz & 333MHz)
- 64MB EDO Memory (expandable to 512MB)
- ECC Memory System
- 4GB Ultra Wide SCSI-3 5,400 RPM Hard Drive
- Integrated Ultra Wide SCSI-3 Controller
- 12X SCSI CD-ROM Drive & 3.5" Diskette Drive
- 3Com 10/100 Twisted Pair Ethernet Adapter
- Four 32-Bit PCI, One EISA, Two PCI/EISA Slots
- 4 DIMM Slots
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- Integrated 32-Bit PCI Graphics with 2MB DRAM
- 13-Bay NS-8000 Server Tower Case with 325-Watt Power Supply, Includes seven External Bays (five 5.25" and two 3.5") and six 3.5" SCA Drive Bays (requires SCA drives)
- 104⁺ Keyboard & Mouse
- MS® Windows NT Server 4.0 (1-4 CPUs, 10 User Licenses)
- ALR InforManager Server Management System with ActiveCPR Processor Protection

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Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a PC.)

Desktops

- 3Com PCI 10/100 TP Ethernet Adapter **$64**
- 16-Bit Token Ring Adapter **$159**
- MS Windows NT Workstation 4.0 **$99** *(upgrade from PCs with MS Windows 95)*

Servers

- 3-Channel ADAC RAID Card **$1130**
- 3-Drive RAID Cage **$100** *(requires 3-Channel ADAC RAID Card)*
- Three 4.2GB SCSI SCA Drives **$1955** *(requires 3-Drive RAID Cage)*
- ADAC RAID Memory Upgrades *(Call for pricing.)*
- 2nd Pentium II 233MHz Processor with 512K ECC Cache **$730**

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GP6-233

- Intel® 233MHz **Pentium II** Processor with 512K Cache
- 32MB SDRAM
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- 8MB 3-D AGP Graphics
- 2GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104⁺ Keyboard & MS® IntelliMouse™
- Microsoft® Windows® 95 & MS Office 97, Small Business Edition plus Bookshelf® 98
- Gateway Gold℠ Service & Support for GP-Series PCs

$1599 **Gateway GoldValue Lease† $56/mo.**

Gateway GP6-233,* PC World *Power Desktop, October 1997

GP6-266

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB 3-D AGP Graphics
- 4GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104⁺ Keyboard & MS IntelliMouse
- MS Windows 95 & MS Office 97, Small Business Edition plus Bookshelf 98
- Gateway Gold Service & Support for GP-Series PCs

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GP6-300

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- 8MB 3-D AGP Graphics
- 8.4GB 8.5ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104⁺ Keyboard & MS IntelliMouse
- MS Windows NT® 4.0 & MS Office 97, Small Business Edition plus Bookshelf 98
- Gateway Gold Service & Support for GP-Series PCs

$2399 **Gateway GoldValue Lease† $84/mo.**

GP6-333 BEST BUY

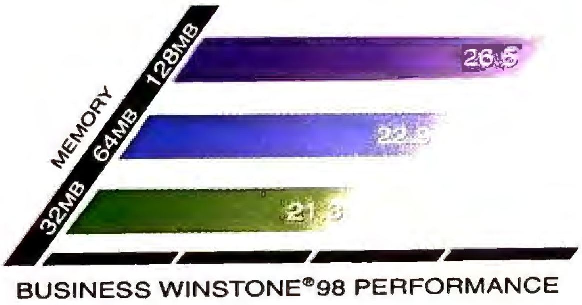
- Intel 333MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- ▸ **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 8MB 3-D AGP Graphics
- 8.4GB 8.5ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104⁺ Keyboard & MS IntelliMouse
- MS Windows NT 4.0 & MS Office 97, Small Business Edition plus Bookshelf 98
- Gateway Gold Service & Support for GP-Series PCs

$2899 **Gateway GoldValue Lease† $101/mo.**

Gateway Extras

(Some items only available to new or existing Gateway customers or with the purchase of a PC.)

3Com® PCI 10/100 TP Ethernet Adapter	**$64**
TelePath® Modem *for Windows,* with x2™ Technology	**$79**
MS Windows NT Workstation 4.0 *(upgrade from PCs with MS Windows 95)*	**$99**
Iomega® Internal ZIP™ Drive with Two Discs	**$99**
TR4 IDE 4GB Tape Backup Unit wih Tape	**$199**
Hewlett®-Packard OfficeJet 600	**$499**



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- 32MB SDRAM
- EV500 .28 Screen Pitch 15" Monitor (13.9" viewable)
- **nVidia™ 4MB 3-D AGP Graphics**
- 2GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq® Wavetable Audio
- Altec Lansing® ACS-41 Speakers
- TelePath® Modem *for Windows* with x2™ Technology
- G-Series Desktop Case
- MultiFunction Keyboard & Mouse
- Microsoft® Windows® 95
- **Microsoft Home Essentials Software**
- Gateway Gold℠ Service & Support for G-Series PCs

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G6-266 BEST BUY

- Intel 266MHz **Pentium II** Processor with 512K Cache
- 32MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- **nVidia 4MB 3-D AGP Graphics**
- 4GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics® MicroMedia™ 3-Piece Speaker System
- TelePath Modem *for Windows*, with x2 Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & Mouse
- MS® Windows 95
- **Microsoft Home Essentials Software**
- Gateway Gold Service & Support for G-Series PCs

$1999 As low as^{x} $70/mo.

G6-300

- Intel 300MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- **nVidia 4MB 3-D AGP Graphics**
- 6.4GB 10ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics MicroMedia 3-Piece Speaker System
- TelePath Modem *for Windows*, with x2 Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse™
- MS Windows 95
- **Microsoft Choice Software**
- Gateway Gold Service & Support for G-Series PCs

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G6-333

- Intel 333MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- **nVidia 4MB 3-D AGP Graphics**
- 8.4GB 8.5ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- Boston Acoustics MicroMedia 3-Piece Speaker System
- TelePath Modem *for Windows* with x2 Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- MS Windows 95
- **Microsoft Choice Software**
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G6-333XL

- Intel 333MHz **Pentium II** Processor with 512K Cache
- 128MB SDRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- **nVidia 4MB 3-D AGP Graphics**
- TV/FM Tuner Card
- 9GB 8.2ms 10K RPM Ultra-Wide SCSI-3 Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **Boston Acoustics MediaTheater™ 3-Piece Speaker System**
- TelePath Modem *for Windows* with x2 Technology
- Iomega® Internal ZIP™ Drive
- G-Series Tower Case
- MultiFunction Keyboard & MS IntelliMouse
- MS Windows 95
- **Microsoft Choice Software**
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Gateway Extras

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- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
  - upgrade from EV500 $450
  - upgrade from EV700 $280
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  - At time of system purchase $99
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Gateway G-Series Multimedia PC

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- 32MB SDRAM
- EV700 .28 Screen Pitch 17" Monitor (15.9" viewable)
- **nVidia™ 4MB 3-D AGP Graphics**
- 4GB 11ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- Ensoniq® Wavetable Audio
- Boston Acoustics® MicroMedia™ 3-Piece Speaker System
- TelePath® Modem *for Windows*, with x2™ Technology
- G-Series Mid-Tower Case
- MultiFunction Keyboard & Mouse
- Microsoft® Windows® 95
- **Microsoft Home Essentials Software**
- Gateway Gold℠ Service & Support for G-Series PCs

$1999 As low as* $70/mo.

Gateway GP-Series Professional PC

GP6-333 BEST BUY

- Intel 333MHz **Pentium II** Processor with 512K Cache
- 64MB SDRAM
- **EV900 .26 Screen Pitch 19" Monitor** (18" viewable)
- 8MB 3-D AGP Graphics
- 8.4GB 8.5ms Ultra ATA Hard Drive
- 13X min/32X max CD-ROM Drive
- 3.5" Diskette Drive
- GP-Series Mid-Tower Case
- 104⁺ Keyboard & MS® IntelliMouse
- MS Windows NT® 4.0 & MS Office 97, Small Business Edition plus Bookshelf® 98
- Gateway Gold Service & Support for GP-Series PCs

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We custom build each GATEWAY 2000®
system to your specifications.

Gateway Destination® DMC

D6-233 BEST BUY

- Intel 233MHz **Pentium**® **II** Processor with 512K Cache
- 32MB SDRAM
- Destination 31" SVGA Monitor
- 2MB Graphics Accelerator with Cable-Ready TV Tuner
- 4GB 11ms Ultra ATA Hard Drive
- **DVD-ROM Drive & DVD Decoder Card**
- 3.5" Diskette Drive
- Ensoniq Wavetable Audio
- **Boston Acoustics® MicroMedia™ 3-Piece Speaker System**
- TelePath Modem *for Windows*, with x2 Technology
- 7-Bay Charcoal-Colored PC Case
- Cordless Keyboard w/ Integrated EZ Pad® Pointing Device
- Cordless Field Mouse® Remote
- MS Windows 95
- **Microsoft Choice Software**
- Gateway Gold Service & Support◆ for DMCs

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Gateway Solo™ Portable PC

9100XL BEST BUY

- **14.1" XGA TFT Color Display**
- Intel 266MHz Pentium Processor with MMX™ Technology
- 64MB SDRAM (expandable to 192MB)
- 512K Pipelined Burst Cache
- 4MB EDO Video RAM
- **Removable Combo 8X min/20X max CD-ROM & 3.5" Diskette Drive**
- 5GB Hard Drive
- Two Lithium Ion Batteries & AC Pack
- External Battery Charger
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- NTSC/PAL Video Input & Output
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- **Gateway GoldValue Lease**[†] – This convenient leasing program is available to qualified commercial customers, and arranged by independent leasing companies with 36-month payment terms. Lease terms are subject to change without notice or obligation.
- **Gateway Easy Pay** – Give your budget a boost with quick credit approval and loans up to $25,000 with low fixed monthly payments. There's no application fee and repayment terms are flexible.
- **90 Days Same As Cash** – Put your Gateway PC to work or play now, and don't pay a thing for 90 days. Ask for details.
- **Gateway Moola MasterCard® Credit Card** – Now a value-packed Gateway PC is well within your reach! The Gateway Moola MasterCard card offers a competitive interest rate and no annual fee. Plus you also earn rebate points that can be used toward future Gateway purchases. Certain restrictions apply.

Extras

(Available to existing Gateway customers or with system purchase.)

- Kensington Master Lock® Cable $39
- Starter Kit $59 *(Includes wrist rest, surge protector, CD wipes, monitor wipes, 10 formatted 3.5" diskettes, diskette/CD box and keyboard cover.)*
- Comfy™ ComfyKeyboard (for kids) $99
- Microsoft SideWinder™ Force Feedback Pro Joystick & Enthusiast Pack Software — Tigershark™: 2060 A.D.; MDK: Mission Laguna Beach™ and Interstate 76 *(Contains mature language.)* $139
- Visioneer® PaperPort® 3000 Color Scanner $149 *($50 rebate offer available.)*
- Visioneer PaperPort Strobe Serial Color Scanner $199
- Epson® PhotoPC™ 550 Color Digital Camera $299
- APC® Back-UPS Office™ $119
- APC Back-UPS Pro 650 $319

Printers & More

(Each printer includes cable and ink cartridge.)

- Epson Stylus® COLOR 400 Ink Jet Printer $199
- Epson Stylus COLOR 600 Ink Jet Printer $269
- Canon® BJC®-80 Color Bubble Jet Printer $299
- Hewlett®-Packard LaserJet 6Lse Laser Printer $399
- Epson Stylus COLOR 800 Ink Jet Printer $399
- Hewlett-Packard 890Cse Color Laser Printer $449
- Hewlett-Packard OfficeJet 600 $499
- Hewlett-Packard LaserJet 6Pse Laser Printer $799

Software

Microsoft® Office 97, Small Business Edition

Includes Microsoft Excel; Word; Publisher; Bookshelf®; Small Business Financial Manager and Outlook™. *(Available only with system purchase.)*

Microsoft Home Essentials

Includes Microsoft Word; Works; Encarta® Encyclopedia; Money; Greetings Workshop and Entertainment Pack: The Puzzle Collection. *(For sale in U.S. only, available only with system purchase.)*

Microsoft Choice

If your PC comes with Microsoft Choice, you'll receive Microsoft Home Essentials *plus* one of these three packages: *(Available only with system purchase.)*

- **Microsoft Child Adventure Suite** (available as an upgrade for $99) Plus! For Kids; Chaos Island: The Lost World™; Goosebumps®: Attack of the Mutant™ 98; Scholastic's The Magic School Bus™ Explores in the Rain Forest; 3-D Movie Maker; Scholastic's The Magic School Bus Explores in the Age Of Dinosaurs and Creative Writer 2.
- **Microsoft Action Titles** (available as an upgrade for $99) Close Combat™; Flight Simulator; Age of Empires™; Monster Truck Madness™; DILBERT'S™ Desktop Games and The Neverhood™.
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This curriculum-based education program is designed to enhance kids' studies in math, algebra, reading and writing — all at their own pace. Levels range from fifth through twelfth grades. **Call for pricing.**

Gateway Software

- **Finance Pack** *(For sale in U.S. only.)* Includes Quicken® Deluxe 98; Quicken Financial Planner™ 2; Quicken Family Lawyer™ 7; Quicken Parents' Guide to Money™ and TurboTax® Deluxe coupon. $69
- **Family Reference Bundle** Includes Grolier Multimedia Encyclopedia®; Mindscape's® World Atlas 6.0; Rand McNally TripMaker™; National Geographic® Swinging Safari Really Wild Animals™ and Mayo Clinic® Family Health. $79
- **Gamer's Pack** Includes DeadLock™; Jack Nicklaus® 4; Super Bubsy®; Sega Rally™ Championship; Mixman 3-Mix™ and PC ProPad. $99
- **Kid's BackPack™ 98** Includes Barbie™ Magic Fairy Tales™ Barbie as Rapunzel; Highlights® Hidden Pictures™ Workshop; Wishbone™ and the Amazing Odyssey; Kids Count™ Jack's House™; Kids Count Jack's Attic™; CTW/Sesame Street® Elmo's Preschool; Twinsen's Odyssey™ and cow-spotted backpack. $99
- **Education Bundle Grades K-3** Includes Reader Rabbit® 1; Math Rabbit®; Let's Start Learning!™; Interactive Math Journey®; Reader Rabbit's Interactive Reading Journey® 1; Paint, Write, Play!™ and Ultimate Children's Encyclopedia™. $99
- **Education Bundle Grades 4-8** Includes Super Solvers® Gizmos & Gadgets!®; Super Solvers OutNumbered!®; Student Writing Center®; Logic Quest™; The Oregon Trail® and Ultimate Writing & Creativity Center® $99

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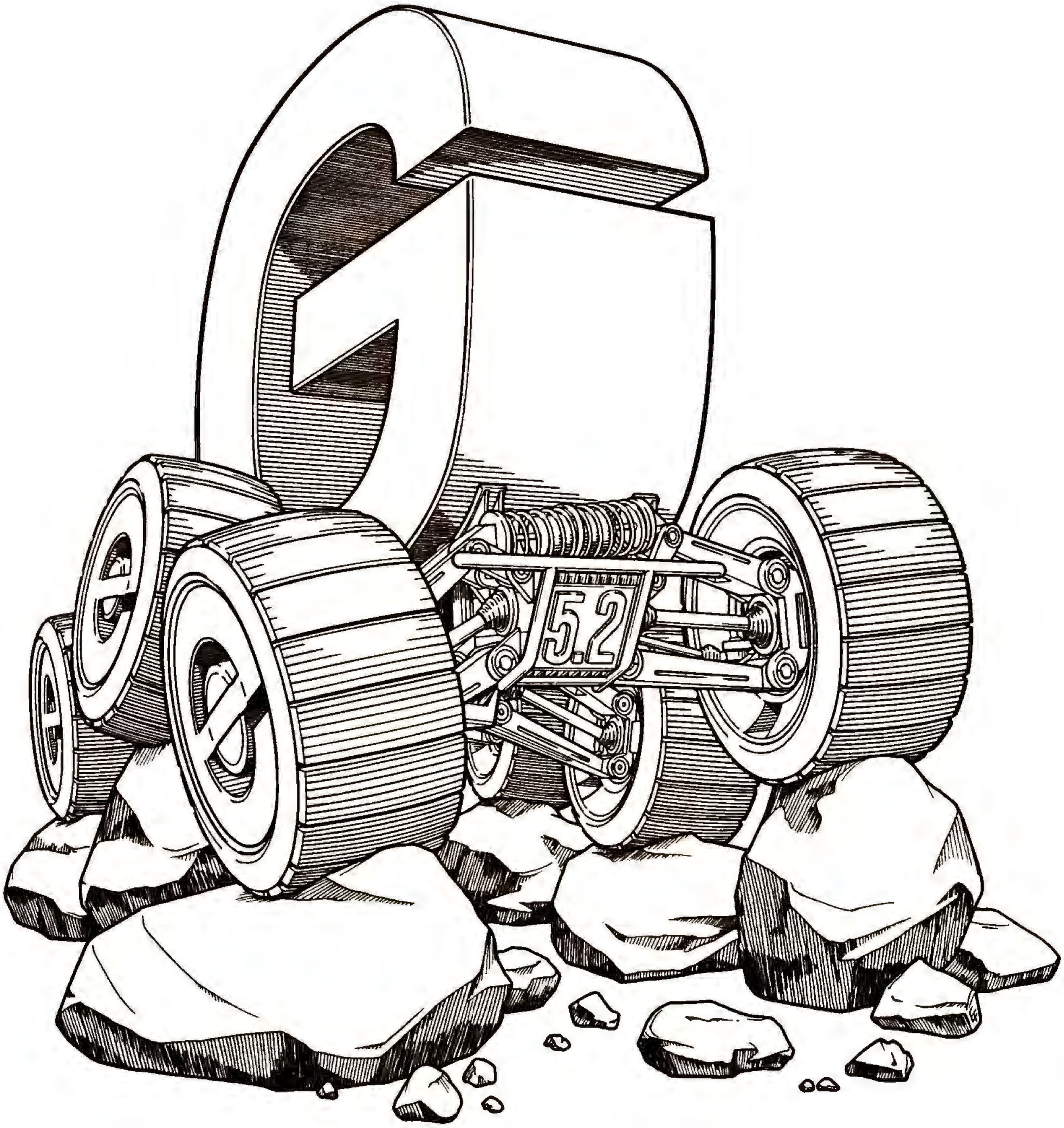

5.2

NEW PRODUCTS

IBM's New Aptiva Breaks the $1000 Barrier

YOU GET WHAT YOU PAY FOR: IBM's $799 Aptiva E16 runs solidly, though the configuration isn't fancy.

DESKTOP

IBM'S PCS HAVE a reputation for many things—quality, reliable components, respectable customer support—but competitive pricing hasn't been one of them. That's why *PC World* has usually recommended systems from reputable mail-order companies such as Dell and Micron over IBM's Aptiva line: Those companies tend to offer comparable products for lower prices.

But even Big Blue has been unable to ignore the sub-$1000 PC stampede. At $799, the new **Aptiva E16** is your cheapest ticket to the IBM name—if not to all the upscale components and features that characterize the more expensive Aptiva systems. For one thing, no monitor is included in the price (IBM displays start at $249 for a 14-incher, $349 for a 15-incher, and $649 for a 17-incher). And though it's housed in a full-size midtower with room to expand, the E16 is not black or sleek like its cousins; it's off-white, square, and rather unappealing. Finally, there's no Intel inside: The E16 is based on an Advanced Micro Devices K6-166 MMX processor.

A shipping E16 unit performed at a satisfactory pace for its class, with a PC WorldBench score of 205—slightly ahead of the Pentium MMX-166–based Seanix Baby Grand CS ($999 with monitor), but slightly behind the similarly configured Gateway 2000 G5-166, which costs $1499 but comes with a monitor and color printer. These performance differences would not be noticeable in typical business applications. The E16's specs range from skimpy to adequate: 16MB of SDRAM, a 2.1GB hard disk, a 12X–20X CD-ROM drive, a 56-kilobits-per-second K56flex modem, an ATI Rage II 3D graphics card, and two Universal Serial Bus ports. The modest software bundle includes Lotus SmartSuite 97, Netscape Navigator 3.0, and trial memberships for a few online services, along with proprietary antivirus and diagnostic software.

As an additional incentive for those who buy before March 1, IBM will waive the $100 first-year-membership fee for its Owner Privileges Program, which promises preferential customer service, deals on software and accessories, and enhanced technical assistance. (Annual renewal fees start at $20.)

The E16 will have plenty of competition: By the time you read this, Acer, Compaq, Hewlett-Packard, and Packard Bell should be shipping new sub-$1000 systems. Most are also without monitor—but not surprisingly, the more expensive ones offer heftier configura-

Aptiva E16

PRO: IBM brand for breakthrough $799 price.

CON: Doesn't include monitor, has limited software bundle.

VALUE: Steady performer.

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www.pc.ibm.com/aptiva
Street price: $799 (without monitor)

PHOTOGRAPH: MARC SIMON

tions. Acer's $999 Aspire 1810M (sold at Walmart only) is based on AMD's K6-233 processor and comes with a 2GB hard drive, 32MB of RAM, a 12X–24X CD-ROM drive, a 33.6-kbps modem, and a 14-inch monitor. Compaq's $999 Presario 4540 comes with an AMD K6-233 chip, a 3.2GB hard drive, and 32MB of RAM. Also, Monorail's $999 Model 7400 sports a Pentium MMX-166 processor and has a built-in SVGA color LCD screen with a 10.4-inch viewable area.

Matching the E16 with $799 price tags (also sans monitor) are HP's Pentium MMX-200–based Pavilion 3260 and Acer's AMD K6-233–based Aspire 1822. Both have 16MB of RAM; the Pavilion comes with a 2.1GB hard drive, an 8X–16X CD-ROM drive, and a 56-kbps modem; the Aspire has a 2GB hard drive, a 12X–24X CD-ROM, and a 33.6-kbps modem. But if you've been waiting for an affordable IBM, the E16 fits the bill.

—Aoife McEvoy

INTERNET

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

Ma Bell Meets George Jetson: 3Com's Bigpicture TV Phone

VIDEOCONFERENCING

I'VE GOT A 900-MHz wireless phone that's so smart, about the only thing it *can't* do is handle video. Enter the **Bigpicture tv Phone** from 3Com. This $389 set-top module, which includes a built-in video camera and modem, allows full-motion videoconferencing without a PC, so that unwired Luddites like my parents can log face time with their favorite magazine editor.

The shipping version I tested was a snap to set up, with clear schematics that helped me puzzle out the connections between my television, VCR, and cable box in less than 10 minutes. Once everything was plugged in, I dialed a video-ready number and started a plain old audio call. I punched two keys on the phone, and 30 seconds later I was looking at a video call on my TV. You don't need a keyboard or a remote, but punching in the telephone keypad commands is more convenient if your phone is located on a table or the wall, as opposed to being handheld like mine.

PC-FREE VIDEOCONFERENCING: 3Com's Bigpicture tv Phone uses a TV and phone lines; quality's good, not great.

Despite the Bigpicture's built-in 28.8-kbps modem (upgradable to 56 kbps using 3Com-owned U.S. Robotics' x2 technology), data rates limped along at a meager 12 kbps—probably because of the poor phone lines in my rural neighborhood—but I still found the video quality quite acceptable. That said, consumers should not believe the glossy ads showing picture-perfect TV images: As with any analog videoconferencing scheme, incoming video is rife with pixelation and distortion, particularly in frames that have a lot of movement.

Multiple menus accessed via the telephone dial pad allow you to change window sizes, view your local camera feed, capture sharp still images, and establish a video mute (useful when you're embarrassed by that messy den). You can also capture high-quality still shots of the person whom you're conferencing with, or of anything in the room. If the other caller is a Bigpicture user, you can even pan, zoom, and tilt the remote camera. Best of all, the Bigpicture tv Phone uses the H.324 videoconferencing standard, so the device will work with most PC-based videoconferencing setups. Suddenly, that 900-MHz phone doesn't seem so smart after all.

—Michael Desmond ▶

Bigpicture tv Phone

PRO: Easy setup, usable video quality, no PC required.

CON: Keypad menus can be time-consuming.

VALUE: The best way for people without computers to enjoy videoconferencing.

3Com Corp.
800/342-5877
www.3com.com
Street price: $389

READER SERVICE NO. 656

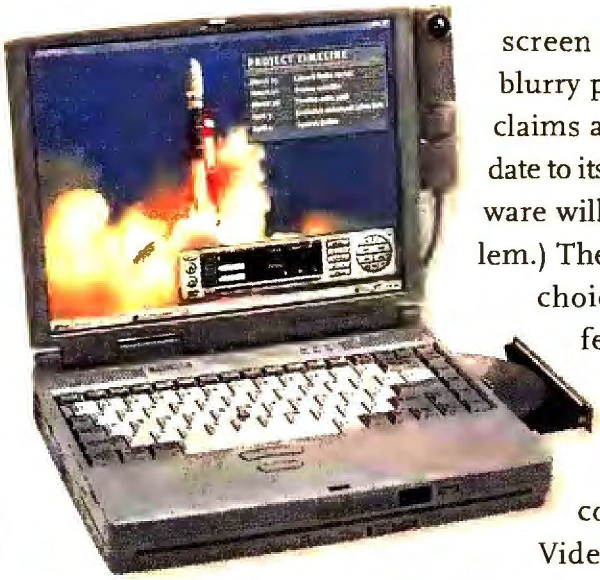
EDITED BY
Yardena Arar and
Laurianne McLaughlin

First DVD Notebooks: Great Video, Big Prices

NOTEBOOK

WITH ITS HUGE storage and superb multimedia capabilities, DVD-ROM is hitting the road. Rapidly becoming commonplace in desktop PCs, drives capable of playing the CD-size, 4.7GB discs are now appearing in high-end portable PCs. I looked at two of the first DVD-ROM notebooks, Panasonic's **CF-63** and Toshiba's **Tecra 750DVD**.

I found a lot to love about these portables, but they are very expensive. The $4999 CF-63 and the $5799 Tecra are high-end corporate tools, suitable mainly for companies that need to run very large multimedia presentations. For example, a multinational firm could distribute a presentation with sound tracks in six different languages on a single DVD-ROM disc—cheaper and more efficient than pressing and distributing six separate single-language CD-ROMs. Most people won't be able to justify these notebooks' steep prices, however, mostly because there's almost no business-oriented software on DVD-ROM. The CF-63 and Tecra 750DVD cost $1000 and $400 more, respectively, than the CD-ROM–only versions of these notebooks—very high premiums to pay for devices that are, for most standard business tasks, no better than 20X CD-ROM drives.



VIDEO TO GO: The Tecra 750DVD has a clip-on camera.

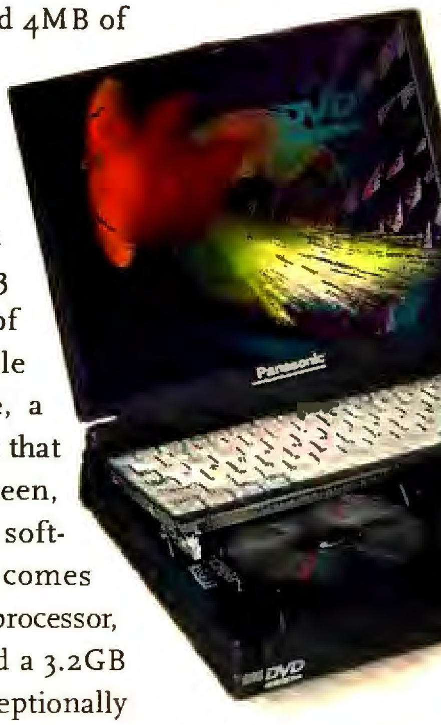
PORTABLE SCREENING ROOMS

TOO BAD, because these notebooks come with a powerful antiproductivity tool: a DVD movie player. The CF-63 is the ultimate in-flight projector; a shipping unit reeled off two high-action DVD films—*Jumanji* and *Twister*—with barely a flicker and lasted 2 hours on a charge. The battery on my preproduction Tecra lasted longer, but even moderate video motion splashed the screen with distracting blurry patches. (Toshiba claims an upcoming update to its DVD player software will solve this problem.) The Tecra is a great choice, however, for feeding movies and presentations to a TV screen. It offers composite and S-Video outputs, with the latter producing exceptionally sharp and snappy video—better than you get from a standard VHS tape player. The CF-63 lacks TV outputs, but Panasonic plans to include them in a future version.

Both portables have second-generation DVD-ROM (DVD-2) drives, which means they read CD-Recordable media. Both also support the AC-3 Dolby sound specification; with a set of Altec-Lansing ACS-290 Surround Sound speakers and subwoofer attached, sound thundered through my living room.

The CF-63 and the Tecra both come with 13.3-inch 1024 by 768 screens and 4MB of video SGRAM, but in many other areas the Toshiba unit gives you more. It sports a Pentium MMX-233 processor, 64MB of RAM, a removable 4.8GB hard drive, a small video camera that mounts on the screen, and video capture software. The CF-63 comes with a PMMX-166 processor, 32MB of RAM, and a 3.2GB hard drive. It's exceptionally sturdy, with almost no give to its magnesium-alloy screen case; the Tecra feels slightly less durable. In my use, these notebooks seemed exceptionally fast but heavy, at 9.4 and 9.2 pounds, respectively. Once prices drop, notebooks like these will put on quite a show.

—*Bryan Hastings* ▶



PANASONIC'S CF-63 plays movies on DVD-ROM with no flicker.

Panasonic CF-63

PRO: Excellent DVD movie playback on a 13.3-inch screen.

CON: Expensive, no TV hookup.

VALUE: Great for traveling presenters and airborne movie buffs.

Panasonic Personal Computer Co.
800/662-3537
www.panasonic.com/ruggedpc
Street price: $4999

READER SERVICE NO. 657

Toshiba Tecra 750DVD

PRO: TV hookup for DVD movies.

CON: Very expensive, doesn't handle fast-motion DVD movies well.

VALUE: Extremely powerful PC for on-the-road presentations.

Toshiba America Information Systems
800/334-3445
computers.toshiba.com
Street price: $5799

READER SERVICE NO. 658

QUICK TAKES

Another Itty-Bitty Notebook

DO YOU THINK subnotebook PCs went the way of the dinosaurs? Think again. In the wake of Toshiba's Libretto and Mitsubishi's Amity CN, Hitachi takes its shot with the **VisionBook Traveler**. With its nice size and weight (under 3 pounds without the AC adapter), it could be a good choice if you find standard notebooks too big and PDAs too limited. It's okay for e-mail and short notes, but touch typists won't like the small keyboard. The $2599 VisionBook has a bright 8.4-inch active-matrix screen, a Pentium MMX-133 processor, and an external floppy drive. Hitachi PC Corp.; 800/448-2244; www.hitachipc.com.

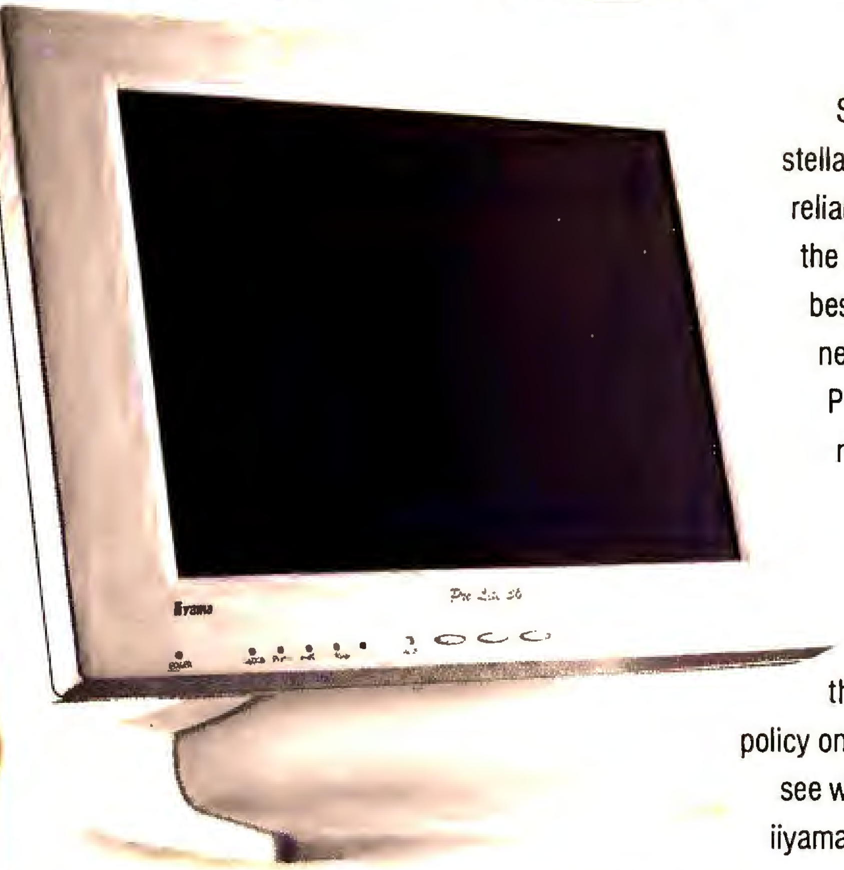
READER SERVICE NO. 659

—*Tracey Capen*

$1599

Getting the highest quality TFT LCD monitor at an affordable price just became possible.

We've listened to our customers to combine the features you want at an unthinkable price. Our 14.1" active matrix TFT display produces brilliant, rock-steady 1024 x 768 images at 75Hz. The sleek ProLite 36 panel is only 2.5" wide and its base conveniently includes a built-in power supply.



So what is more important: stellar performance, outstanding reliability, exceptional value, the latest technology, or the best warranty in the business? With iiyama's new ProLite 36 LCD, you make no tradeoffs.

Unbeatable price.

Award-winning quality.

Our exclusive *No Worries*™ 3-year limited warranty* with the most stringent replacement policy on the market – it's easy to see why the new ProLite 36 from iiyamaDirect is a true champion.

	iiyama ProLite 36	ViewSonic ViewPanel VP140	NEC LCD400V	Sceptre FT15G	CTX PanoView 630
Screen Size/Type	14.1"/TFT	14.0"/TFT	14.1"/TFT	14.5"/TFT	12.1"/TFT
Max. Resolution @ 75Hz	1024x768	1024x768	1024x768	1024x768	800x600
Minimum number of defective pixels for service or replacement	7, 2 if adjacent*	7, 2 if adjacent	Depends on the count and location of the defects.	8	<19 White, 2 if adjacent <16 Dark, 2 if adjacent
Power Supply: Built-in/External	Built-in	External	Built-in	External	External
Warranty: Parts/Labor/Backlight	3/3/1 years	3/3/1 years	3/3/1 years	3/1/1 years	1/1/1 years
Price (Manufacturer's Estimated Price)	$1,599	$2,399	$1,998	$2,295	$2,295

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PC Magazine Best of 1997
January 6, 1998
Vision Master Pro 17

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Perfect Five-Star Rating
January 1998
Vision Master 450
Vision Master Pro 500

ComputerLife
Perfect Five-Star Rating
November 1997
Vision Master Pro 17

Performance & Technical Excellence
March 1997
Vision Master Pro 21

MW Editors' Choice
Six Time Winner
Jan 1997, Feb 1997, March 1997, April 1997, May 1997, June 1997
Vision Master Pro 21

PC Magazine Editors' Choice
October 7, 1997
Vision Master Pro 17

Computer Labs
March 1997
Vision Master Pro 21

PC World Best Buy
Six Time Winner
July 1996, Jan 1997, March 1997, July 1997, Sept 1997, Jan 1998
Vision Master Pro 17

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*Three year parts and labor, 1 year backlight. Comparative prices and specifications are based on information provided by the manufacturers as of 12/31/97. Manufacturer's Estimated Price is shown, actual price may vary. Prices do not include shipping, handling, and any applicable taxes. Specifications are subject to change without notice. Offer valid only in the United States of America. As an Energy Star™ Partner, iiyama has determined that this product meets the Energy Star™ Guidelines for energy efficiency. For more information, please write us at 575 Anton Blvd., Suite 590, Costa Mesa, CA 92626 888/663-2289, 714/437-5111, Fax:714/437-5982; Home Page: www.iiyamadirect.com.

Circle 108 on reader service card

Nothing Lasts Longer

Back-UPS Pro Power User Features

PowerChute® Pro *power management software lets you configure ten or more UPS parameters, use WorkSafe™ to automatically save data, close programs, and automatically shut down your computer.*

Automatic Voltage Regulation (AVR) and CellGuard™ intelligent battery management extend battery life, speed recharging and let you work through prolonged brownouts without wasting battery power.

APC's critical Safety, Readiness and Reliability Features

APC's microprocessor-controlled automatic battery self-test regularly checks status of the unit and ensures battery readiness.

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Back-UPS Pro 420
APC
AMERICAN POWER CONVERSION
Renewable UPS System
DESIGNED TO LAST A LIFETIME!
• User-Resettable Circuit Breaker •
• User-Replaceable Batteries •
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Check Battery
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Electrical Wiring Fault

A push-button circuit breaker provides user-resettable overload protection, prevents damage from accidental overloads and eliminates the need to replace a traditional fuse or even the entire "disposable" UPS.

APC units are Internet and network ready.

The Site Wiring Fault Indicator lets you know when APC UPS units automatically identify building wiring problems.

BlockSafe® outlets give you room to plug in transformer blocks.

"The only UPS we've seen that accommodates power transformers."

'Best Uninterruptible Power Supply' "With its wealth of features..., APC Back-UPS Pro makes it easy to protect your equipment and data against electrical surges, brownouts, and blackouts."

"Editors' Pick":
"We wouldn't be caught dead withou
an uninterruptible power supply – and
neither should you.'

APC has won more awards for reliability than all other UPS vendors combined.

. . . Guaranteed!

The world's best-selling UPSs now start at only $99!

Now the world's best-selling desktop UPS units offer you even more value for you power protection dollar! With over 45% of all data loss and downtime caused by bad power, your APC investment pays for itself the first time you use it.

New: More power and guaranteed "Best in Class" Longest Runtime.
Our runtime will meet or exceed that of any same VA UPS for desktop applications, or your money back! When the power's out and the clock is ticking, you can count on APC.

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"Best in Class" Runtime Guarantee

APC Back-UPS Pro, Back-UPS and Back-UPS Office will provide runtime which meets or exceeds that of any same VA UPS for desktop PC applications or your money back.
For details visit www.apcc.com

Multipath protection for your whole system
Protect everything: CPU, monitor, external modem, laser printer, fax machine, zip drive ... you name it, gets full protection. And since phone and network lines carry dangerous surges, your CPU and modem benefit from Back-UPS Pro® and Back-UPS Office® telephone/network surge suppression.

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APC QuickSwap™ battery packs are the quickest and easiest way to safely renew a UPS, unlike "disposable" UPSs, which don't allow safe user replacement and mean the end of your investment.

Safe, even from lightning
Lightning strikes represent the most powerful threat to your computer equipment. APC multi-stage surge suppression clamps down on lightning and offers a $25,000 guarantee against damage to your equipment.

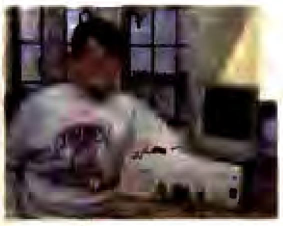
LIFETIME EQUIPMENT PROTECTION
$25,000
FOR AS LONG AS YOU OWN THIS PRODUCT, IF YOUR PROPERLY CONNECTED EQUIPMENT IS EVER DAMAGED BY AN AC SURGE, INCLUDING SURGES DUE TO LIGHTNING, APC WILL REPAIR OR REPLACE OUR PRODUCT AND UP TO $25,000 OF CONNECTED EQUIPMENT (SEE POLICY FOR DETAILS, VALID IN U.S. AND CANADA ONLY).

Readiness and Reliability mean everything
No matter what, you know you can count on Back-UPS®, Back-UPS Pro® and Back-UPS Office®. We build in readiness and reliability features so you never have to worry about whether your UPS will work when you need it.

APC packs the power and features desktop users want, plus the peace of mind and legendary reliability reflected by over 8,000,000 field-tested and proven units.

Back-UPS®, APC's best value uninterruptible power supply with high performance surge suppression, protects your entire system starting at just $99

Over 8 million people say ProtectME! with APC.



Severence MacLauglin
Student, Cornell University
Ithaca, NY

If you spend three or four thousand dollars on a computer, you should definitely spend a couple of hundred more to protect both the data and the hardware. I consider the APC Back-UPS Office to be an indispensible tool to get through school successfully."

Antonio Pasin
Radio Flyer, Inc
Chicago, IL

I don't have the extra $12,000 to buy a new system. An APC UPS was more cost-effective. I have lots of time invested in my data and Back-UPS Pro protects that as well.

Choose the APC UPS Features your system requires.

	Runtime Guarantee	User Replaceable Battery	Resettable Circuit Breaker	Internet Protection	UPS Monitoring Software	Microsoft Windows' Approved
Back-UPS *Basic PC protection for family/education systems*	✗	✗	✗			
Back-UPS Office® *Multipath protection for internet and multimedia systems*	✗	✗	✗	✗		
Back-UPS PRO *Advanced PC protection for performance systems*	✗	✗	✗	✗	✗	✗

FREE Catalog and UPS Selection Guide!

☐ **YES!** I want to know how to choose the right UPS for my PC. Please send me my free APC catalog and selection guide.

☐ **NO,** I'm not interested at this time but please add me to your mailing list.

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Title: ____________________

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Phone: ____________________

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Brand of PCs used? ____________ # ______

Brand of Servers used? ____________ # ______

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Circle 45 on reader service card

HP's Smart Scanner Needs a Higher IQ

SCANNER

IN THE AGE OF the $100 color flatbed scanner, you have to do something special to justify a $299 price tag. Hewlett-Packard tried to add enough intelligence to its **ScanJet 5100C** to make complex scanning tasks easy. The unit analyzes all elements on a page and adjusts its settings on the fly as it makes a single pass. This will save time if you want to re-create pages with art and text—magazine and newspaper articles, for example. But you'll pay a heavy premium for what turns out to be an inexact science.

The look-alike successor to the ScanJet 5P, the 5100C is HP's first flatbed model to connect to a PC via the parallel port, with a pass-through port for your printer cable. This makes installation quick for most people, though you may have to adjust some Windows 95 settings.

The ScanJet 5100C's included PrecisionScan software identifies different regions of a page as text, photographs, and black-and-white or color artwork; adjusts the scan settings for each region; executes the scan in one pass; and then sends the output to almost any popular application you choose in a suitable file format. You can override settings in regions and scan the entire page or parts of a page.

To test a shipping unit, I scanned several color magazine and newspaper articles, a color brochure, and a couple of black-and-white book and newsletter pages with line illustrations. The results were mixed. Even on the simplest pages, the ScanJet 5100C identified some display type as art. In bound materials or pages with lightly tinted backdrops, the software frequently lumped text in with a graphic image. You can't change the boundaries of a single region either, which means that time savings are often lost.

The 5100C ships with Adobe PhotoDeluxe 2.0 for image editing, Caere PageKeeper Lite for document management, plus a limited edition of Caere's Omnipage OCR software that does only an indifferent job of converting text. The scans (300-by-600-dots-per-inch optical resolution) looked good in my tests, and the device works quickly. The 8.5-by-11.7-inch scanning area is a tad longer than the letter size of most budget flatbeds. But this expensive scanner doesn't entirely deliver on its ambitious intentions.

—Yardena Arar

ScanJet 5100C

PRO: Able to scan mixed-content pages in one pass and send directly to applications.

CON: Expensive, software doesn't always work.

VALUE: Flawed but can be useful for re-creating pages that have both text and art.

Hewlett-Packard Co.
800/722-6538
www.hp.com/go/ScanJet
Street price: $299
READER SERVICE NO. 660

Velo 500: One Palmtop PC Does Not Fit All

PALMTOP

HOLDING OFF ON buying that handheld PC until the software gets better? Philips' **Velo 500**, the successor to the Velo1, is one of the first palmtops with Windows CE 2.0, Microsoft's new version of the operating system for handhelds and other non-PC devices. I was moderately impressed by the preproduction unit I examined.

MIXED RESULTS: The Velo 500 has a nice LCD but a cramped keyboard.

The sturdy-looking Velo 500, which costs $639 or $749 depending on the amount of RAM, isn't noticeably bigger than its predecessor but houses a wider black-and-white LCD screen (640 by 240 resolution compared to 480 by 240), which you'll appreciate if you work in Pocket Excel. Another plus: You can print directly from the Velo—if you have a printer with an infrared port. Otherwise you still have to transfer files using the docking station and print from your PC. In general, I found the Velo's performance sluggish, even though it has a faster processor than its predecessor.

The new support for 256-color VGA output worked like a charm, allowing me to run full-color presentations on a monitor using the new Pocket PowerPoint and a VGA-out PC Card. However, you need to create these presentations in PowerPoint 97, and the PC Card draws its power from the Velo 500, so you'll want to travel with the included AC adapter.

The Velo 500 is worth considering for mobile presenters. It works reasonably well for sending e-mail and doing limited Word and Excel editing. But while the keyboard is easier to type on than the Velo1's, you still wouldn't want to spend much time on it; touch typists should consider the Psion Series 5 handheld as an alternative.

—Andrew Brandt ▶

Velo 500

PRO: Sturdy industrial design, Windows CE 2.0 goodies.

CON: Loads large documents slowly.

VALUE: New features benefit business travelers.

Philips Corp.
888/367-8356
www.velo.philips.com
Street price: with 16MB of RAM $639, with 24MB of RAM $749
READER SERVICE NO. 661

EXTREME POWER.

Presenting ThinkPad® 770. IBM's most powerful notebook* with our most impressive range of Options by IBM. A 14.1" screen, 233 MHz[1] Pentium® processor with MMX™ technology, DVD,[2] Dolby® Digital audio[3] and a big choice of storage options. *PC Magazine* even voted the ThinkPad 770 Best PC at Fall COMDEX™ 97. Call 1 800 426-7255, ext. 4954,[4] or visit www.pc.ibm.com/us/thinkpad. A better place to think.

Double your storage capacity up to a maximum of 10.2GB[5] with an additional, removable hard drive.

Ramp up your RAM from 32MB to 160MB by adding SDRAM SO DIMMs.

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IBM.

Solutions for a small planet™

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* Model 1AU only. Other 770 models/features will vary. [1]MHz refers to internal clock speed of the microprocessor only. Other factors may also affect application performance. [2]Optional drive. [3]Optional DVD drive required. [4]M-F, 8 am-8 pm EST, excluding holidays. We direct you to an authorized IBM Business Partner. [5]GB = 1 [illegible] bytes when referring to hard drive capacity; accessible capacity may be less. IBM, ThinkPad and Solutions for a small planet are registered trademarks or trademarks of International Business Machines Corporation. Dolby is a registered trademark of Dolby Laboratories. The Intel Inside logo and Pentium are registered trademarks and MMX is a trademark of Intel Corporation. Other company product or service names may be trademarks or service marks of others. PCs referenced in this ad ship with an operating system. © 1998 IBM [illegible]. All rights reserved.

Pointing Devices Aim for Comfort—Some Miss

POINTING DEVICE

FINGER POINTING: The VersaPad, our top choice, lets you use touch or a stylus.

LATELY IT SEEMS that no one is satisfied with the mouse that came with their PC. Oh, sure, the original mouse can do the job, but not without inflicting long-term discomfort or risking that dark, painful syndrome known as repetitive-strain injury. I checked out shipping versions of four new mouse alternatives: a pair of trackballs—Logitech's **TrackMan Marble FX** and Microsoft's **IntelliMouse TrackBall**—Goldtouch Technologies' **Goldtouch Mouse,** and Interlink Electronics' **VersaPad.** While each pursues the quest for user comfort in a different way, none is designed for left-hand use—and even for righties, only the VersaPad impressed me.

Logitech takes the trackball a step further with the $100 TrackMan Marble FX. I don't think that it's a step worth taking, though. Logitech seems to think that bigger is better: The red "marble" on this oversize device is bigger than a golf ball. The 1950s-retro design does let your hand rest comfortably on the ball so that the index finger can rotate it. But it's all too easy to unintentionally press the five user-customizable buttons—four of them on the left side where your thumb rests—and the trackball does not allow the precise on-screen movement needed for clicking on small objects.

Microsoft's $84.95 IntelliMouse TrackBall is the trackball version of the company's IntelliMouse, which pioneered the scrolling wheel button. The IntelliMouse TrackBall's cursor control is more precise than most trackballs'. As with the TrackMan, the contoured design lets your hand sit fairly comfortably so your index finger can scroll the ball. Alas, the wheel is placed to the right of the ball, making it hard to use if, like me, you work the trackball with your middle finger and wind up trying to use the wheel with your ring finger or pinkie. Also, two buttons on the left side are subject to inadvertent presses.

Goldtouch bills its $60 product as the "world's best ergonomic mouse." Yeah, right. The contoured Goldtouch Mouse, sloped high on the left and lower on the right, has a scroll *button* rather than a wheel. Press the button and the pointer moves up, down, right, or left; or you can scroll or pan the screen. But the scroll button's placement on the extreme left side not only makes it awkward to operate, but it also forces you to use your middle finger on the left mouse button.

The best for last: Interlink's new $69.95 VersaPad is a touchpad with a difference—it provides precise cursor control with your finger or a stylus. Up to now I haven't been a fan of touchpads because they lack sensitivity. But the VersaPad is so precise it can capture signatures to include in documents. You also get a separate five-key customizable toolbar (press a button once for saving, pasting, copying, or any function you choose) and a separate scroll bar that matches the scroll bars on your PC screen. The VersaPad is the most useful, comfortable device in this bunch; I'd definitely recommend it as a mouse alternative.

—Michael S. Lasky ▶

LET THIS WHEEL ROLL PAST YOU: Microsoft's ergonomically contoured IntelliMouse TrackBall has a poorly placed scrolling wheel.

TrackMan Marble FX

PRO: Contour design offers excellent hand comfort.
CON: Awkward button placement, ball has too much give.
VALUE: Worth trying only for people with repetitive-strain problems.
Logitech
800/732-3039
www.logitech.com
Street price: $100
READER SERVICE NO. 662

IntelliMouse TrackBall

PRO: More precise cursor control than most trackballs.
CON: Wheel is oddly placed, easy to inadvertently press buttons.
VALUE: Better trackball choices are available.
Microsoft Corp.
800/426-9400
www.microsoft.com
List price: $84.95
READER SERVICE NO. 663

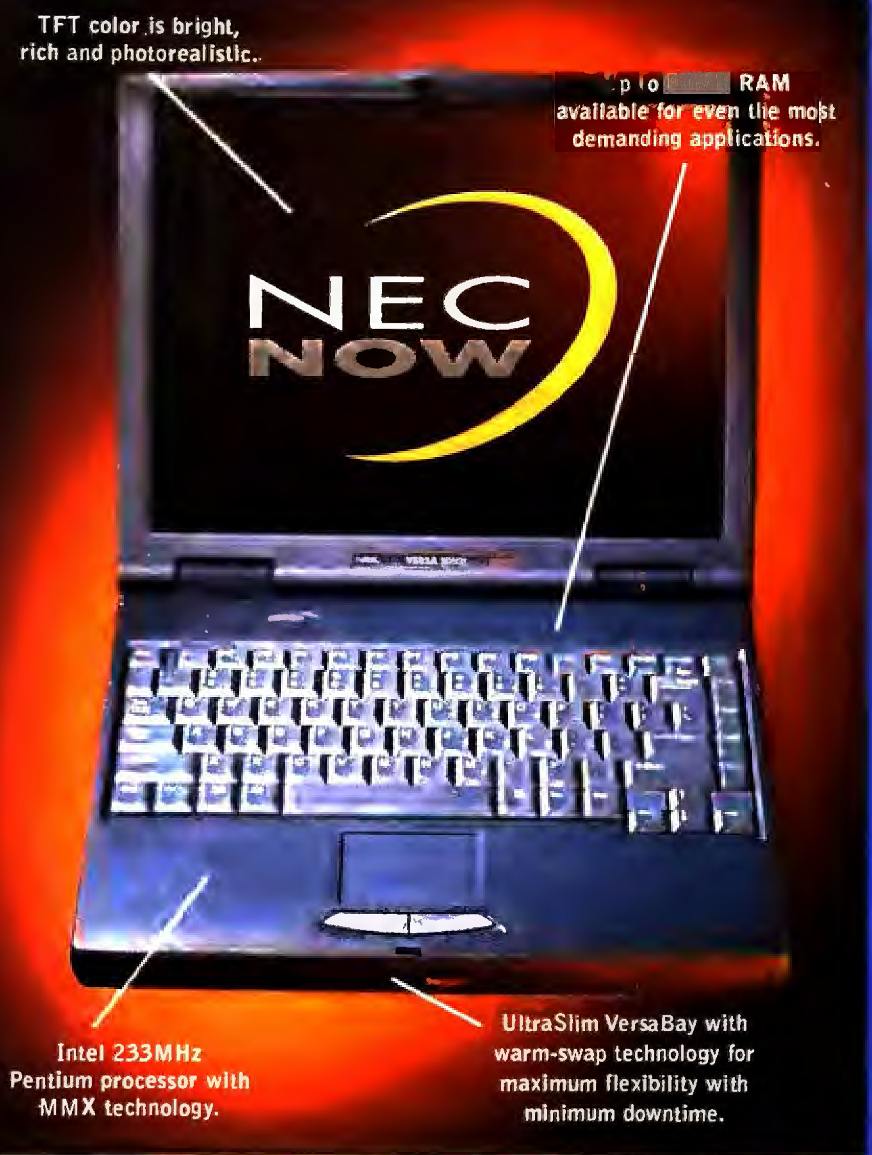
Goldtouch Mouse

PRO: Scroll button instead of scroll wheel is an interesting idea.
CON: Poor scroll button placement makes use uncomfortable.
VALUE: Awkward product, don't bother.
Goldtouch Technologies
800/593-2453
www.goldtouch.com
Street price: $60
READER SERVICE NO. 664

VersaPad

PRO: Precise, easy cursor control with finger or stylus. Captures signatures.
CON: Finger-pointing devices are an acquired taste.
VALUE: A worthy touchpad option.
Interlink Electronics
800/340-1331
www.interlinkelec.com
List price: $69.95
READER SERVICE NO. 665

It's 1½" thin and weighs just 4.9 lbs. But with all these features, it's no lightweight.


TFT color is bright, rich and photorealistic.
Up to [redacted] RAM available for even the most demanding applications.
NEC NOW
Intel 233MHz Pentium processor with MMX technology.
UltraSlim VersaBay with warm-swap technology for maximum flexibility with minimum downtime.

Introducing the NEC Versa® 5000. No notebook this thin and this light has ever offered this many features. But that shouldn't surprise you. NEC introduced the first notebook PC, and offers one of the world's most extensive lines. All available direct from our factory. And with NEC NOW,℠ you get to buy computers in the way that's best for you. Because we give you the choice of buying direct or working with a highly qualified NEC reseller partner. So call our System Consultants today. When it comes to helping you choose the right computer, they're not lightweights either.

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Everything you expect in a notebook – except the weight.

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Versa 5080X

- **233MHz Pentium® processor with MMX™ technology**
- 13.3" XGA Active-Matrix TFT Color Display
- **32MB EDO DRAM (80MB max)**
- 512KB L2 Pipeline Burst Cache
- **2.1GB Hard Drive**
- Modular UltraSlim VersaBay with Warm-Swap Technology Accepts 20X max Variable Speed CD-ROM, 1.44MB Floppy Drive and Weight Saving Module (all included)

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* 2nd Lithium Ion Battery, add $199
* Microsoft Windows NT Workstation 4.0, add $99
* Upgrade to UltraCare Extended Service, add $99

$3699
Lease From: $133/mo.† Code #V5083

Versa 5060X

- **166MHz Pentium processor with MMX technology**
- 13.3" XGA Active-Matrix TFT Color Display
- **32MB EDO DRAM (80MB max)**
- 256KB L2 Pipeline Burst Cache
- **2.1GB Hard Drive**
- Modular UltraSlim VersaBay with Warm-Swap Technology Accepts 20X max Variable Speed CD-ROM, 1.44MB Floppy Drive and Weight Saving Module (all included)

* Upgrade to 64MB RAM, add $299
* U.S. Robotics® x2™ XJACK® 56Kbps* Capable Modem, add $159
* Versa PortBar™ 5000 with 10Base-T, add $249
* VersaNote™ Ballistic Nylon Compact Carrying Case, add $59

$3199
Lease From: $118/mo.† Code #V5061M01

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- * Upgrade Memory from 64MB SDRAM to 128MB SDRAM, add $179
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- * Upgrade to Yamaha Wavetable Audio, add $49

Common Features: Minitower or Desktop Tool-Less Chassis • 512KB L2 Cache • 3.5" Floppy Drive • 2 Universal Serial Bus (USB) Po
Windows® 95 • **Microsoft Office 97 Small Business Edition** • Microphone • Microsoft IntelliMouse® • NEC Palmrest Keyboard • 3-

Direction SPL333
- **333MHz Pentium® II processor**
- **64MB SDRAM Memory**
- **9.1GB Ultra DMA Hard Drive**
- **DVD-ROM Drive and Decoder Card**
- NEC C700™ 17" Monitor (16" viewable)
- Diamond Viper® AGP, 4MB SGRAM Graphics Card
- Altec® Lansing ACS-45 Speakers with Subwoofer
- Yamaha Wavetable Audio
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- **Select either U.S. Robotics® x2™ 56Kbps* Modem or 3COM 3C905 10/100 PCI Network Card**
- * Upgrade to 128MB SDRAM Memory, add $179
- * Upgrade to NEC C900™ 19" Monitor (18" viewable), add $249

$2999
Business Lease: $111/mo. Code #D5063

Direction SPL333
- **333MHz Pentium II processor**
- **64MB SDRAM Memory**
- **8.4GB Ultra DMA Hard Drive**
- NEC C700 17" Monitor (16" viewable)
- Number Nine Revolution 3D AGP, 4MB WRAM Graphics Card
- Altec Lansing ACS-90 Speakers
- 32X max Variable Speed CD-ROM
- **Select either U.S. Robotics x2 56Kbps* Modem or 3COM 3C905 10/100 PCI Network Card**
- * Upgrade to 128MB SDRAM Memory, add $179
- * Upgrade to NEC C900 19" Monitor (18" viewable), add $249
- * Iomega 100MB Internal Zip Drive with One Cartridge, add $99
- * Upgrade to Yamaha Wavetable Audio, add $49
- * Upgrade to Altec Lansing ACS-45 Speakers with Subwoofer, add $39

$2699
Business Lease: $100/mo. Code #D5064

Direction SPL300
- **300MHz Pentium II processor**
- **64MB SDRAM Memory**
- **9.1GB Ultra DMA Hard Drive**
- NEC C700 17" Monitor (16" viewab
- Diamond Viper AGP, 4MB SGRA Graphics Card
- Altec Lansing ACS-45 Speakers w Subwoofer
- 32X max Variable Speed CD-RO
- **Select either U.S. Robotics x2 56Kbps* Modem or 3COM 3C9 10/100 PCI Network Card**
- * Upgrade to 128MB SDRAM Memo add $179
- * Upgrade to NEC C900 19" Monit (18" viewable), add $249
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$2499
Business Lease: $92/mo. Code #D5

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- ExpressBuilder Installation Software
- 3-Year On-Site Service Warranty
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- Certified for Microsoft Windows NT® and Novell NetWare

Fully configured servers starting at:

$2809
Leasing Available

All the features of a Pentium II processor-based server at a desktop PC price.

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- **Single 233, 266 or 300MHz Pentium II processor**
- 512KB Integrated L2 Cache with ECC
- Up to 512MB ECC DIMM Memory
- Integrated Ultra Wide SCSI Controller
- 3 Disk Drive Bays for up to 27GB Capacity
- 6 Expansion Slots; 4 PCI and 2 ISA
- 24X max IDE CD-ROM, 1.44MB Floppy Drive
- ESMPRO Server Management Suite
- ExpressBuilder Installation Software
- 3-Year On-Site Service Warranty
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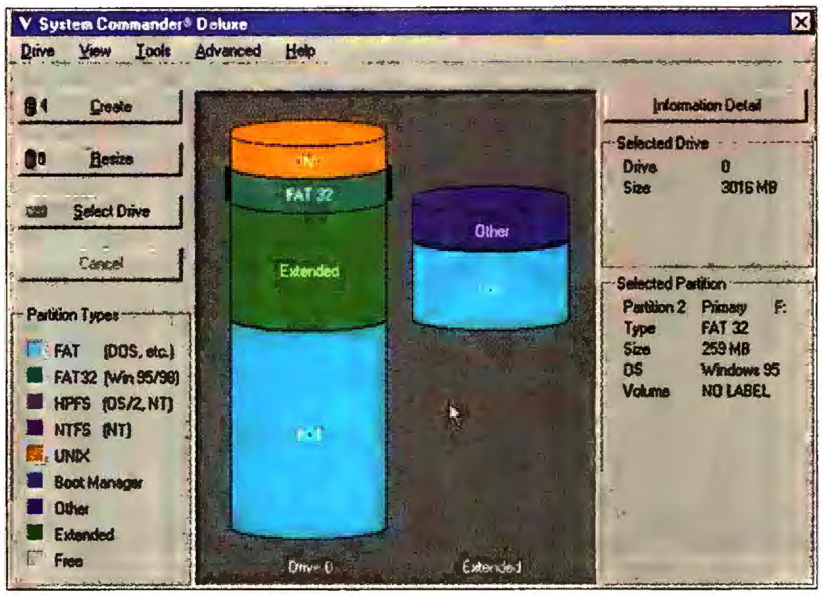
For government pricing call 1-888-4-GOV-NEC

System Commander Deluxe: The OS Juggler

UTILITY

WINDOWS 95 is fine on its own, but it doesn't play well with others—other operating systems, even other Microsoft products. Yet sometimes it's useful to have other OSs available. Maybe you want to run oldie-but-goodie applications (early DOS games, or any number of Windows 3.1 programs) that operate best in their native environment. Maybe you're reluctant (or downright afraid) to overwrite your current version of Windows to upgrade—say, from Windows 3.1 to Windows 95, or from Windows 95 to a beta of Windows 98—or to try a completely different system such as Linux or OS/2.

System Commander Deluxe, the latest incarnation of V Communications' unique utility, allows you to run virtually any combination of Intel-compatible operating systems on your computer; you make your choice from a menu at boot-up. There are some limitations, of course, and multiple operating systems and their applications quickly fill up even the largest hard disk.



Selected Drive
Drive 0
Size 3016 MB

Selected Partition
Partition 2 Primary F:
Type FAT 32
Size 259 MB
OS Windows 95
Volume NO LABEL

HARD DISK CENTRAL: System Commander Deluxe lets you create and change disk partitions for new OSs with just a few mouse clicks.

New in the $70 Deluxe version of System Commander is a wizard that steps you through the process of adding or changing operating systems after you've installed the program. It vastly simplifies a formerly painstaking procedure. Another utility adds and changes disk partitions on the fly, helpful for installing OSs that require their own partitions, such as Windows NT using the NT File System, or the many UNIX variants.

Although it uses a variety of techniques to work around the way different OSs install and start up (they often try to destroy other OS files), System Commander Deluxe is solid and dependable. I used the original version to equip my PCs with seven different operating systems and had no problems. (I tested the shipping version of the upgrade, which uses the same core software.) But if an unexpected meltdown occurs, the program has extensive abilities to fix problems and recover data.

—Stan Miastkowski

System Commander Deluxe

PRO: Easy wizard-based setup, dependable.

CON: Needs large hard drive or multiple disks.

VALUE: Unique utility juggles multiple operating systems.

V Communications
800/648-8266
www.v-com.com
Street price: $70

READER SERVICE NO. 730

Two Can Browse as Cheaply as One

INTERNET UTILITY

IF YOU'RE PUTTING a small business—or your entire family—on the Net, the cost of extra phone lines and Internet service provider accounts can add up quickly. Here's a $19.99 solution: StarTech's **Internet Sharing Software** lets two networked PCs access the Net simultaneously with one modem, one phone line, and one ISP account. Versions for larger groups are also available.

Internet Sharing Software handles the translations that are required to funnel data between the Internet and the PCs. Each person uses the browser of their choice and Windows 95 Dial-Up Networking in the normal way; each machine operates completely independently.

To use the product, each computer must be networked, with each running TCP/IP, and each must have a unique IP address—a technically advanced and difficult setup chore unless you're experienced with networks. If you're not yet networked, StarTech sells a $99.99 kit that includes two network cards, a cable, and the sharing software. Or you can save money by connecting the PCs with a $29.95 CyberCable, available in both serial and parallel versions.

After installing Internet Sharing Software, my wife and I browsed the Web on separate computers over a single 33.6-kbps connection and were pleasantly surprised by the performance. We noticed very little speed degradation, probably because the flow of data to and from the Web isn't constant during a typical session. (However, both users wouldn't want to download large files at the same time.) You can even get separate e-mail addresses on the same account; be prepared to pay your ISP extra for the privilege, though.

—Stan Miastkowski ▶

Internet Sharing Software

PRO: Inexpensive shared Internet access.

CON: TCP/IP setup is complicated.

VALUE: Can't beat the price.

StarTech Computer Products Ltd.
800/265-1844
www.startechcomp.com
List price: two users $19.99, five users $99.99, unlimited users $144.99

READER SERVICE NO. 731

SYMANTEC
NORTON
AntiVirus
Eliminate today's viruses—and tomorrow's new ones.

Remote Control Software Speaks Up

REMOTE ACCESS

REMOTE ACCESS software is getting smarter—and more versatile. Upgrades to Artisoft's **CoSession Remote 32** and Compaq's **Carbon Copy 32** add support for tasks such as training and printing.

CoSession Remote 32 8.1 depends on Windows 95 and NT wizards and utilities for everything from direct cable connections to calling another computer. Version 5.0 of Carbon Copy 32 comes with everything you need to connect, including a serial cable.

CoSession Remote 32's new voice-chat capability lets you tell the person at the other end what you're doing. Carbon Copy offers a similar feature, along with support for encryption, NT security, remote printing, and firewalls. It also picks up your dial-up connections as it's loaded.

The big differences between the two packages lie in the user interface. CoSession Remote puts its phone book and utility folders on your desktop. Its control panel lists available connections and displays a view of the remote screen—but scaled down, sometimes illegibly so. Carbon Copy, which costs $149.95 and comes with versions for all Windows platforms, uses the same Windows Explorer–like interface as top sellers LapLink and PcAnywhere and is equally fast.

At $119, CoSession Remote costs less, but its dependence on Windows 95 can lead to problems. My prerelease version was never able to make a direct cable connection between two computers running different releases of Windows 95. For reliable, self-contained remote control software, I found Carbon Copy to be a worthy alternative to the market leaders.

—Dana Blankenhorn

Carbon Copy 32 5.0

PRO: Works with all versions of Windows, over all kinds of links.

CON: File and folder interface is more like Windows 3.1 than Win 95.

VALUE: A complete solution in one package.

Compaq Computer Corp.
800/822-8224
www.microcom.com
List price: $149.95

READER SERVICE NO. 732

CoSession Remote 32 8.1

PRO: Easy to learn, uses familiar Windows 95 and NT communications and networking routines.

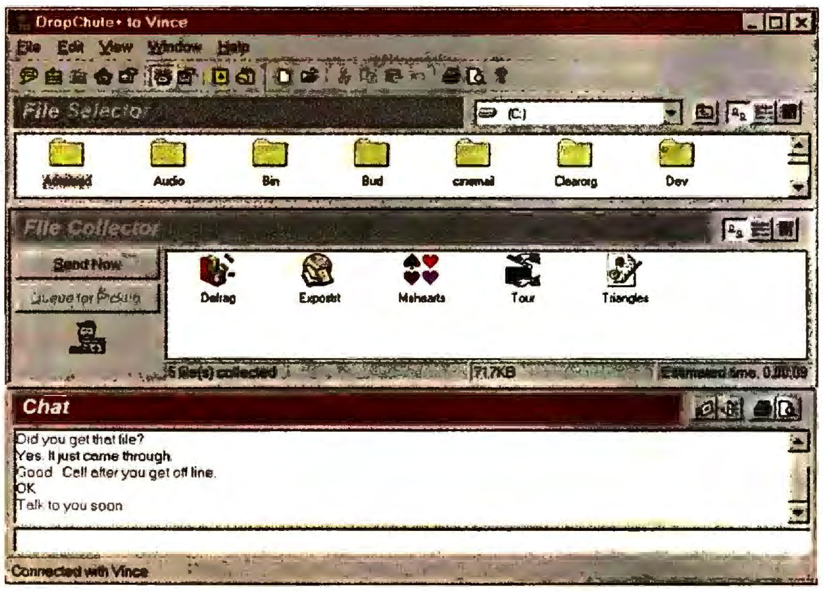
CON: Incorporates the weaknesses of Windows 95 and NT.

VALUE: Inexpensive, but the competition is more dependable.

Artisoft Inc.
732/744-9770
www.artisoft.com
List price: $119

READER SERVICE NO. 733

DropChute+: Hilgraeve's Virtual Courier



Did you get that file?
Yes. It just came through.
Good. Call after you get off line.
OK
Talk to you soon

FORGET FTP: DropChute+ transfers files between two PCs swiftly and securely. You can even chat with recipients while you're waiting.

UTILITY

THE INTERNET makes information sharing so easy, you may be lulled into the belief that all is well. But in reality, e-mail attachments often arrive unreadable—if they get there at all. Large files simply crash. And who knows what prying eyes have access to the mail and File Transfer Protocol servers where your sensitive documents may be sitting unattended? Hilgraeve's **DropChute+** wants to make online document delivery secure, fast, and dependable—with or without the Internet.

This $50 program lets you transfer files directly by modem or Internet connections between two computers. It encrypts and compresses files, authenticates the recipient's identity, and notifies you of receipt or failure thereof. You can chat with the recipient during transmission. If a recipient with dial-up access is offline, an Internet Rendezvous feature places a modem call instructing the remote system to activate its Net connection—great for unattended transfers. (However, the setup of this feature was tricky in a preproduction version.)

DropChute+ (or the free version, DropChute) must be installed at both ends. You send files using a simple drag-and-drop process. While speed in dial-up connections depends on network conditions, my transfers seemed at least as fast as any e-mail I've used. Over a 33.6-kbps connection, it took under half an hour to send a 5MB-plus folder with its file structure intact.

DropChute+ requires Windows 95 or NT 4.0, a problem if your recipients use other OSs. Otherwise, DropChute+ is an appealing file-transfer package at a reasonable price.

—Vincent Vitale ▶

DropChute+

PRO: Secure, easy, direct file transfers with or without the Internet.

CON: Communicates only with Windows 95 or NT computers that also have the software.

VALUE: Excellent, affordable alternative to e-mail or FTP.

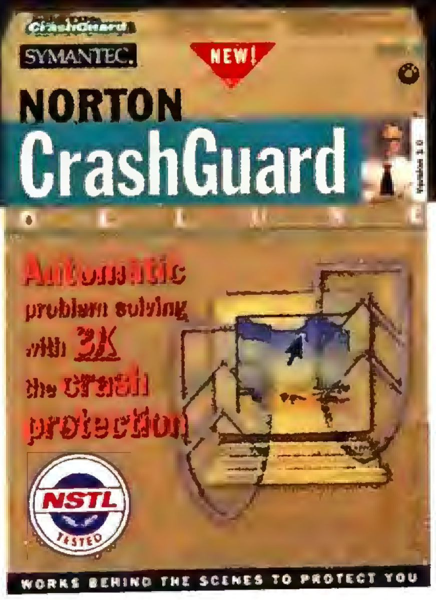
Hilgraeve Inc.
800/826-2760
www.hilgraeve.com
Street price: $50

READER SERVICE NO. 734

Norton CrashGuard Deluxe.

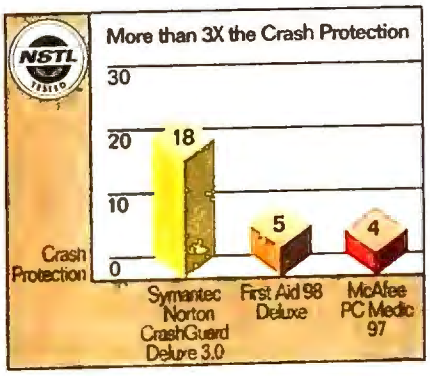
THREE TIMES THE CRASH PROTECTION.

None of the frustration.


CrashGuard
SYMANTEC.
NEW!
NORTON
CrashGuard
DELUXE
Version 3.0
Automatic problem solving with 3X the crash protection
NSTL TESTED
WORKS BEHIND THE SCENES TO PROTECT YOU

When it comes to PC crash protection, nothing comes close to Norton CrashGuard™ Deluxe.

Norton CrashGuard Deluxe intercepts application crashes and stabilizes the application in time for you to save your work. It unfreezes "frozen" applications. And repairs problems behind the scenes to eliminate potential crashes before they happen to your computer.



Norton CrashGuard Deluxe. One more great Norton software product from Symantec.

Try it yourself. Point your web browser to the Symantec site at www.symantec.com where you can download a free trial version of Norton CrashGuard Deluxe today.

Automatic problem-solving with more than three times the crash protection of any other software.

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www.symantec.com

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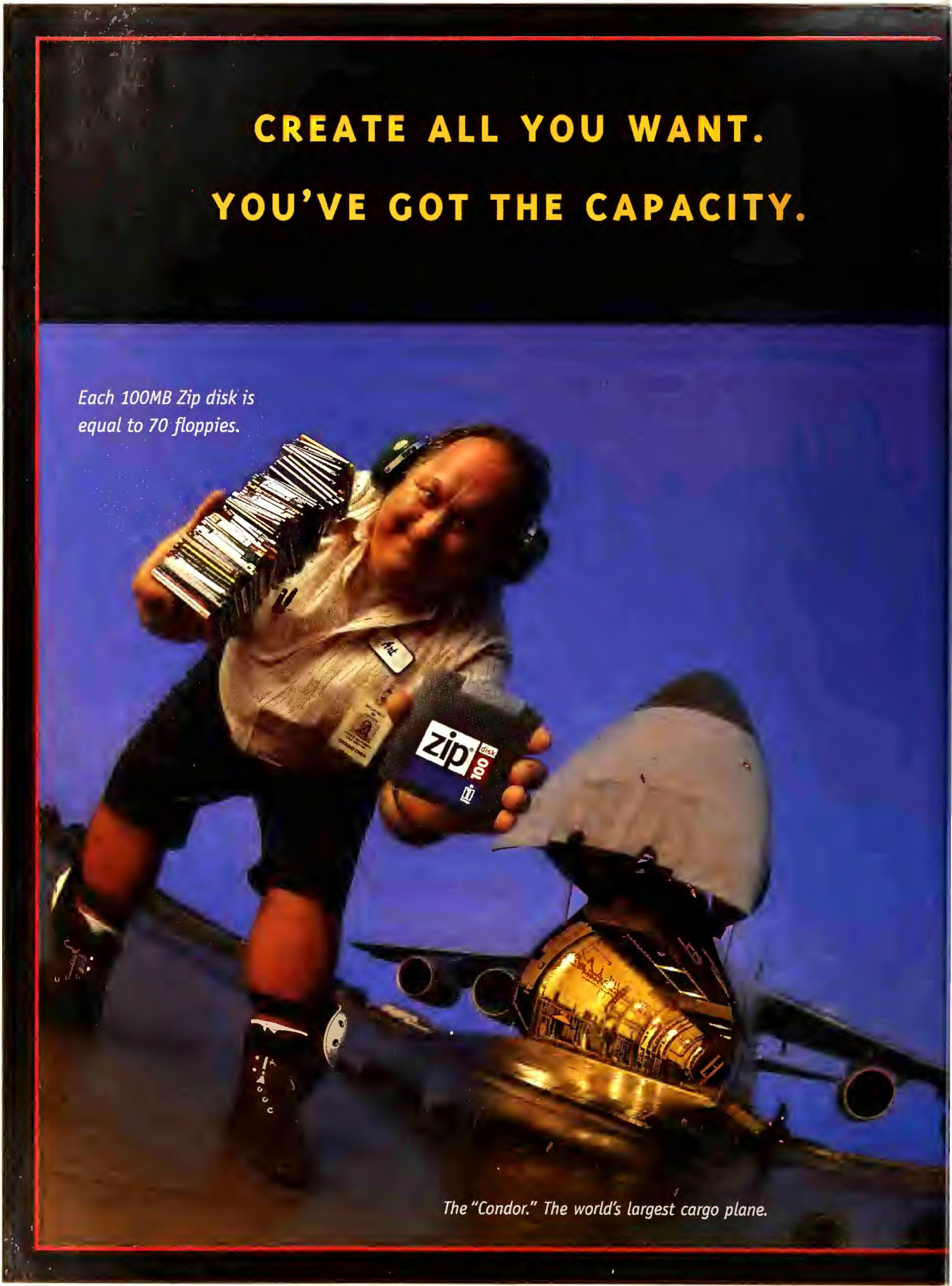
CREATE ALL YOU WANT.
YOU'VE GOT THE CAPACITY.
Each 100MB Zip disk is equal to 70 floppies.
zip disk 100
The "Condor." The world's largest cargo plane.

You need big cargo space on your computer these days. Certainly more than hard drives or little floppies can offer. Today's multimedia software just fills them up too fast. But a Zip Built-In™ drive gives you unlimited space. And the 100MB Zip disk can handle whatever big nasty file you throw at it. So if you're computer shopping, look for the Zip Built-In logo. It says you've got the capacity to create more, share more, save more, do more. **www.iomega.com**

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Introducing Zip Built-In.

A Zip® drive built into your notebook or desktop PC gives you unlimited capacity to store, back up, and share tons of stuff.

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NEC
IBM
DELL
Apple
GATEWAY2000
SONY
MICRON ELECTRONICS ™
UNISYS
HITACHI
SIEMENS NIXDORF

With over 10 million out there, Zip is the standard in high-capacity removable storage.

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Get a Zip drive. Or the new Zip*Plus*™ drive that works with either SCSI or parallel ports, has an amazingly small power supply, and comes with cool multimedia software.

BECAUSE IT'S YOUR STUFF.™ iomega.

Bryce 3D: See the Earth Move Under Your Feet

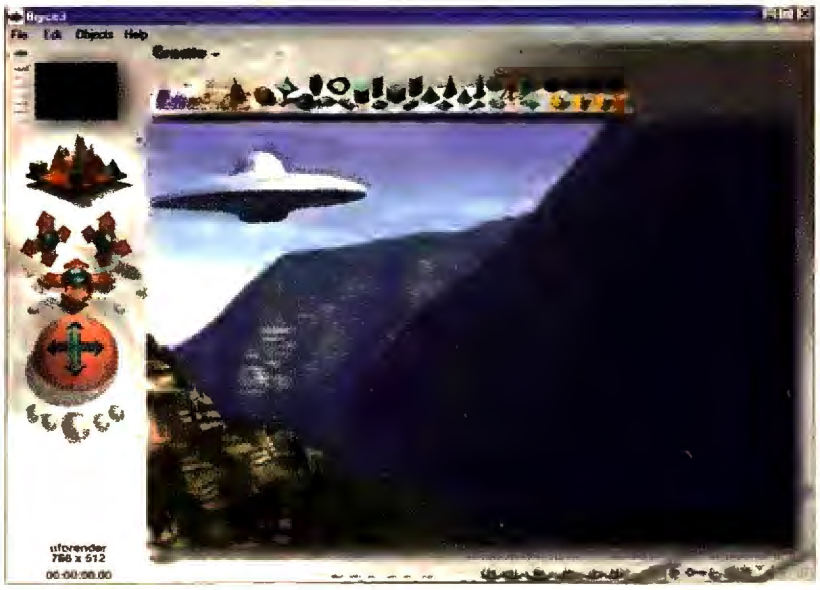
GRAPHICS

EARTHQUAKE! Well, not exactly, but **Bryce 3D** can make your 3D worlds—and everything in them—move. Unlike its two predecessors, the new version of MetaCreations' 3D landscape software lets you set motion for every facet of an environment—objects, terrains, even sky and fog.

Using a beta copy, it took me only a few minutes to apply motion to a flying saucer in my 3D environment. First I assigned timed motion attributes using the Time Scrubber (which times movement in seconds). Then I adjusted velocity, viewed the timeline, and edited keyframes (the points between which movement is timed). You can add atmospheric effects like wind blowing clouds across the sky, or environmental images such as star fields, comets, and rainbows. Hyper Textures allows you to create 3D textures—realistic clouds, for example. Bryce now supports textures created in other applications.

New users may find the interface challenging. But for $199, you won't find another program with Bryce's ability to make scenes come alive.

—*Grace Aquino*



FLY ME TO THE MOON: With Bryce 3D you can create and animate three-dimensional worlds such as this UFO-scape.

Bryce 3D

PRO: Creates good-looking 3D worlds that you can easily animate.

CON: Interface isn't intuitive.

VALUE: Powerful 3D landscape builder and animation tool, fairly priced for its capability.

MetaCreations Corp.

800/846-0111

www.metacreations.com

Street price: $199, upgrade $99

READER SERVICE NO. 735

DeBabelizer's Back

NEED TO CONVERT multiple graphics files to other formats in one fell swoop? DeBabelize them. The upgrade to Equilibrium's popular image-processing program includes a host of new features. You can set up multiple batch processes in one command, layer images, and shave and outline images to set an object apart from the background. The new **DeBabelizer Pro 4.5** ($595, or $99 as an upgrade from version 4.0) also supports Kodak FlashPix, PNG, and EPSF bit-map file formats. As usual, DeBabelizer provides powerful, easy-to-use tools that can enhance, batch process, and archive graphics files. Equilibrium; 800/524-8651; www.equilibrium.com.

READER SERVICE NO. 737

—*Grace Aquino*

For Faster Flowcharts: AllClear 4.0

FLOWCHART

MOST FLOWCHARTING programs help you draw; SPSS's **AllClear 4.0** lets you write your way to a graphic visualization. This $360 package can be a big time-saver because it creates charts based on typed text outlines. Collapse or expand the outline, and AllClear will change the chart's level of detail accordingly.

The program does this by treating certain punctuation (question marks, colons, brackets, and such) as macro commands. For example, type 'Is report complete?' in the outline window, and AllClear creates a box with the query and two-way (yes/no) decision boxes in the adjacent diagram window. There's also a handy Outline toolbar with one-click commands (new tree, new item, and more), and a Diagrammer toolbar with predesigned layout options.

Editing is also easy. You can access layout options, graphics properties, and box information through standard pull-down menus or by right-clicking the chart itself. You can work in the outline window, the diagram window, or both.

I found a preproduction version of AllClear 4.0 fairly easy to use after exploring the tutorials. Like other flowcharting packages, AllClear can add hyperlinks to documents, applications, and Internet or intranet addresses. You can save AllClear flowcharts as Web-compatible JPEG graphics files—but not as HTML files, as you can with Visio.

If you need only an occasional flowchart or diagram, cheaper packages—the $149 Visio Standard 5.0, for example—can do the job, but they require more manual labor.

Frequent flowcharters will find AllClear worth the extra money for the time it saves in producing and revising their charts. The program works with Windows 95 or NT.

—*Richard Jantz* ▶

AllClear 4.0

PRO: Easily creates flowcharts from outlines, supports hyperlinks.

CON: More expensive than the competition, doesn't save HTML files.

VALUE: Timesaving godsend for flowcharting professionals.

SPSS Inc.

800/543-2185

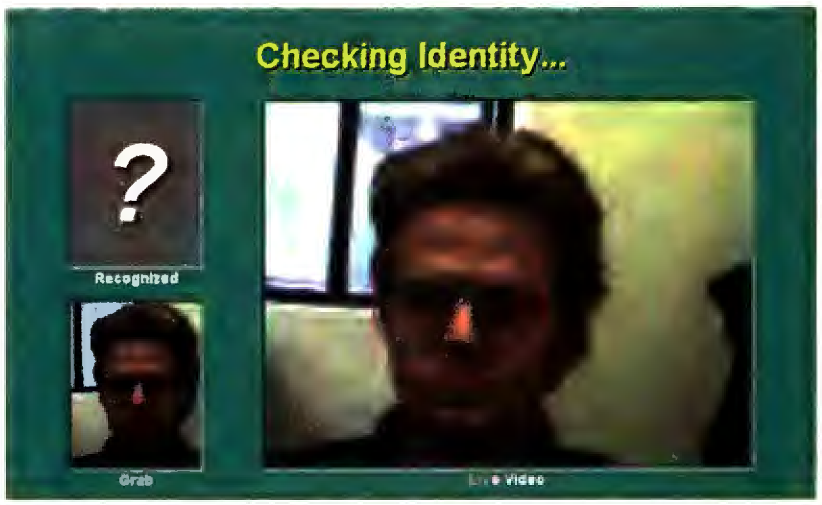
www.spss.com

Street price: $360, upgrade from version 3.5 $149

READER SERVICE NO. 736

FaceIt Face Recognition Falls Flat on Its...

BIOMETRIC SECURITY



WHO IS THAT UNMASKED MAN? FaceIt grants PC access to a familiar face, but it rarely recognized this particular master's mug.

VISIONICS' **FaceIt PC 3.0**, a face-recognition security package aimed at the consumer market, suffers from one small problem—it can't place your face. When I tested a shipping version of the $150 software—which requires a Windows-compatible video-capture system—with a brand-new Connectix QuickCam 2, I was locked out of my own PC much of the time.

When you first install FaceIt, it takes several still pictures of your face and "memorizes" your features. You can then assign the image any number of access privileges—it can be used to lock your system or encrypt certain files and directories. When you want in, FaceIt displays a live video box, zeros in on your head with a vaguely disturbing red crosshair circle, and grants you access if it recognizes your face. (You can set a password override as well.)

But even at the most liberal recognition setting, FaceIt rudely refused to recognize me most of the time. Bumping up the video resolution helped, but any significant change—a hat or a different light source—baffled it completely. Too bad, because the package has some very cool features, including video messaging and remote monitoring (which takes a picture of anyone who visits your desk while you're away and automatically posts it to a remote Web site).

Looks like Big Brother will have to wait.

—Glenn McDonald

FaceIt PC 3.0

PRO: Remote surveillance features, video messaging.

CON: Its basic function, face recognition, works poorly.

VALUE: Pass on this one.

Visionics Corp.
201/332-9213
www.faceit.com
Street price: $150
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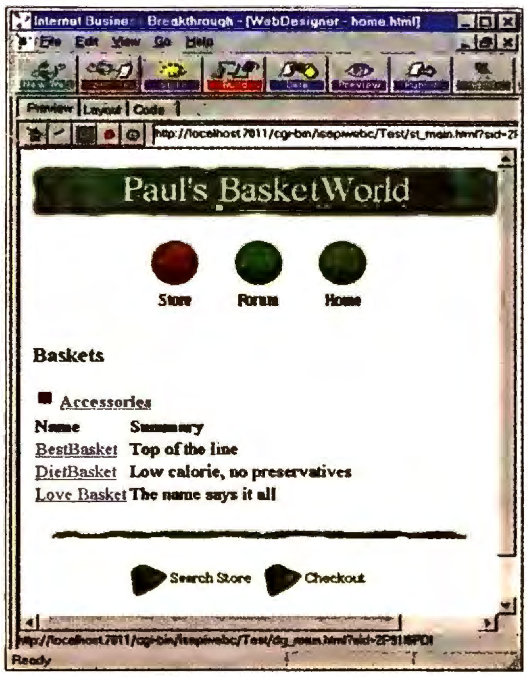
Internet Business Breakthrough - [WebDesigner - home.html]
File Edit View Go Help
Preview
Preview Layout Code
http://localhost:7011/cgi-bin/isapiwebc/Test/st_main.html?sid=2F
http://localhost:7011/cgi-bin/isapiwebc/Test/dg_main.html?sid=2F91I8PDI
Ready

Paul's BasketWorld

Store Forum Home

Baskets

■ Accessories

Name	Summary
BestBasket	Top of the line
DietBasket	Low calorie, no preservatives
Love Basket	The name says it all

Search Store Checkout

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—Paul Heltzel

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WINDOWS 95

HEADACHES

(and How to Cure Them)

System crashes, installation hassles, lousy performance. Here's some relief for your Windows pain.

INSIDE

- Performance Pains
- Interface Irritations
- File Management Migraines
- Installation Woes
- Missed Connections

PLUS

- Windows 3.1 Glitches
- Before the Crash
- Windows NT Gotchas
- The X'd Files: Delete Them Forever, Guilt-Free

BY VALERIE RYAN

WINDOWS 95 FLOATED in on a raft of promises. It was the operating system that was supposed to be easy to navigate, prevent system crashes, solve all your installation problems, balance the federal budget, and bring about world peace. Now, two and a half years later, we know better.

Despite the rosy promises (and many service releases, bug fixes, and updates), many "features" in Windows 95 still leave us gritting our teeth and reaching for a bottle of aspirin (or scotch). These aren't necessarily catastrophes that will wipe out your data, just everyday glitches that annoy and irritate—enough to make you want to stick pins in your Bill Gates doll.

At *PC World* we feel your pain (hey, we use Windows too). So we pulled together the things that bother us most about Windows 95 and came up with ways to fix them. Read on, and you'll find tips, work-arounds, and cures for what ails you. We'll tell you how to minimize system crashes, boost ▶

ILLUSTRATIONS BY ROSS MACDONALD

crash
RPM

sluggish performance, avoid interface flaws, and in general make Windows 95 do some of the things it was supposed to do in the first place. We'll show you which files you can safely delete forever and how to prepare for and prevent system disasters. We also include a few things that bug us about Windows 3.1 and Windows NT.

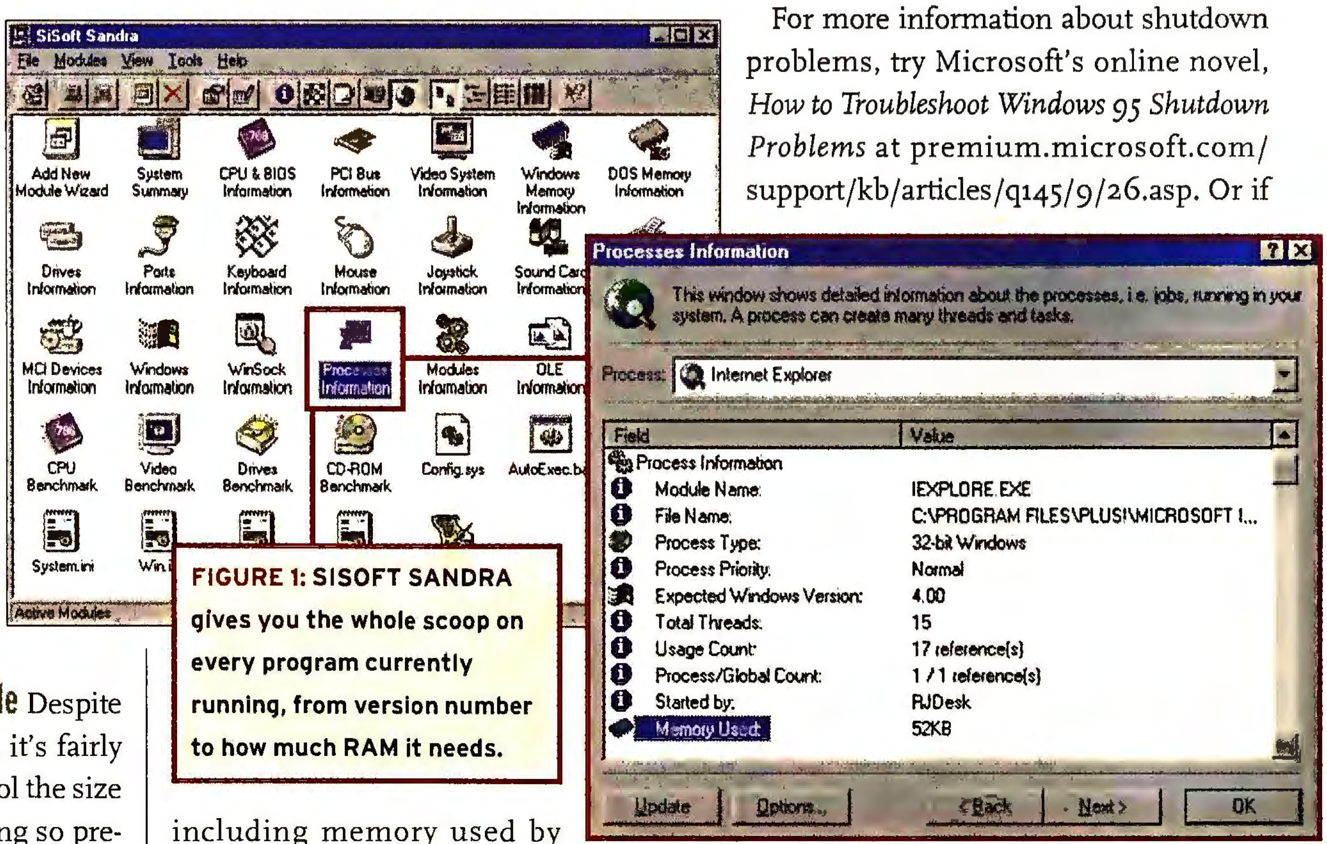
Of course, there are some problems that no amount of tweaking can help. Though we can't fix everything, we can offer a few ways to make life with Windows a little more bearable.

PERFORMANCE PAINS

The Eternally Thrashing Hard Disk If Windows 95 has slowed to a crawl and all you see is a flickering hard disk light, you probably don't have enough free hard disk space for Windows 95's dynamic swap file. The simplest solution is to free up some space. Simply right-click your hard drive icon (probably the C: drive) in any Explorer window and select *Properties* for a pictorial view of available hard disk space. (Or select your hard drive icon in any Explorer window to display its free space in the status bar.) As a general rule, take the amount of system RAM and set aside at least twice as much disk space—three times is even better. As an example, a PC with 32MB of RAM should have about 100MB of free disk space.

The Unswappable Swap File Despite what Microsoft tells you, it's fairly easy and even desirable to control the size of your swap file manually. Doing so prevents the annoying random disk activity that holds up whatever you're doing while Windows 95 readjusts the file's size. Open the Control Panel and double-click *System;* click on the *Performance* tab and then the *Virtual Memory* button. Select *Let me specify my own virtual settings* and take the reins out of Microsoft's hands. Sweet.

Help, I'm Losing My Memory It's not you, it's your apps. The best way to stop memory loss is to shut down RAM-hungry programs. To find out which apps are sucking up RAM, select *Start•Programs•Accessories•System Tools•Resource Meter.* (If you don't see Resource Meter, use the Control Panel's Add/Remove Programs item to install it.) Resource Meter will display the total memory used as a percentage of system resources. But the buck stops there. For the complete skinny on every program that's currently running on your system, including memory used by each, grab a copy of SiSoft Software's standard Sandra shareware program (free to individual users, www.sisoftware.demon.co.uk/sandra/index.htm) and double-click *Processes Information* (see FIGURE 1). Why couldn't Microsoft have made information gathering this simple?



This window shows detailed information about the processes, i.e. jobs, running in your system. A process can create many threads and tasks.

Process: Internet Explorer

Field	Value
Process Information	
Module Name:	IEXPLORE.EXE
File Name:	C:\PROGRAM FILES\PLUS!\MICROSOFT I...
Process Type:	32-bit Windows
Process Priority:	Normal
Expected Windows Version:	4.00
Total Threads:	15
Usage Count:	17 reference(s)
Process/Global Count:	1 / 1 reference(s)
Started by:	RJDesk
Memory Used:	52KB

FIGURE 1: SISOFT SANDRA gives you the whole scoop on every program currently running, from version number to how much RAM it needs.

Slooooow Start-Ups The more apps you load, the more Windows 95 drags its feet. Unfortunately, there's little you can do to speed up start-up. To shave off two whole seconds, remove the boot delay by adding the line **BootDelay=0** to the '[Options]' section of your Msdos.sys file. (Keep in mind that you'll lose that 2-second interval at the 'Starting Windows 95' message, where you might otherwise press <F8> to access start-up.)

Shoddy Shutdowns Wouldn't it be great if you could safely shut down Windows 95 with a single keystroke? Keep dreaming. As often as not, selecting *Start•Shut Down* and clicking *OK* to close all your open apps brings up a 'Program not responding' error message. Tough luck if you haven't saved your work in that app. And don't bother with third-party utilities, such as Chris Bluethman's ShutDown (members.fullnet.net/cdb), unless you just want Shortcuts to the shutdown procedures Windows 95 already uses. Our advice: Save all your work before using Win 95's shutdown command, or use <Alt>-<F4> to close each window one at a time.

For more information about shutdown problems, try Microsoft's online novel, *How to Troubleshoot Windows 95 Shutdown Problems* at premium.microsoft.com/support/kb/articles/q145/9/26.asp. Or if you run Windows 95 on a LAN and can hold out for Windows 98, take heart. Microsoft claims that, on a LAN, Win 98 will shut down faster than Win 95 (which isn't saying much).

Which Windows 95 Version Do You Have?

TO FIND OUT, right-click *My Computer* and select *Properties;* under the General tab you'll see the version number. This will tell you which flavor of Windows you're using.

Version listed	Description	What's been updated
4.00.950	original version	n/a
4.00.950a	original version updated with Service Pack 1	9 features listed at www.microsoft.com/windows95/info/spinfo.htm
4.00.950b	OSR2 (OEM Service Release 2)	31 features listed at www.microsoft.com/windows/pr/win95osr.htm
4.00.950b [1]	OSR2.1	adds Universal Serial Bus support

[1] To identify OSR2.1, in Control Panel select *Add/Remove Programs* and check for 'USB Supplement to OSR2'.

Windows Has Fallen and It Can't Get Up When even pressing <Ctrl>-<Alt>-<Del> won't reboot your system, you know Windows is flat on its back—again. You can try <Ctrl>-<Esc> to bring up the Start menu (at which point you could select Shut Down), but it's a long shot. Basically, you're done for. Turn that baby off, reboot, and run ScanDisk to fix (you hope) any errors caused by the improper shutdown. (If you have OEM Service Release 2, ScanDisk will run automatically when you restart your system.)

When you relaunch the application you were working in before the problem occurred, the program may bring up "recovered" files (as in the case of Microsoft Word or Excel). These files allow you to recover some—though not necessarily all—of the changes you made between the last time you saved the files and the system crash. Save the recovered files under new file names and compare these to the versions you saved before the crash, then use the files that contain your most recent changes.

When a Networked App Crashes, So Does Windows If the LAN disconnects during certain network operations, you'll receive a 'System Error—Network Error on Drive X:' message, and Windows 95 will lock up completely. Microsoft has confirmed this problem (see www.windows95.com/apps/explorer-addons.html) but offers no solution for it. Your only option is to reboot. End of story. Our advice: If your network is crash-prone and you're working with sensitive data, log off the LAN to do your work, then log back on when you're through.

INTERFACE IRRITATIONS

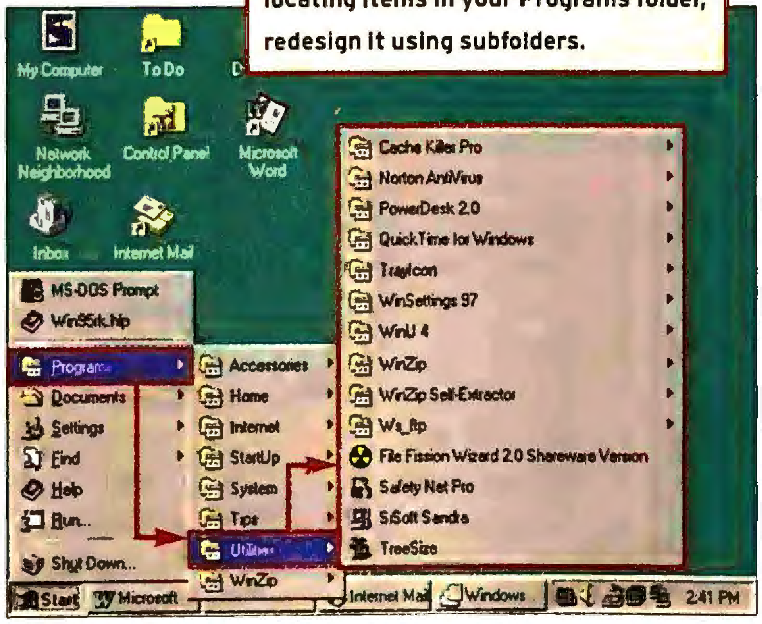
Messy Start Menu The idea behind the Start menu is a good one: Put every application in one easy-to-find place for quick access. The problem is, every application ends up in the Programs folder—and Microsoft offers no tools to keep "application central" from becoming a big mess. The solution? Give your Start menu an overhaul (see **FIGURE 2**). It requires a little time, but the result is worth it.

Right-click *Start* and select *Open* to get at your Start menu items. One way to approach the problem is to create new subfolders—such as Internet, Suites, Utilities, Games, and so on—inside the Programs folder. To do this, open the Programs folder, choose *File•New•Folder,* type a name for the folder, then press **<Enter>**. Or you can ignore the Programs folder altogether and create new folders on the main Start menu. Either way, drag application Shortcuts from the old Programs folder into your new folders. When you're done, you may want to wipe out the Programs folder Shortcuts you never use, or put them inside a Seldom Used folder for those rare moments when you actually need them.

Stubborn Log-In Dialog Box Once you set up a Windows 95 password, that Welcome to Windows dialog box just doesn't want to go away. If you don't need to control access to your system, get rid of this dialog box by setting the password to nothing. In the Control Panel, double-click *Passwords,* then click *Change Windows Password.* Type the old password, and for the new password, press **<Enter>**. Press **<Enter>** again on the 'Confirm password' line, then click *OK.*

Useless Passwords Windows 95 offers no security beyond a log-in dialog box that anyone can bypass by pressing <Esc>. A lot of good that does you. Your alternatives? Buy a third-party utility, such as Bardon Data Systems' WinU (shareware, $49.95, www.fileworld.com), or use the System Policy Editor, buried on the Windows 95 installation CD-ROM at D:\Admin\Apptools\Poledit. Both have their limitations, however. Though third-party utilities seem like a good solution, even amateur hackers can crack most of them. The System Policy Editor's settings are more secure, but they're most useful for restricting access to system settings and applications, not data files.

FIGURE 2: IF YOU'RE HAVING trouble locating items in your Programs folder, redesign it using subfolders.

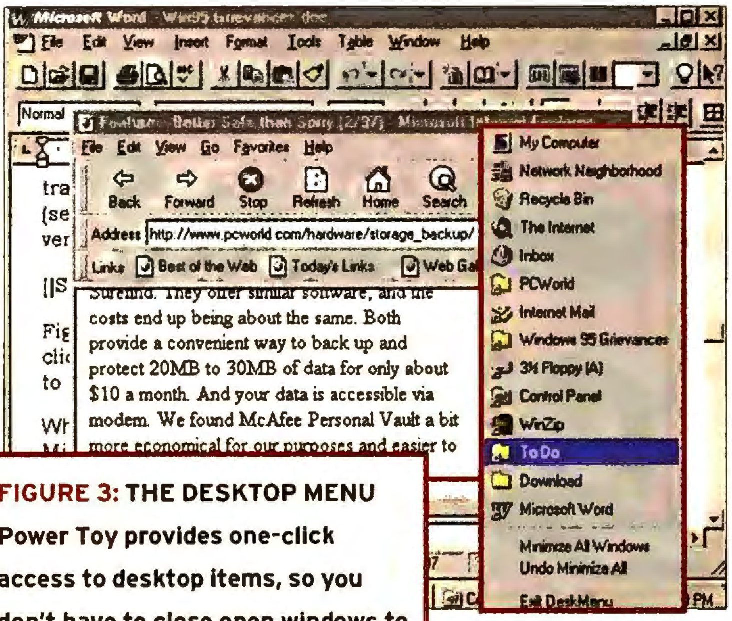


Think you'll just wait for Windows 98? Don't hold your breath. We didn't find ▶

better security there—at least not in the beta versions we looked at. Perhaps Microsoft is still working on it.

Win 95, Desktop Dictator

For an operating system that's supposed to be so customizable, Windows 95 sure is a control freak. It insists on rearranging the desktop icons, even when Auto Arrange isn't selected. Don't even waste your time trying to outsmart it. Use EzDesk (www.aol.com/EzDesk95/index.html) to make your desktop icons stick like glue to your location of choice.


Microsoft Word - Win95 Grievances.doc
File Edit View Insert Format Tools Table Window Help
Normal
Feature: Better Safe than Sorry (2/97) - Microsoft Internet Explorer
File Edit View Go Favorites Help
Back Forward Stop Refresh Home Search
Address http://www.pcworld.com/hardware/storage_backup/
Links Best of the Web Today's Links Web Gallery
My Computer
Network Neighborhood
Recycle Bin
The Internet
Inbox
PCWorld
Internet Mail
Windows 95 Grievances
3½ Floppy (A:)
Control Panel
WinZip
To Do
Download
Microsoft Word
Minimize All Windows
Undo Minimize All
Exit DeskMenu

costs end up being about the same. Both provide a convenient way to back up and protect 20MB to 30MB of data for only about $10 a month. And your data is accessible via modem. We found McAfee Personal Vault a bit more economical for our purposes and easier to

FIGURE 3: THE DESKTOP MENU Power Toy provides one-click access to desktop items, so you don't have to close open windows to get to program and folder icons.

The Hidden Desktop

Want to reach desktop icons without minimizing all the apps you're running? You'll have to look to DeskTop Menu, a Windows 95 PowerToy (see following item), for the solution. Once DeskTop Menu is installed, simply click its icon in the tray of the Taskbar for a pop-up desktop menu (see **FIGURE 3**). Microsoft saw the light and added a desktop icon to the IE 4.0 Taskbar; click it to go straight to the desktop.

Sticky Window Settings

How to change default window settings is one of the most widely asked Windows 95 questions—and one with the least satisfying answer: There is no easy way to make all windows display files in List view, for example. However, you can make settings stick on a window-by-window basis, assuming you've set them once. To do it, you'll need yet another software package. Download and install Tweak UI 1.1, a Windows 95 PowerToy (freeware.www.microsoft.com/windows95/info/powertoys.htm), then select *Save window settings* in the *General* tab. We won't bore you with the details about the Registry-based solution—it's way too much work.

Getting Rid of 'Shortcut To'

As if the little arrow on every Shortcut icon isn't enough of a clue, Win 95 automatically adds the words 'Shortcut To' to every desktop Shortcut. A Windows 95 PowerToy, Tweak UI (see the "Sticky Window Settings" item at left), will turn off this annoying feature. Once you've installed the utility, open it, click on the Explorer tab, and deselect *Prefix "Shortcut To" on new Shortcuts.*

Icons, Begone!

Some icons (like the one for Microsoft Network) cling to your desktop like barnacles. That's because Microsoft deliberately left out the Delete command from the icon's context menu. To fix this, open the Registry Editor and navigate to HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\explorer\Desktop\NameSpace. Select an alphanumeric key—a long string of numbers and letters in brackets—in the NameSpace folder, and the key's corresponding icon name will appear in the right-hand pane under Data. When you find the icon you want to lose, right-click its key in the left-hand pane and select *Delete* (see **FIGURE 4**). Close the Registry Editor, click on the desktop once, and then press **<F5>** to refresh.

Windows 3.1 Glitches

WINDOWS 95 CERTAINLY hasn't cornered the market when it comes to annoying features. Although more and more people are leaving Win 3.1 behind, here are a few bumps to avoid if you're still using Windows 95's predecessor.

GPFS AND SYSTEM LOCKUPS How do you avoid those dreaded General Protection Faults? A good rule of thumb is not to let your available system resources drop below 20 percent. (To view current resources, select *Help•About* in any Windows app, such as Notepad.)

You could also try a more advanced setting. Open system.ini in Notepad, look for '[386Enh]', and add the line **MaxBPs=768**. This command specifies the maximum number of break points (break points are a means of transferring control to 386 Enhanced Windows; the default number is 200). If Windows exceeds the maximum number of break points, you get a **GPF**.

FILE NAMES TOOSHORT.DOC Want to use long file names with Win 3.1? You can, but only with a third-party utility. Alexoft's Instant File Access (shareware, $25 for single registration, www.alexoft.com) adds long file name support to Windows 3.1.

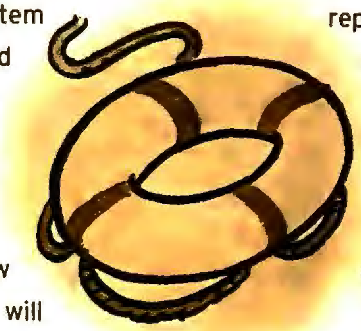
FILE MISMANAGEMENT Mijenix's WizManager Pro 2.5 (shareware, $39.95, www.mijenix.com) beefs up the Windows 3.1 File Manager. Besides adding a DOS Command Line Box, this utility includes a customizable Launchbar for opening applications and files, a Buttonbar with icons, and many more useful features. Two thumbs up.

INSCRUTABLE .INI FILE Microsoft has put together two very long (but, we have to admit, comprehensive) explanations of Win.ini and Sys.ini and their settings. Download them from support.microsoft.com/support/downloads (then navigate your way to /SupportDownloads/MicrosoftWindows/Windows 3.x and all earlier versions/Updates and Utilities).

ICON GROUPS Do other people futz with your Program Manager settings? A simple way to discourage changes is to add the read-only attribute to all of your .grp files. Open File Manager and search for .grp files in your \windows directory. Select them all, choose *File•Properties*, and select the read-only attribute. Click *OK*. Now other users can't move or delete icons or groups (unless they remove the read-only attribute, but who's going to go to all that trouble?). —V. R.

Before the Crash

WINDOWS CRASHES are inevitable—but don't have to be disasters. Here are five ways to keep small problems from turning into big ones.



PROTECT YOUR HARD WORK The best way to avoid disaster is to back up your data files. If your system goes down, nothing—not even the rage you feel toward Microsoft—will make you more miserable than losing days or weeks of work. Keep all your data files in one location, and back them up on a regular basis.

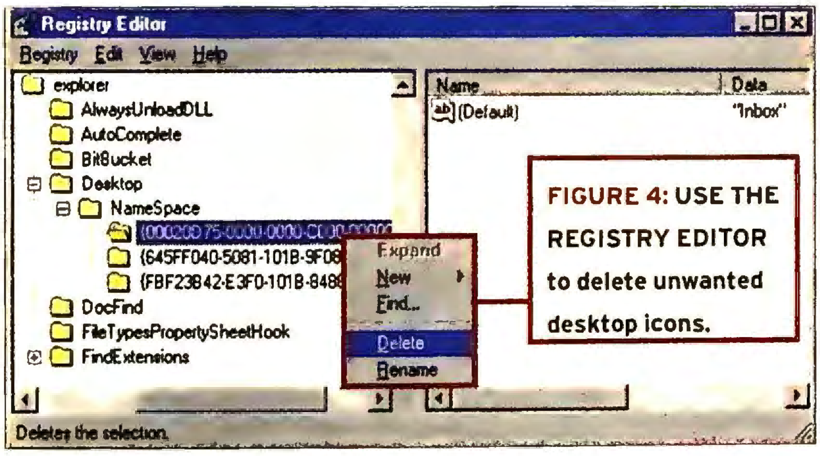
WATCH YOUR REGISTRY Back up your Registry files—System.dat and User.dat—regularly. (Remember, every time that you add software, the Registry changes, too.) Better still, back up *all* your system files. If you find this is cumbersome, Safety Net Pro (shareware, $22, www.fileworld.com) will back up your Registry and other configuration files to a floppy disk in one easy step.

CREATE A START-UP DISK If you can't get into Windows 95 some day, a start-up disk will get you to an A> prompt, where you can use the disk's diagnostics and repair tools. To create a disk, open the Control Panel, double-click *Add/Remove Programs*, and on the Startup tab, click *Create Disk*.

DON'T FORGET THE DRIVERS To make sure Windows can find your CD-ROM drive after a crash, copy the CD-ROM and MSCDEX drivers to your start-up disk. Be sure to add your autoexec.bat and config.sys files, and make sure they point to these drivers. (To obtain real-mode CD-ROM drivers, try www.windows95.com/drivers/drives.html or www.driverzone.com, or check with the drive's manufacturer.)

PLAN FOR YOUR EMERGENCY RECOVERY Finally, create an emergency recovery disk. This disk includes your system and configuration files, plus a program that restores them. To create the disk, run the Emergency Recovery Utility, located on the Windows 95 installation CD-ROM at D:\Other\Misc\Eru\Eru.exe. —V. R.

The icon's gone—and good riddance. (Make a note of its key, just in case you need to re-create it.)

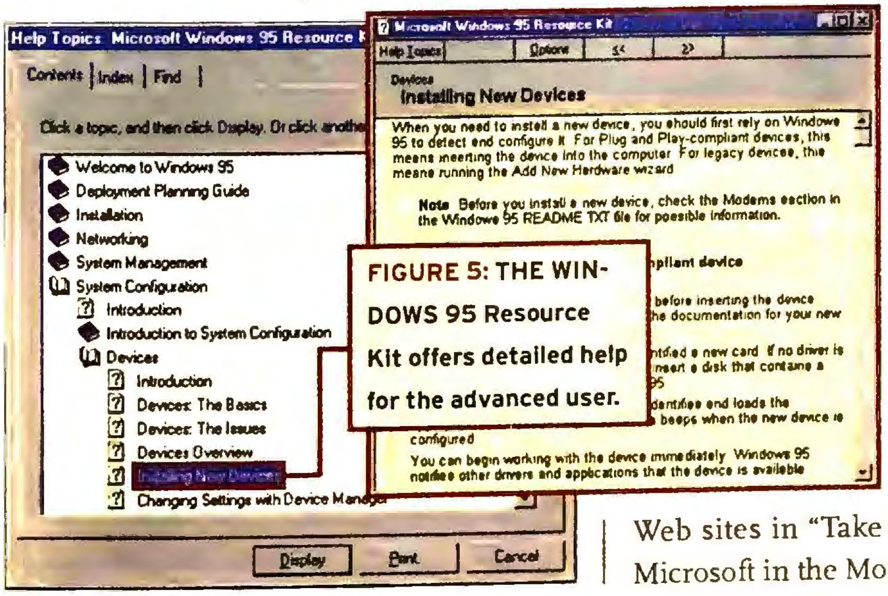


Deletes the selection.

FIGURE 4: USE THE REGISTRY EDITOR to delete unwanted desktop icons.

Noise Pollution Windows has a cute little noise for just about everything. Fortunately, you can silence all this racket using the Sounds Properties dialog box. Open the Control Panel and double-click *Sounds*. Select an item in the Events list that is preceded by a yellow speaker, and under Name you'll see the .wav file associated with it. Select any sound in the list to replace it, or select *None*, at the top of the list, for some peace and quiet during that event. And if you think operating systems should be seen and not heard, select *No Sounds* under Schemes and click *OK*.

Lousy Help If you run into a sticky problem, don't bother using Windows 95's on-screen help system. Nine times out of ten, it's no help at all. Unless you're a beginner, look instead to the Windows 95 Resource Kit (see **FIGURE 5**) for more detailed (albeit dry) information. Unearth this help file from the installation disc at D:\Admin\Reskit\Helpfile\Win95rk.hlp, or download the file from www.microsoftffl.com/windows95/info/win95reskit.htm. Or better still, we really encourage you to check out the list of helpful Web sites in "Take Two URLs and Call Microsoft in the Morning" on page 128.



Click a topic, and then click Display. Or click anothe

Installing New Devices

When you need to install a new device, you should first rely on Windows 95 to detect and configure it. For Plug and Play-compliant devices, this means inserting the device into the computer. For legacy devices, this means running the Add New Hardware wizard.

Note Before you install a new device, check the Modems section in the Windows 95 README.TXT file for possible information.

pliant device

before inserting the device
he documentation for your new

tified a new card. If no driver is
nsert a disk that contains a
95

dentifies and loads the
beeps when the new device is
configured.

You can begin working with the device immediately. Windows 95 notifies other drivers and applications that the device is available.

FIGURE 5: THE WINDOWS 95 Resource Kit offers detailed help for the advanced user.

FILE MANAGEMENT MIGRAINES

Missing File Extensions Can't see file extensions in Windows Explorer? That's because Microsoft assumes you don't want to see them. Sounds backward, we agree. To display extensions such as .exe or .doc in Explorer, select *View•Options*, choose the *View* tab, and deselect *Hide MS-DOS file extensions for file types that are registered*.

No File Filtering Add this to the long list of useful File Manager features Microsoft left out of Windows Explorer: You can't filter files by extension. Just great. Want to find all the .exe files inside a folder? You'll have to do a search for *.exe, or sort the file list by clicking the *Type* bar, so you can see all the .exe files next to each other. Here's another good reason to lose Explorer completely and get Mijenix's PowerDesk ExplorerPlus (see the following item).

▶

No Panes, No Gain

Ever try to move a file from the top of your C: drive to the bottom of your D: drive? In Win 3.1 it was easy: Just open multiple drive windows inside File Manager and drag the file from one window to the other. But in its infinite wisdom, Microsoft left this feature out of Windows 95's Explorer. One solution is to launch two copies of Windows Explorer, then arrange and resize them to see both Explorer windows at once—a real pain. A better option? Ditch Explorer entirely and get Mijenix's PowerDesk ExplorerPlus (shareware, $39.95 and worth every penny, www.mijenix.com/powerdesk.htm), shown in **FIGURE 6**.

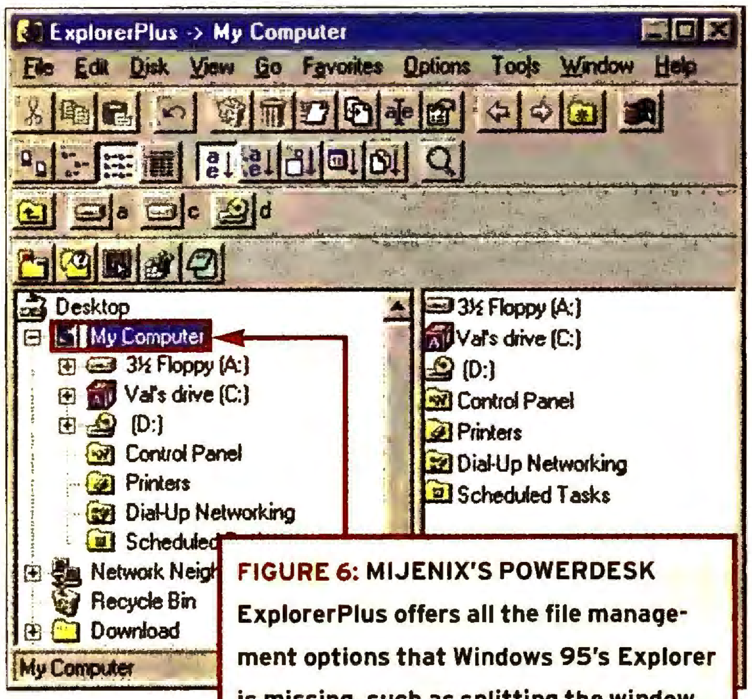


FIGURE 6: MIJENIX'S POWERDESK ExplorerPlus offers all the file management options that Windows 95's Explorer is missing, such as splitting the window into two panes for easy drag and drop.

Unsavable Searches

Ever used Explorer's Find Files tool and wished you could save the list of files you found? You can, but don't go looking in Explorer for the method. The only way to save search results is to create a desktop Shortcut to them. After completing a search in the Find dialog box (*Start•Find•Files or Folders*), select *Options•Save Results*, then select *File•Save Search*. Next double-click the new Shortcut, and you will discover the Find dialog box with your search results inside. If you want to update the search results, click *Find Now*. To save the results of several different searches, create a folder for each one to avoid cluttering your desktop.

Sloppy Floppy Disk Formatting

It's always a good idea to check out the contents of a floppy disk before formatting it. But if you view your A: drive in Explorer and then you try to use the Format command, Windows 95 will inform you that it can't format the disk. What a nuisance. To sidestep this roadblock, place a Shortcut to your floppy drive on the desktop. You can then double-click it to view a floppy disk's contents. When you're ready to format, close the open window, right-click the Shortcut, and select *Format*. But an even better alternative is the aforementioned PowerDesk ExplorerPlus (see the item "No Panes, No Gain" at left), which allows you to format the floppy disk even if its contents are displayed. ▶

Windows NT Gotchas

WINDOWS NT 4.0 IS not without its share of problems. Here are five of the nastier ones, and how to fix them.

■ **DUAL-BOOT DILEMMAS** Microsoft gives you the ability to install Windows NT and Windows 95 on the same computer–the same hard disk, even–but also endowed them with mutually exclusive file systems. Windows NT 4.0 can't read FAT32 (the 32-bit file allocation table), which Win 95 OEM Service Release 2 uses on large hard disks, and all versions of Window 95 balk at the NT File System. Fortunately, both OSes speak FAT16. The easiest way to convert a file system to FAT16 is with PowerQuest's $69.95 PartitionMagic 3.0 utility (www.powerquest.com). Or you can wait for NT 5.0, which will read FAT32 partitions.

■ **THE BLUE SCREEN OF DEATH** In theory, Windows NT is more stable than Windows 95, because it does a better job both of isolating buggy 16-bit DOS and Windows 3.1 code from the operating system and of scrutinizing device drivers. Unfortunately, Windows NT itself is buggy as hell–you'll see that blue system-crash screen more often than you'd like. But if you plan to install NT anyway, download and install the nearly 18MB Service Pack 3 (ftp://ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/ussp3/i386/nt4sp3_i.exe). While you're there, check the descriptions (text files that start with *q*) for the 15 post-Service Pack 3 fixes in ftp://ftp.microsoft.com/bussys/winnt/winnt-public/fixes/usa/nt40/hotfixes-postSP3.

■ **DOS GAMES WON'T PLAY** Want to play Quake on your new NT workstation? No can do. Windows NT is very picky about DOS games, usually because they access hardware like video boards and memory directly, something the operating system forbids. Increasingly, though, the game manufacturers make Windows 95 versions, which stand a much better chance of running under NT. You can find a list of NT-compatible programs at www.microsoft.com/window/thirdparty/winlogo /default.htm.

■ **NO FAX, MA'AM** Support for faxing has never been one of NT's strengths–even third-party fax tools are scarce compared to the many offerings for Windows 95. And NT doesn't ship with even the minimal fax software that Windows 95 includes–yet. Microsoft is working on NT fax software, and it offers a free, stable, no-frills 735K beta version at www.microsoft.com/ntworkstation/fax.htm.

■ **FRAGMENTED DISKS** Unlike Windows 95, NT lacks a built-in defragmentation tool. How very convenient. Executive Software's $49.95 Diskeeper 3.0 is the premier Windows NT disk-defragmentation tool–just ask Microsoft, which plans to include a stripped-down version with NT 5.0. If the price seems a bit steep, download the company's free Diskeeper Lite from www.diskeeper.com/dklite/download.htm.

–Scott Spanbauer

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How Big Are My Subfolders? In a perfect Windows world, you'd be able to see how much disk space all your subfolders consume at a glance. But n instead, you have to right-click each fol in Explorer, select Properties, and w while Windows 95 does the math—wa too much work. If you really want to view all folder sizes at once, use TreeSize (freeware, www.windows95.com/apps/explorer-addons.html).

Bad Associations Double-click a data file in Windows Explorer, and it will launch the file from the appropriate application, right? Well, maybe. If you installed Internet Explorer, for instance, Windows will use it to open GIF or JPEG files, regardless of what program you associated with those file types. To reassert your own preferences, you need to remove the new association and restore the old one. To remove the association, on the File Types tab of the *View•Options* dialog box, select the file type you want to change (GIF Image or JPEG Image), click *Remove,* and then select *Yes* to confirm the change. To reassociate files of that type, double-click a .jpg or .gif file. In the Open With dialog box that appears, select the app you want to use to open the file, make sure 'Always use this program to open this file' is selected, and click OK.

Recycle Bin Blues Quiz: When is a deleted file not deleted? When it's sitting in Win 95's Recycle Bin. Unless you empty it manually, files will simply collect there until the bin is full. One solution: Reduce the bin to a bare minimum. Right-click the Recycle Bin in Explorer and select *Properties,* then click the *Global* tab. Move the slide bar to the left until the Bin consumes only 1 percent of your total hard drive capacity. Even then, if you have a 3.2GB drive, you'd have to accumulate 32MB of trash before Windows 95 would empty the Recycle Bin. If you really despise emptying the bin, turn it off altogether. Right-click the Recycle Bin, then select *Do not move deleted items to Recycle Bin.*

INSTALLATION WOES

Won't Plug, Doesn't Play So you've installed a Plug and Play device, and now it won't work. Welcome to the club. There are a few things you can do, other than returning the device (and Windows 95). Open the Control Panel, double-click *System,* and select the *Device Manager* tab. Choose the device that you just installed, click *Properties,* and select the *Resources* tab. Check the 'Conflicting device' list for conflicts. If you don't see one, then Windows 95 is oblivious to the problem and can't help. If you do see a conflict, call upon the Hardware Conflict Troubleshooter: Select *Start•Help,* click the *Contents* tab, and under Troubleshooting, double-click *If you have a hardware conflict.*

If neither of those steps help, try starting over. Remove the device from the Device Manager, turn your system off, unplug the device, plug it back in, then restart your system and try the installation again. May the force be with you.

Stalled Uninstalls Here's a fun game: Remove a software program from your system, then check the Install/Uninstall tab of Windows' Add/Remove Programs dialog box. Is the program still listed there? If so, you've discovered one of the many inefficiencies of Windows 95's uninstall feature. To remove these ghost programs from the list, you could open the Registry Editor, navigate your way to HKEY_LOCAL ▶

The X'd Files: Delete Them Forever, Guilt-Free

UH-OH, your hard drive is full. Don't panic. Just give the old heave-ho to useless files. Here's a list of the ones you can safely obliterate, from .avis to .zips. If you're feeling cautious, use <Delete> to send these files to the Recycle Bin; if your PC remains problem-free, you can blast them into oblivion.

■ **RETURN THE VIDEOS** There are 7MB of useless .avi video files in the Windows\Help folder alone. If you don't use 'em, lose 'em.

■ **SCRATCH YOUR .BAKS** The following leftover files are of no use to you. In the Windows folder: All .___, .old, .bak, .000, .001, .002 (and so on) files. In the root directory: All .___, .old, .prv .txt and .dos files (Note: If you dual-boot, leave the .dos files alone.)

■ **CLEAN YOUR CACHE** Your Web browser's cache folders are prime disk hogs. Internet Explorer 4.0 users should delete the contents of their Windows\Temporary Internet Files folder, or if you have Netscape Navigator 4.0, delete the contents of C:\Program Files\Netscape\Users\(username)\Cache. Better yet, you can ask Cache Killer Pro to do this for you (shareware, www.fileworld.com).

■ **FIRE YOUR .TMPS** Temporary files are typically wiped out by a proper Windows 95 shutdown. Well, we all know how often that happens seamlessly. Search your PC for .tmp files and delete all but those with the current date.

■ **LOSE THE PICTURES** Graphics files are big space hogs. To get rid of all unnecessary .bmp and other graphics files, search on your hard drive for .bmp and .pcx files. Trick: For quick bit-map viewing, set the .bmp file to display a thumbnail view as its icon. To get to the Registry Editor, choose *Start•Run,* type **regedit** in the field line, and click *OK.* Make sure 'My Computer' (or whatever you named your hard drive) is there, and make your way to HKEY_CLASSES_ROOT\Paint.Picture\DefaultIcon. In the right pane, right-click *(Default),* select *Modify,* type **%1** on the Value data line, and click *OK.* (Be careful not to delete bit maps you need, such as screen saver files.)

■ **ZAP YOUR .ZIPS** Check your disk for any .zip files. If you've already extracted their contents, they're only wasting valuable space.

—V. R.

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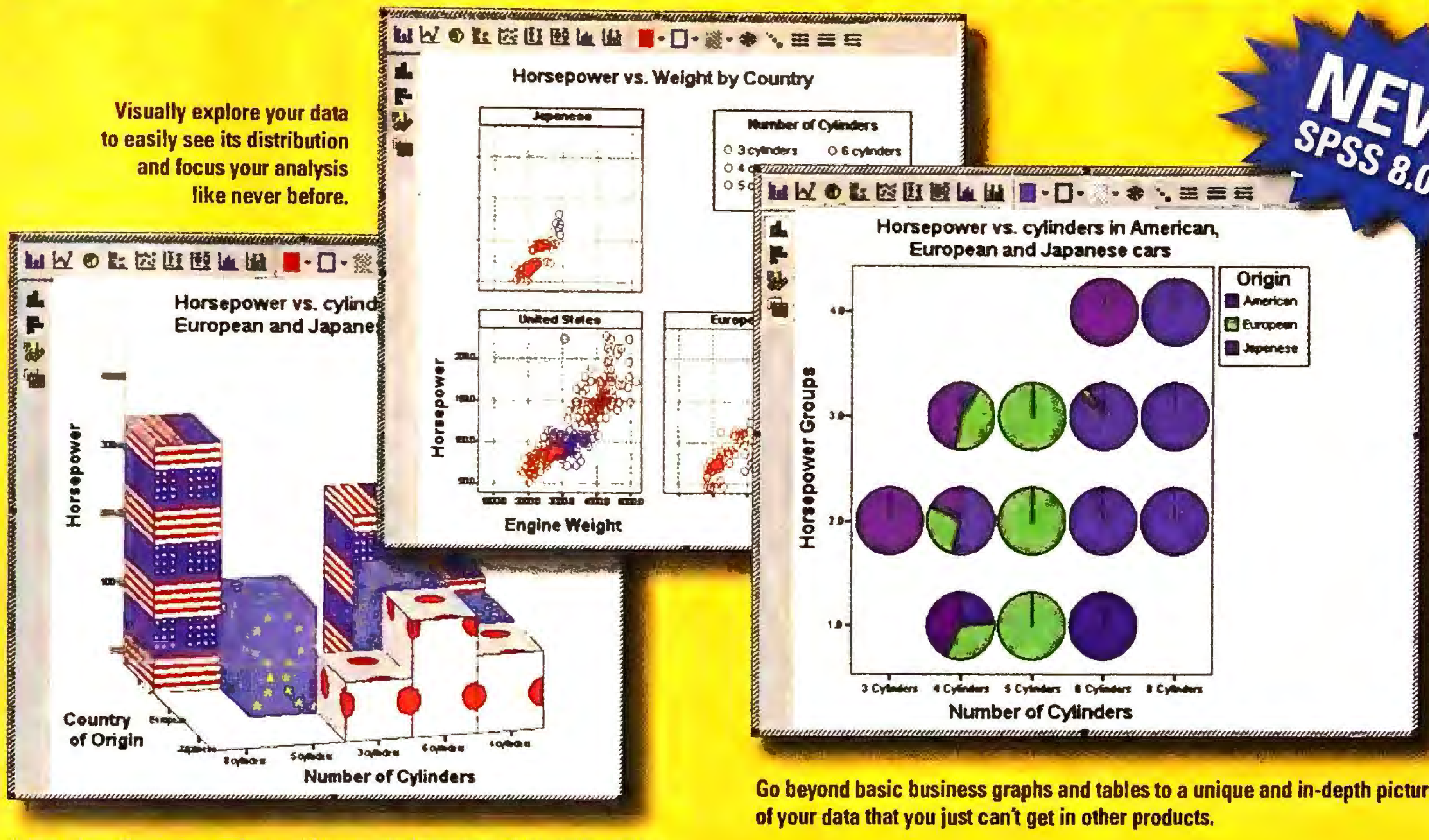

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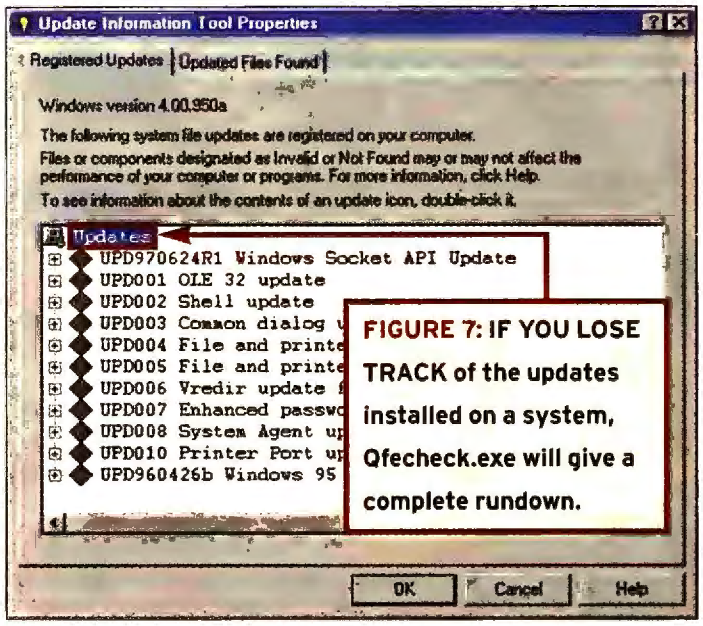
MACHINE\Software\Microsoft\Windows\CurrentVersion\Uninstall, and delete any unwanted items manually. But Tweak UI PowerToy (see "Sticky Window Settings," page 120) provides the easiest way: Click the *Add/Remove* tab, select the offending app, and click Remove.

Which Windows 95 Am I Using? When you install updates to Win 95, the Windows 95 Update Information Tool, Qfecheck.exe, is installed along with it, usually in the Windows folder. Heck, it's the least Microsoft can do. Run Qfecheck.exe to see a list of the updates installed on your system (see **FIGURE 7**). (For a quick guide to the many flavors of Windows, see the chart "Which Windows 95 Version Do You Have?" on page 119).

Microsoft has improved the clumsy updating process with Windows 98. In its Start menu, a help file links to a Web site that automates downloading and installing updates.



Windows version 4.00.950a

The following system file updates are registered on your computer.

Files or components designated as Invalid or Not Found may or may not affect the performance of your computer or programs. For more information, click Help.

To see information about the contents of an update icon, double-click it.

```
Updates
UPD970624R1 Windows Socket API Update
UPD001 OLE 32 update
UPD002 Shell update
UPD003 Common dialog u
UPD004 File and printe
UPD005 File and printe
UPD006 Vredir update f
UPD007 Enhanced passwo
UPD008 System Agent up
UPD010 Printer Port up
UPD960426b Windows 95
```

FIGURE 7: IF YOU LOSE TRACK of the updates installed on a system, Qfecheck.exe will give a complete rundown.

Unsupported Backups The list of drives that Microsoft Backup does *not* support is longer than the list of those it does. How embarrassing. (For a list of compatible drives, check out premium.microsoft.com/support/kb/articles/q124/7/30.asp.) If your tape drive didn't come with its own backup utility, you'll need a third-party one, such as Computer Associates' Cheyenne Backup for Windows 95 ($79, www.cheyenne.com). Just be sure to use one designed for Windows 95, so it will keep long file names intact.

P.S. Don't bother downloading the Backup Update (www.microsoft.com/windows95/info/backupd.htm). Microsoft says it adds "slight performance improvements" to Microsoft Backup. But the company admits it won't help you with tape drive incompatibilities.

Take Two URLs and Call Microsoft in the Morning

STUMPED BY A Windows snafu? Here are the ten best Web sites for Windows help.

SITE/URL	Comments
ClubWin www.clubwin.com	Tips, FAQs, and links from people who eat, sleep, and breathe Windows.
Cutter's Windows 95 Crossroads www.io.com/~kgk/win95.html	A huge collection of links to other Windows 95 sites.
Frank Condron's World o' Windows www.conitech.com/windows	Windows 95 and NT drivers, news, and tips.
Microsoft's Knowledge Base www.microsoft.com/kb/default.asp	Answers to Windows technical questions.
PC World Online www.pcworld.com/home/index.html	Everything in the print *PC World*, plus a software library, news, online features, and more.
TipWorld www.tipworld.com	Free daily e-mail tips on Windows and many other programs.
Windows95 Annoyances www.creativelement.com/win95ann	Discussion of some of the more annoying Windows 95 features.
Windows95.com windows95.com	Windows 95 information and shareware.
WindowsCentral www.windowscentral.com	Windows news and tips (part of My Desktop Network, www.mydesktop.com).
WUGNET's Shareware Hall of Fame www.wugnet.com/shareware/index.html	Windows 95 and NT shareware and tips.

MISSED CONNECTIONS

Password Amnesia So you downloaded and installed the Service Pack 1 Update, thinking that all your Windows 95 problems would be solved, right? Wrong! Now Windows won't remember your password for dial-up networking. (OSR2 users, go get some coffee—you won't have this problem.) Download the patch for the Windows 95 Password List Update patch from www.microsoft.com/windows95/info/passwd.htm. Before installing it, delete all .pwl files from your Windows folder to ensure that all corrupted files have been purged from your PC.

Calling Card Snafus Yes, Virginia, you *can* use your calling card with Dial-Up Networking—but only if you use OSR2. (To see which default calling card strings Windows supports, launch Dial-up Networking and select *Properties•Dial Using Calling Card*). It's a royal pain if your calling card number isn't on the list, though, because you have to type it in each time—you can't save customized dialing strings.

Exchanging E-Mail Microsoft Exchange has many glitches, including an inability to send and receive mail through an Internet service provider. To resolve this, download the Microsoft Exchange Update for Windows 95 (www.microsoft.com/windows95/info/exupd.htm) to upgrade to Windows Messaging. OSR2 users already have this upgrade. IE 4.0 users have an even newer Microsoft Exchange as well as Microsoft Outlook Express. Take your pick.

For files mentioned in this article, visit www.fileworld.com. Valerie Ryan is a freelance writer based in Holliston, Massachusetts, and Scott Spanbauer is a PC World *senior associate editor.* ■

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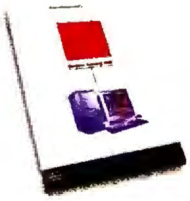

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QP5/233 M-2 $1499
(with MMX™ Technology)

Lease: $53/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Pipelined Burst Cache
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D w/4MB SGRAM
- 17" Digital Monitor (15.8" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-90 Speakers
- Quantex Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows '95 with MS Plus!
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/233 M-2x (with Pentium II processor). . $1649
QP6/266 M-2x (with Pentium II processor). . $1749
QP6/300 M-2x (with Pentium II processor). . $1899

QP6/266 M-3x $1899
(featuring Pentium® II processor)

Lease: 67/Mo.

- 266MHz Pentium® II Processor
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (15.8" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows '95 with MS Plus!
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/233 M-3x (with Pentium II processor). . $1799
QP6/300 M-3x (with Pentium II processor). . $2049
QP6/333 M-3x (with Pentium II processor). . $2199

QP6/333 M-4x $2499
(featuring Pentium® II processor)

Lease: 88/Mo.

- 333MHz Pentium® II Processor
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 3D Labs Permedia 2 AGP Graphics Card with 8MB
- 19" Digital Monitor (18.1" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS Mouse
- MS Windows '95 with MS Plus!
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

QP6/233 M-4X (with Pentium II processor). . $2099
QP6/266 M-4X (with Pentium II processor). . $2199
QP6/300 M-4X (with Pentium II processor). . $2349

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

QP5/233 SM-1 $1399
(with MMX™ Technology)

Lease: $49/Mo.

- 233MHz Pentium® Processor with MMX™ Technology
- 32MB EDO Memory / 512KB Pipelined Burst Cache
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- STB Nitro 3D w/4MB SGRAM
- 15" Digital Monitor (13.8" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-90 Speakers
- Quantex Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows '95 with MS Plus!
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**

QP5/200 SM-1 (with MMX Technology). . $1349
QP6/233 SM-1x (with Pentium II processor). $1549
QP6/266 SM-1x (with Pentium II processor). $1649

QP6/266 SM-2x $1899
(featuring Pentium® II processor)

Lease: $67/Mo.

- 266MHz Pentium® II Processor
- 32MB SDRAM Memory / 512KB Secondary Cache
- 4.3GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (15.8" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows '95 with MS Plus!
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- 3-year limited warranty with 1-year On-Site Service**

QP6/233 SM-2x (with Pentium II processor). $1799
QP6/300 SM-2x (with Pentium II processor). $2049
QP6/333 SM-2x (with Pentium II processor). $2199

QP6/300 SM-3x $2149
(featuring Pentium® II processor)

Lease: $75/Mo.

- 300MHz Pentium® II Processor
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 17" Digital Monitor (15.8" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows '95 with MS Plus!
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**

QP6/233 SM-3x (with Pentium II processor). $1899
QP6/266 SM-3x (with Pentium II processor). $1999
QP6/333 SM-3x (with Pentium II processor). $2299

QP6/333 SM-4x $2649
(featuring Pentium® II processor)

Lease: $93/Mo.

- 333MHz Pentium® II Processor
- 64MB SDRAM Memory / 512KB Secondary Cache
- 8.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 3D Labs Permedia 2 AGP Graphics Card with 8MB
- 19" Digital Monitor (18.1" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-90 Speakers with ACS-250 subwoofer
- Quantex ATX Mid Tower Case
- 104-Key Keyboard with MS IntelliMouse
- MS Windows '95 with MS Plus!
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
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QP6/233 SM-4x (with Pentium II processor). $2249
QP6/266 SM-4x (with Pentium II processor). $2349
QP6/300 SM-4x (with Pentium II processor). $2499

Best Buy Specials

M-Series Best Buy $1999
(featuring Pentium® II processor)

Lease: $70/Mo.

- 300MHz Pentium® II Processor
- 2 Universal Serial Bus (USB) Ports/ Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 5.1GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 64-bit 3D AGP Graphics Card w/4MB SGRAM
- 17" Digital Monitor (15.8" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- 32X Max EIDE CD-ROM Drive
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-90 Speakers
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite with MS Mouse
- MS Windows '95 with MS Plus!
- Value Multimedia Software Bundle
- 3-year limited warranty with 1-year On-Site Service**

SM-Series Best Buy $2499
(featuring Pentium® II processor)

Lease: $88/Mo.

- 300MHz Pentium® II Processor
- 2 Universal Serial Bus (USB) Ports/ Intel 440LX PCI Chipset
- 64MB SDRAM Memory / 512KB Secondary Cache
- 6.4GB Ultra ATA HD / 3.5" 1.44MB Floppy Drive
- 128-bit Riva 128 3D AGP Graphics Card with 4MB SGRAM
- 19" Digital Monitor (18.1" viewable)
- K56flex protocol Fax/Modem* w/Voice Mail and Speakerphone
- Toshiba 2nd-Generation DVD-ROM Drive w/Decoder Board
- Ensoniq 32-Bit Wavetable Sound Card
- Altec-Lansing ACS-45 Speakers with subwoofer
- Quantex ATX Mid Tower Case
- MS Natural Keyboard Elite MS IntelliMouse
- MS Windows '95 with MS Plus!
- Power Multimedia Software Bundle
- Microsoft Office '97 Small Business Edition
- 3-year limited warranty with 1-year On-Site Service**

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Zip 100MB Internal Drive w/ one cartridge	$ 89
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HP Deskjet 692C Printer (w/photo color kit)	$ 299
HP Laserjet 6L Laser Printer	$ 379
Microsoft® Sidewinder™ 3D Joystick	$ 59

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A GIG IN YOUR POCKET

BY MIKE HOGAN

Need storage to go? Zip, SyJet, Jaz, Shark, and other removable-cartridge drives can help you cram hundreds of megabytes onto a disk the size of a coaster.

WHO SAYS YOU CAN'T TAKE IT WITH YOU? Sure you can—about seven ways from Sunday, by our reckoning. And these days, you can take more of it with you than ever before.

Obviously, we're not talking about your 1.44MB floppy. Let's face it, the PC's original removable-storage solution is stuck in the eighties. It can't handle your multimegabyte spreadsheets or your desktop presentations, even if you turn them into .zip files. And you can forget about transferring a big multitable relational database or

PHOTOGRAPHS BY GIAMPIERO BENVENUTI

a graphics project to one of your coworkers.

BEST BUY

★ IF YOU'RE LOOKING for the portable equivalent of your hard drive, we recommend the EIDE version of SyQuest's $299 SyJet 1.5GB. Among large-capacity drives, the SyJet format is not as prevalent as the Iomega Jaz format, but this drive was easy to install, fast, and the best bargain per megabyte. For lighter data-transport needs, we favor the EIDE version of the $150 Iomega Zip drive, which is fast, cheap, and easy to install and uses disks that cost only $13 each.

Fortunately, you have a good number of high-capacity floppylike alternatives, whether you want to supplement your desktop's hard drive, lock your data in a desk drawer at the end of the day, or shuttle your files and core applications between home and office. For this review we rounded up a dozen drives from Avatar, Iomega, Nomai, and SyQuest, and put them to the test. Their disk capacities range from 100MB—large enough for a large presentation—to 1.5GB, enough for a moderate-size database. They include versions that mount inside your PC, and portable drives that plug into parallel or SCSI ports. Some of them are as fast as your PC's hard drive, and a few hold just as much data. Many—though not all—are easy to install, and all are easy to use. Best of all, none of these drives use disks bigger than fat 3.5-inch floppies.

Magnetic disks are still the best choice for whisking applications and files around; they offer the best combination of low cost, high capacity, and—most important—quick access to files. But if you have secure, long-term file storage in mind, optical disks may be the way to go (see "Archival Rivals").

OUR BEST BUYS

IN ASSESSING each drive, we looked at the cost of the drive and media, ease of installation, quality of support, and performance. We also looked at disk capacity, drive size, and other features that enhance or detract from the drive's day-to-day usefulness. Most of these drives come in both internal and portable versions and offer a range of interfaces, including Enhanced IDE, SCSI, and parallel port. (Enhanced IDE drives are often also called EIDE or ATAPI drives).

No removable-disk drive serves all needs, so we ended up naming two Best

REMOVABLE DISK DRIVES

FEATURES

INTERNAL	Drive street price (1/5/98)	Disk capacity (MB)	Comments	Drive size (inches)
Iomega Jaz SCSI 800/697-8833 www.iomega.com	$299	1000	Hard drive-like performance; can be tough to install, media is pricey.	3.5
★ **Iomega Zip EIDE** 800/697-8833 www.iomega.com	$150	100	Combines speed and ease of installation in very popular format.	3.5
Nomai USA 750.C SCSI 888/996-6624 www.nomai.com	$249	750	Quite fast; inferior manuals can make installation a nightmare.	3.5
★ **SyQuest SyJet 1.5GB EIDE** 510/226-4000 www.syquest.com	$299	1500	Ultrahigh-capacity drive is fastest tested, disks have lowest cost per megabyte.	3.5
SyQuest SyJet 1.5GB SCSI 510/226-4000 www.syquest.com	$299	1500	Fast and big enough to replace your hard drive; may be tough to install.	3.5
PORTABLE				
Avatar Peripherals Shark 250 parallel 888/462-8282 www.goavatar.com	$249	250	Supersmall size makes this a must for frequent travelers.	5.5 x 3.5 x 1
Iomega Jaz parallel [3] 800/697-8833 www.iomega.com	$399	1000	Latches keep disk in place during movement; very slow.	7.5 x 5 x 1.5
Iomega Jaz SCSI 800/697-8833 www.iomega.com	$399	1000	Very fast, disks remain securely seated during motion; expensive.	7.5 x 5 x 1.5
Iomega Zip parallel 800/697-8833 www.iomega.com	$150	100	Compatible with drives on many new desktop PCs; very slow.	7.5 x 5 x 1.5
Iomega Zip SCSI 800/697-8833 www.iomega.com	$150	100	Zip format becoming more common; can be difficult to install.	7.5 x 5 x 1.5
Nomai USA 750.C SCSI 888/996-6624 www.nomal.com	$299	750	Very fast and very portable; subpar manuals made installation tough.	7 x 4.3 x 1
SyQuest SyJet 1.5GB parallel [3] 510/226-4000 www.syquest.com	$299	1500	Uses massive-capacity 1.5GB disks, fastest parallel port unit we tested.	7.5 x 5 x 1.5

★ Best Buy ● Yes ○ No

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[1] No charge if problem stems from drive itself.

[2] For more information about all products in this table, circle reader service no. 901.

Buys: SyQuest's SyJet 1.5GB and Iomega's Zip. We tested several models of the SyJet and Zip drives, but only the internal EIDE units got our top recommendation. They were about as fast as their SCSI siblings on our performance tests and much easier to install. The SCSI versions of these drives generally gave us many more installation headaches than the EIDE or parallel port versions did. (See "Happy Homecoming?" for details.)

The $299 SyJet drive is one of the most expensive of the bunch, but it's fast, its media costs less per megabyte than that of any other product reviewed, and it holds mammoth amounts of data. This 1.5GB drive is fast enough and probably big enough to be your desktop's secondary hard drive, but unlike with most hard drives, you can lock up the disks in a desk drawer when the day is done, one of your best guarantees against data theft. At the low end of the capacity spectrum is Iomega's $150 Zip drive, our other Best Buy. The Zip, which accepts 100MB floppy-size disks, is ideal for budget-conscious people with more modest storage needs. Zip's presence is also growing, which means you're more likely to be able to swap disks with more people. If a desktop we look at for *PC World*'s monthly Top 20 roundup includes a high-capacity removable-disk drive, it's nearly always a Zip. In fact, Zip drives are now standard on all Micron PCs.

If your PC has a SCSI adapter, consider the SCSI versions of the SyJet and Zip drives, especially if your PC's EIDE connectors are already taken. In this case, a SCSI model could actually be less of a pain to install because the port's already there—no messing around with an adapter card. But if your system doesn't come with a spare SCSI connector, you'll most probably have an easier time installing an EIDE or parallel port drive.

If you want the ultimate in portable convenience, go for the 250MB Avatar Peripherals Shark unit. The entire drive weighs less than 10 ounces and is about the size of one of those single-serving boxes of fruit juice you pack in your kid's lunch. It doesn't even need an AC adapter; it gets its power from either the mouse port or the keyboard port on your notebook. In fact, it would have been a Best Buy except for the relatively high cost of its media.

DOCKET IN YOUR POCKET: Avatar's 250MB Shark drive is the smallest drive here, and it draws its power off the computer.

	SUPPORT					
Disk street price (1/5/98)	Warranty (years)	Charge per support call[1]	Toll-free support	Weekday support (hours)	Weekend support	Reader service number[2]
$90	1	$20	●	12	none	603
$13	1	$15	●	12	none	604
$69	1	none	●	9	none	605
$80	1	$15	○	14	Sat., Sun.	606
$80	1	$15	○	14	Sat., Sun.	607
$33	1	none	●	12	none	608
$90	1	$20	●	12	none	609
$90	1	$20	●	12	none	610
$13	1	$15	●	12	none	611
$13	1	$15	●	12	none	612
$69	1	none	●	9	none	613
$80	1	$15	○	14	Sat., Sun.	614

[2] For Uses SCSI-to-parallel adapter.

The Iomega Jaz drives impressed us with their sturdy builds and high 1GB capacities, but they were no competition for the SyQuest SyJet units. The SyJet disks hold 500MB more data and cost $10 less than the Jaz disks, and interface-to-interface (for example, SCSI to SCSI) the drives are faster. The Nomai units are a bit pricey as well. Nomai's disks cost $11 less than the SyJet's, but they offer only half the capacity.

PAYING THE PRICE

IF YOU'RE LOOKING strictly for cheap storage, a standard nonremovable hard drive is still the best bargain—the cost is roughly a nickel per megabyte. But you don't get the portability, security, and limitless expandability of a removable-disk drive. Among the drives we tested, the cost per megabyte rose as disk capacity dropped (see "Cheaper by the Gigabyte").

Take our two Best Buys, for example. The SyJet 1.5GB, the highest-capacity ▶

Cheaper by the Gigabyte

SyJet disks rival 7-cents-per-megabyte cost of typical hard drive.[1]

		INITIAL COST		ONGOING COST	
DRIVES	Disk capacity (MB)	Drive street price (1/5/98)[2]	Drive cost per MB	Disk street price (1/5/98)	Additional disk cost per MB
SyQuest SyJet 1.5GB internal EIDE*	1500	$299	$.20	$80	$.05
SyQuest SyJet 1.5GB internal SCSI	1500	$299	$.20	$80	$.05
SyQuest SyJet 1.5GB portable parallel	1500	$299	$.20	$80	$.05
Iomega Jaz internal SCSI	1000	$299	$.30	$90	$.09
Iomega Jaz portable SCSI	1000	$399	$.40	$90	$.09
Iomega Jaz portable parallel	1000	$399	$.40	$90	$.09
Nomai USA 750.C internal SCSI	750	$249	$.33	$69	$.09
Nomai USA 750.C portable SCSI	750	$299	$.40	$69	$.09
Avatar Shark 250 portable parallel	250	$249	$1.00	$33	$.13
Iomega Zip internal EIDE*	100	$150	$1.50	$13	$.13
Iomega Zip portable SCSI	100	$150	$1.50	$13	$.13
Iomega Zip portable parallel	100	$150	$1.50	$13	$.13
			$0 $.50 $1.00 $1.50		$0 $.05 $.10

***Best Buy** [1]Based on PriceWatch price for a 2.1GB Seagate Medalist, 12/19/97. [2]All drives come with one disk.

drive we reviewed, is also the cheapest per megabyte. At $299 for the drive and one disk, it comes to 20 cents per megabyte. (The price of all drives we review here includes one disk.) Additional 1.5GB SyJet disks cost $80 each, or 5 cents per megabyte—the same as a nonremovable hard disk. On the other hand, Iomega's $150 Zip drive works out to a whopping $1.50 per megabyte for the drive and 13 cents per megabyte for each additional 100MB disk.

But don't base your purchase just on cost per megabyte. If you shuttle around only a few dozen megabytes of files, then the Zip drive makes the most sense. You could buy two—one for home and the other for work—and still pay about what you would for the SyQuest drive. And each additional 100MB Zip disk costs only $13, a lot less painful than the $80 for a SyJet disk. However, if you need hard disk speed and huge capacity, the SyJet is best.

HAPPY HOMECOMING?

BEFORE YOU CAN START enjoying removable storage, you have to get the device up and running. If you want dead-easy installation, the parallel port drives are the way to go. With the Avatar Peripherals Shark 250 and the parallel port versions of Iomega's Jaz and Zip and SyJet's SyQuest drives, all we had to do was plug them into the parallel port and run the setup software. All the routines ran without even a single hiccup, and we were in business in less than 5 minutes.

Installing the internal EIDE Zip drive, one of our two Best Buys, was almost as effortless a task. All we had to do was lift the cover of our computer, slide the drive into a free bay, secure it with a few screws, and connect it to free EIDE connector on the motherboard.

If you plan on installing a SCSI drive, however, you'd better slip into your wrestling togs. SCSI installation can require a major effort and can also ▶

LITTLE BIG DISKS: Lined up from left to right, the Shark 250MB, Zip 100MB, SyJet 1.5GB, Jaz 1GB, and Nomai 750MB. At front right is a standard 1.44MB floppy disk.

THIS COLLAR GOES TO FILEMAKER PRO.

The Town of Poughkeepsie Police Department uses FileMaker Pro to organize their entire operation. So they can nab more bad guys.

The Town of Poughkeepsie Police Department once used two notepads and a ballpoint pen to track cases. Though this is a common system, it leaves a lot of holes. So with no formal software training at all, Detective David Lundgren mastered a new and better way. He rounded up some drug-seizure money, picked up a copy of FileMaker® Pro software, and quietly revolutionized his department's operations.

MILLIONS OF FANATIC USERS

But if you think the Town of Poughkeepsie PD is an isolated case, your evidence must have been tampered with. Truth is, millions of zealous users in organizations of all shapes and sizes manage their data with FileMaker Pro. It brings new information to light, you can customize it to the way you work, and it's easy to use. Importing spreadsheet data is as simple as dragging and dropping.

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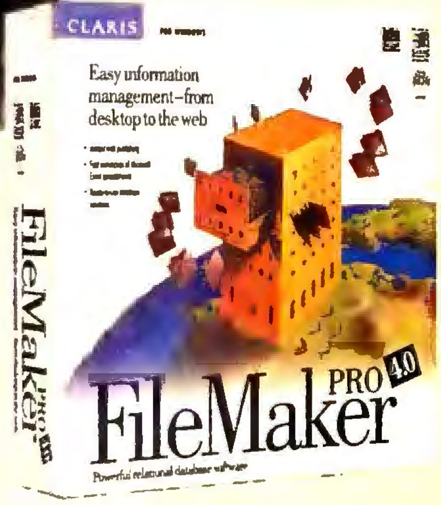
MANAGING INFORMATION IS A SNAP

Just ask Detective Lundgren: "Yesterday we brought in a suspect for a string of residential burglaries. The detective did a quick find on his laptop: 'Burglaries in Zone 2 since August.' The suspect confessed to five of them. And there's no way he would have if we hadn't had FileMaker Pro."

USE INFORMATION IN WAYS YOU NEVER THOUGHT POSSIBLE

FileMaker Pro can show you information you didn't even know you had. And its extensive sorting and reporting capabilities let you view that data however you like, creating everything from simple mailing labels to a complex inventory system. Spreadsheets just can't do that. What's more, anyone can use it. "I have guys working for me who can erase a hard drive just by looking at it," said Lundgren, "but every one of them gets the job done with FileMaker Pro."

To get the full story on how FileMaker Pro has simplified life for the Town of Poughkeepsie PD and other organizations, visit us at www.filemaker.com/pcw. Or visit your local reseller so you can start using FileMaker Pro right now.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- PCG-717C: 200 MHz Intel Pentium Processor with MMX Technology and a 12.1" SVGA Active Matrix LCD (800 x 600) 32 MB SDRAM, expandable to 128 MB
- PCG-719C: 233 MHz Intel Pentium Processor with MMX Technology and a 12.1" XGA Active Matrix LCD (1024 x 768) 32 MB SDRAM, expandable to 128 MB

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- "Sony Tuned" MPEG Digital Video Playback
- Removable 14.5x CD-ROM Drive (maximum performance)
- Remote Control Headphones
- Digital Touch Pad
- A versatile device bay accommodates a second battery to increase battery life to 8 hours
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- One-Year Limited Warranty, Parts and Labor

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result in major extra cost—a $50 to $200 SCSI adapter. PCs don't usually come with these adapters, leaving you with the often onerous task of installing one yourself. Even worse, none of the six SCSI units we looked at comes with an adapter either, and most of the vendors don't bother to note on the packaging that you need one—you won't discover this nasty little surprise until you get home and are ready to install the drive.

Even if you have the SCSI adapter in hand, installing it can be an ordeal. Most SCSI cards are Plug and Play, but they still require a free IRQ (interrupt request), a precious commodity on today's heavily loaded computers. In fact, you may not be able to install the card without pulling another device to free up an IRQ. We had to spend some time fishing around on our test PC before we found an available IRQ for the adapters we used—Adaptec's AHA-2940 Ultra SCSI (one of the most common models on the market) and Iomega's SCSI JazJet card (an extra-cost option for the Jaz and Zip drives). If you run Windows NT or 3.*x*, expect more snags. SCSI controller makers don't always include NT drivers, and 3.*x* users must tinker with SCSI ID configuration programs and jumper switch settings.

The only time you can run into headaches like these when installing an EIDE drive is in the unusual situation where all four of your EIDE connectors are taken—for example, if you already have an a CD-ROM drive, a pair of hard drives, and a tape backup drive all using this interface. In this case, adding an EIDE drive can be as complicated as adding a SCSI drive. You'll need to install an EIDE adapter board, a job that requires hunting around for another free IRQ. Most people, however, won't face this problem.

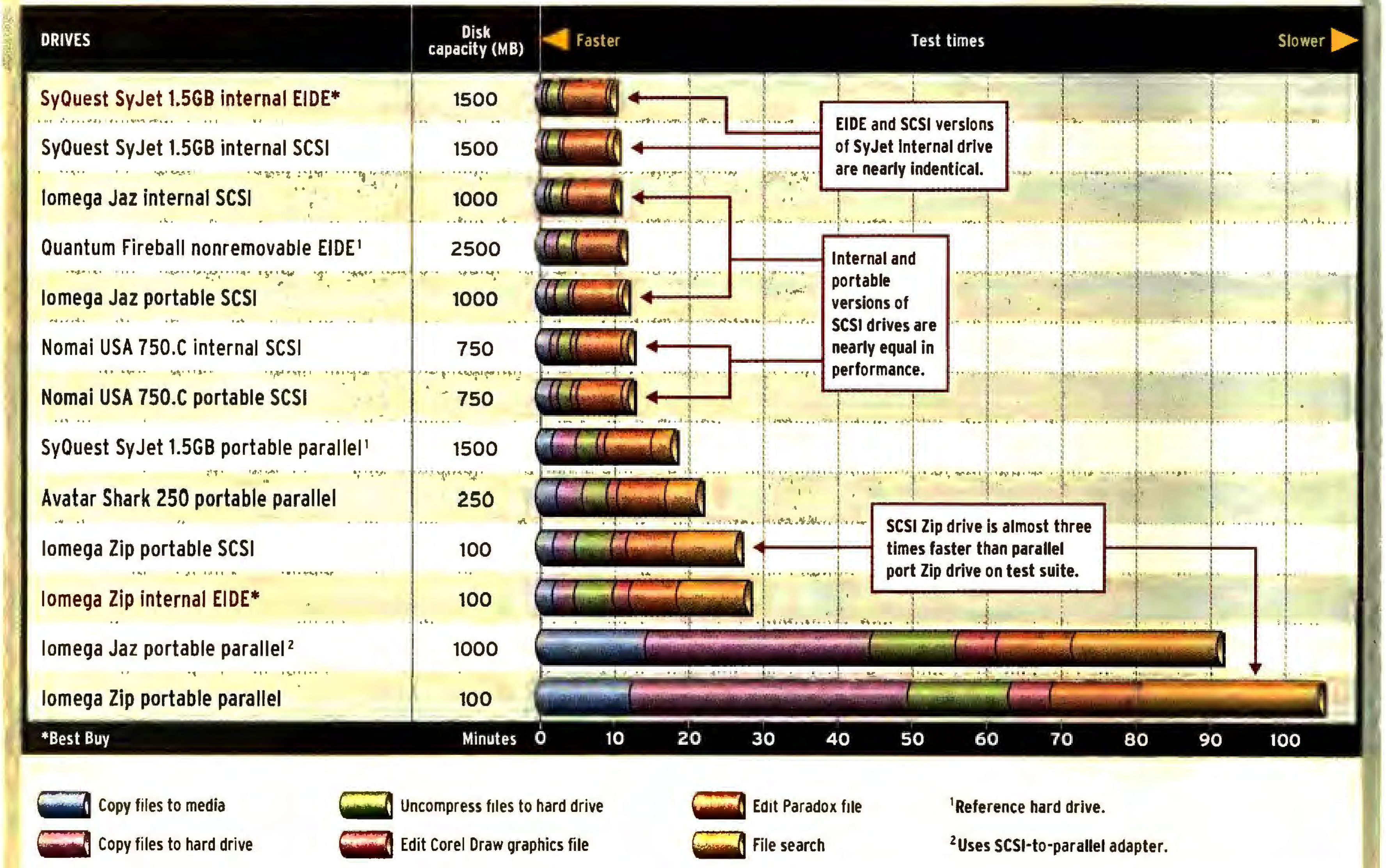
The upshot? For the best combination of performance and easy installation, go for one of our top-ranking EIDE drives. A SCSI drive controller would cost at least

> **For the best combo of performance and easy installation, go for one of our top-ranking EIDE drives.**

TEST REPORT

Top SyJets Run as Fast as Your Hard Drive

SCSI and EIDE drives typically perform better than parallel port drives.



¹Reference hard drive.

²Uses SCSI-to-parallel adapter.

HOW WE TEST We ran performance tests under Windows 95 OSR2 on a Hewlett-Packard Vectra VL Pentium MMX-166 desktop with 32MB of RAM, a 512K secondary cache, a 2.4GB hard drive, and an Adaptec AHA-2940 Ultra SCSI card. Using Windows Explorer, we copied 83MB of files and folders from the hard drive to the removable-media drive and back to the hard drive. Using WinZip, we then uncompressed a 45MB .zip file from the media to the hard disk, resulting in 95MB of uncompressed files. Next we opened and saved a 12MB graphics file in Corel Draw. Finally, we performed a file search for specific text inside a file on the media.

another $100, plus who knows how much for the Excedrin needed to install it, and would give you at best a marginal performance gain.

PHONE SUPPORT BLUES

INSTALLING A SCSI drive can be a neophyte's nightmare, but you can hit occasional snags even with EIDE and parallel port drives. For that reason, we read through all the drives' documentation and called all the vendors' technical support lines. The sad fact is, when it comes to providing help, every one of these companies could do a whole lot better.

Documentation was okay in most cases. SyQuest's manuals are more comprehensive than Iomega's, but both use clear, concise language. Avatar's manual is straightforward, but Nomai's is way too sparse and hard to read.

DRIVES TO GO—portable drives and their removable disks, clockwise from far left: Iomega Zip, SyQuest SyJet 1.5GB, Iomega Jaz, Nomai USA 750.C, and Avatar Peripherals Shark 250 (center).

Getting phone support was frustrating all around. When we finally got through, we found friendly, helpful people at every company, but first we had to spend a lot of time on hold listening to elevator music and lame product hype. Phone support was the one and only area where SyQuest really stumbled. Getting through to this company turned into a 3.5-hour ordeal stretching over two days. We spent 2 of those hours on the phone, mostly on hold or wandering through voice menus. SyQuest is the only company of the bunch that offers support on weekends, but you get just one free support call, after which the company charges $15 per query if the problem stems from any source other than the SyQuest drive itself. To get the magic phone number for our free call, we first had to dial another number and answer a bunch of prerecorded questions using the phone's keypad (for example, "Press 2 if you've checked your SCSI ID"). What a pain. Things were only a little better elsewhere. Avatar, Iomega, and Nomai all offer unlimited free support, but we still had to leave a string of messages and wait on hold. Iomega also charges for support calls, if the technical rep determines that the problem doesn't stem from an Iomega drive.

AS FAST AS A SPEEDING HARD DRIVE

WE FOUND THAT in general, the larger the capacity, the faster the drive. Our speed champ, the Best Buy EIDE SyJet drive, and the internal SCSI versions of the SyJet and Jaz drives that followed on its heels, were all as fast as many standard nonremovable hard drives. The EIDE SyJet took only 9 minutes, 56 seconds to finish our entire test script; the internal SCSI SyJet and Jaz units trailed it by less than a minute. The portable SCSI Jaz drive and the two Nomai drives were also quite fast, providing performance similar to that of nonremovable hard drives. They trailed the EIDE SyJet by only 2.5 minutes.

Compared to almost all the other drives, the Zip drives acted like a Buick on two cylinders. The parallel port version of the Iomega Zip drive, for example, took over ten times longer than the EIDE SyJet to complete our test. If you regularly transfer big chunks of data between computers, consider getting one of the faster drives, even if it has more capacity than you think you need. On the other hand, if you copy only 5MB or 10MB of data per day, any of these drives will work fine.

Using one of these drives is like using a floppy or hard disk—it shows up as another lettered drive in Explorer.

If you want the convenience of a parallel port drive that you can swap quickly between machines, we recommend the parallel port SyJet, the fastest of the parallel port drives we tested. It took almost 9 minutes longer to finish the test suite than its EIDE sibling did, but it's ▶

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still practical for launching applications and transferring large amounts of data. We'd give Iomega's Jaz portable parallel drive a wide berth. It's as easy to get running as the SyJet parallel, but took almost *an hour and a quarter* longer than the SyJet to crank through our performance tests.

DAY-TO-DAY USABILITY

ALTHOUGH INSTALLATION in some cases was a bummer, once we got through it, we were home free. Using each of these drives was just like using a floppy or hard drive. As soon as we attached a drive, it appeared as another lettered drive in Windows Explorer and conveniently identified itself either by name or generically, as 'Removable Drive'. All drag-and-drop moving and copying functions in Explorer worked the same way. Iomega and SyQuest bundled some disk copying and backup utilities, but as with your nonremovable hard drive, it's usually quicker to perform disk operations with the functions on Windows Explorer's menu bar. That said, Iomega's drives come with a nice set of one-step tools. Copy Machine, for example, is a one-click utility that copies the entire contents of the Jaz drive onto another Jaz drive, or onto your hard drive. Iomega also supplies one-click tools for disk backup and restore.

Suffice to say that all these drives and their media are portable; some are just more portable than others. The 10-ounce Avatar Shark is a tough act to follow—the whole drive fits in your shirt pocket. If you do a lot of traveling, this is the one to take along. It's so cool looking, it even makes a good conversation starter. The SyQuest SyJet and the Iomega Jaz and Zip drives aren't as portable, with traveling weights of 3, 3, and 2 pounds, respectively. Their AC adapters alone are nearly as big as the Shark drive. But if all you need is a device to carry between home and office, the Iomega and SyQuest drives will work fine.

All the portable drives are sturdy and sleek, except for the Nomai 750.C, which comes in a clunky-looking metal case that heats up during use. You'd want to use this drive in a well-ventilated area, as ▶

ARCHIVAL RIVALS

FOR TOTING FILES to and fro, magnetic removable-media drives are your best option. But what if you have files you want to keep but rarely need to access—accounting records from a few years ago, for example, or those sensitive short stories you mean to polish? Or say you want to preserve critical files such as medical records? In these cases, we recommend an optical drive like magneto-optical, CD-Recordable, or CD Rewritable. Optical drives are pricier and slower than magnetic disk drives, but the media promises to safeguard your files better and longer. Highly resistant to magnetic fields, dust, temperature extremes, and shock, optical discs are less susceptible to damage than magnetic media such as tape or Winchester, Jaz, or Zip disks. According to Mary Bourdon, principal analyst at Dataquest, optical discs can store files reliably for at least 30 years.

CUT YOUR OWN CDS

WE TOOK A LOOK at two magneto-optical drives—Pinnacle Micro's Apex 4.6GB Optical Hard Drive and Fujitsu's DynaMO 640—and the new Hewlett-Packard SureStore CD-Writer Plus Model 7110. All three drives were easy to use, but we were especially taken with HP's CD-Writer, which let us make our own CDs using the supplied CD-R and CD-RW discs. While you can write to CD-R discs only once, any PC with a CD-ROM drive can read them. (You can write to CD-RW discs multiple times, but they work only in CD-RW and other drives with MultiRead, which excludes most CD-ROM drives.) The CD-Writer Plus comes in portable and internal EIDE versions, for $610 and $499, respectively. The CD-R discs sell for only few dollars per 650MB disc, while CD-RW discs are $15 to $20 each.

The main drawback of the Apex and the DynaMO products is that their discs work only in other MO drives. The Apex drive writes to 4.6GB MO discs, making this drive ideal for putting huge amounts of data in deep storage. But the drive is pricey, selling for $1395 and $1495 for the internal and portable versions, and the 4.6GB discs cost $169 each. The DynaMO drive is much more affordable, at $419 and $449 for the internal and portable units, and the 3.5-inch discs cost only $20 apiece. But each DynaMO disc holds only 640MB of data—a capacity smaller than that of a CD-R or CD-RW disc.

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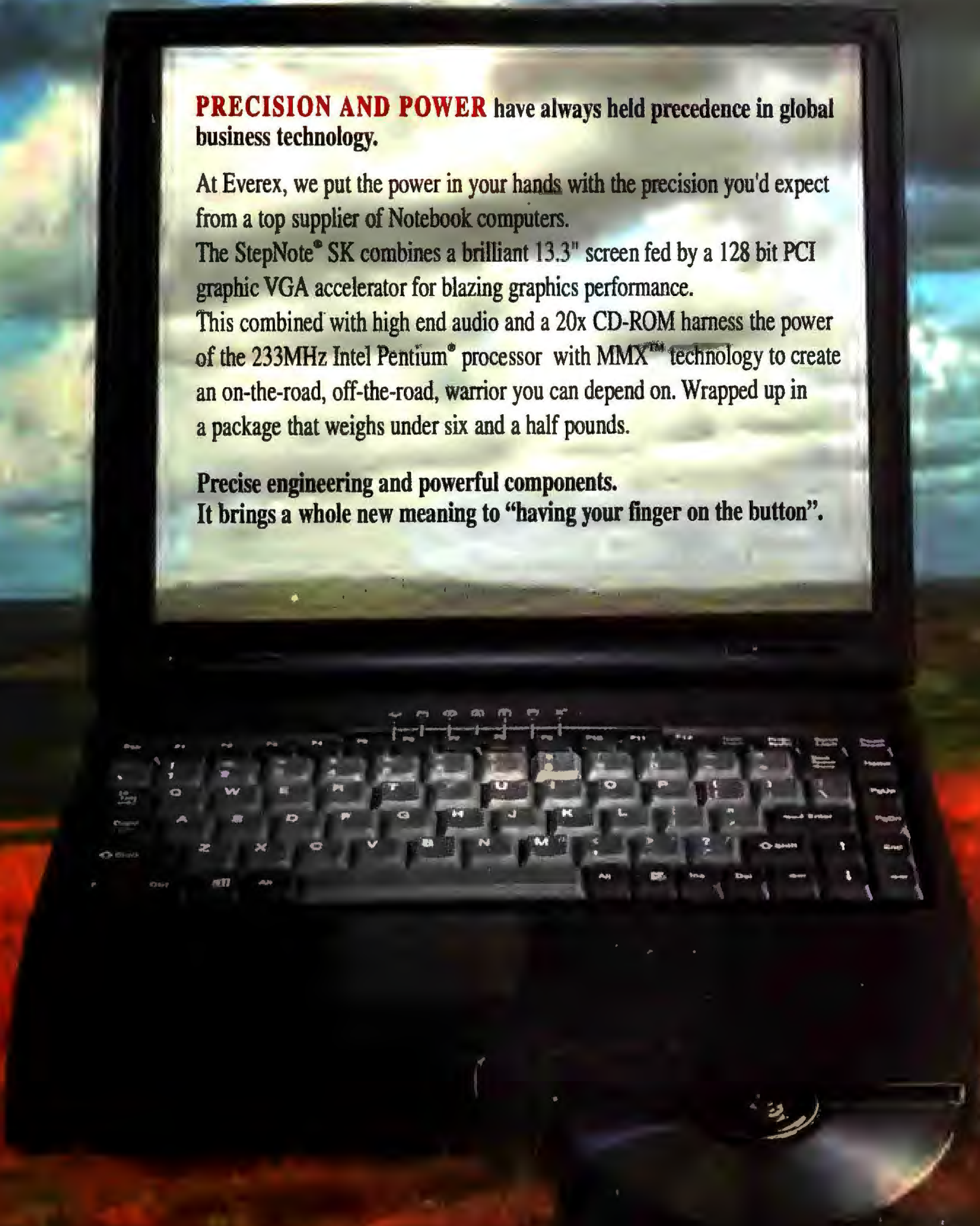

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heat is one of the great enemies of delicate electronics. We especially liked the Jaz drive's special latches, which keep the disk safely seated during use even if it's bumped around. The Jaz, Zip, and SyJet cases are designed so you can stand them on their sides to free up desk space, though in the case of the SyJet, disk loading and unloading didn't always work as smoothly this way. In fact, on one of our test SyJet drives that we had positioned on its side, we had to press lightly on the disk to get it to eject.

SHAKE 'N' BAKE

THE WHOLE POINT of a removable disk is that you can pop it into your shirt pocket and take it anywhere. But how well do the five disk types in this review hold up to the rigors of the road? To find out, we subjected them to a little mistreatment. Nothing serious: We dropped them, stored them atop a monitor that we turned on and off a few times, and fried them under a heat lamp to simulate leaving them in a hot automobile.

All disks came through the monitor test just fine, even though we subjected them to potentially high doses of magnetic radiation each time we turned the screen on and off. And only the SyQuest disk had trouble after the three 2.5-foot tumbles to the floor. We could still read its files on our test PC, but we found quite a few cluster errors, enough so that we would opt to replace the disk. The Zip disks really suffered under the 145-degree heat lamp, though. After an hour, we could still insert the Zip disk into the drive but couldn't read any of the files on it. The Shark, Jaz, and Nomai disks passed all tests.

SHAPE OF DRIVES TO COME: Drives and disks clockwise from left: the Sony HiFD, Iomega Clik, Iomega ZipPlus, and Castlewood Systems ORB. The Clik disk (not shown) is silver-dollar size.

The 200MB HiFD floppy drive, which can also read 1.44MB floppies, may give the Zip a run for its money.

NEW DRIVES JOIN THE FRAY

REMOVABLE-DISK drives are finally getting enough capacity to handle most files we work with, but the fight to become the new de facto standard has only just begun. Of the models reviewed here, Iomega's Zip is the most widely used, but it's far from ubiquitous. Furthermore, the new high-speed 200MB HiFD floppy disk drive, developed jointly by Fuji and Sony, may give the Zip a run for its money. HiFD drives are due to ship this spring from several vendors including TEAC America, a major manufacturer of 1.44MB floppy disks and drives, and are expected to sell for prices similar to Iomega's Zip. In addition, the HiFD drive can read and write to standard 1.44MB floppies, unlike the Zip product, which accepts only Zip disks. While we didn't have the HiFD drives in time for this review, we saw a demonstration of a PC running MPEG video clips off the HiFD drive with little degradation, attesting to the HiFD's fast hard drive–like performance. Meanwhile, desktop PC vendors continue to adopt Zip, with Micron the first company to offer the option of making the Zip drive the default boot drive on its system. Zip will also start appearing on notebooks—NEC will include it in its Versa line. Also, Iomega is now shipping the ZipPlus parallel port/SCSI drive, also not available in time for testing. It's a compact unit that uses standard Zip disks and is supposed to be much faster than the parallel port unit we reviewed.

Iomega is delving into other areas of the removable-disk drive market as well. The company's 40MB Clik drive, due to ship in the last half of this year, is as small as Avatar's Shark drive and similarly shaped, and its disks are no bigger than silver dollars. Iomega designed this product to be a low-cost storage alternative for handheld PCs and other small electronic devices such as digital cameras and smart phones. The Clik disks are expected to sell for $10 each, many times less expensive than typical solid-state memory cards.

On the high end of the removable-disk storage spectrum is the company's Jaz 2GB drive, which started shipping at the end of last year. Meanwhile, this spring Castlewood Systems plans to ship its 2.2GB ORB drive, priced very competitively at $200 for the drive and one disk, and $30 for each 2.2GB disk. Neither drive arrived in time for this review.

After years of stagnation, the market for removable-disk drives is booming, with no letup on the horizon. Even if no single successor emerges from the mounting battle, there's less reason than ever to settle for the 1.44MB floppy.

Mike Hogan is a frequent contributor to PC World *and an avocado farmer in Fallbrook, California. Performance and durability testing by Ulrike Diehlmann and Robert James of the PC World Test Center.* ■

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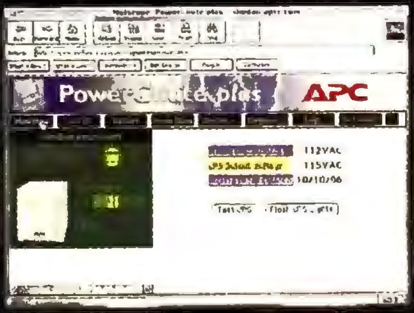

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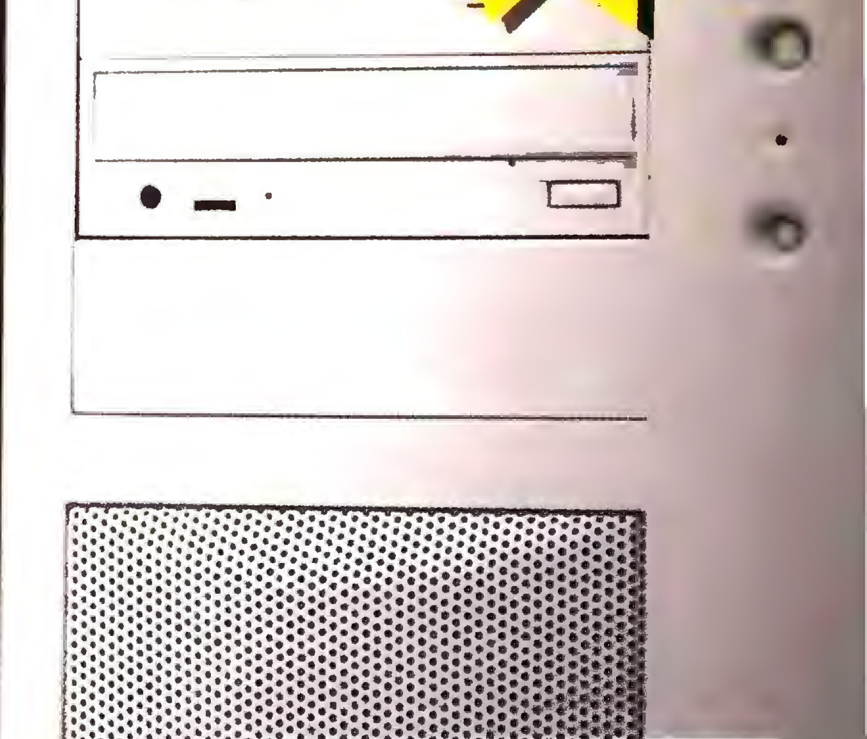

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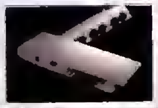

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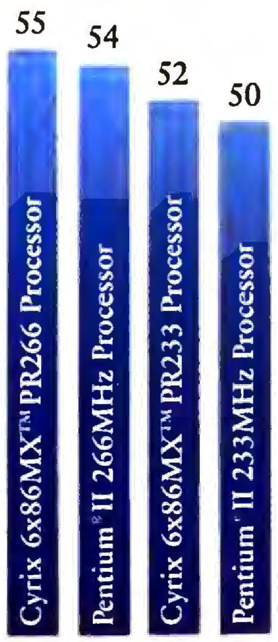

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The truth is out there. Here are the quickest ways to find it.

ILLUSTRATIONS BY JAMES YANG

YOU WANT INFORMATION. You want it now. And deep in your heart you know it's out there, somewhere, lurking on the Internet. But how do you find it?

Maybe you start by using a search engine. Alas, search engines have an inherent paradox: The more thorough they are at indexing the Web, the more likely they'll respond with a daunting tangle of hundreds of links, many of which have only fleeting value. By the time you find the information you want, you could have gone out and bought a book on the topic—or maybe written one.

But don't give up just yet. There *are* better ways to search the Web. Turn the page to find the best sites, tips, and techniques for combing the Net.

START YOUR ENGINES

The Best Search Sites

BY HARRY McCRACKEN

IF YOU THINK that locating information on the Web is as tough as finding the proverbial needle in a haystack, think again. It's harder. That's because the Internet offers up many haystacks—er, search sites—to choose from. Even Microsoft is planning to get into the act early this year, with an as-yet-unnamed search site. How can you tell which one is best for your particular search?

To find out, I tested big directories like Yahoo, lesser-known search engines such as WebCrawler, and newcomers like Britannica Internet Guide. And I discovered that there's no perfect search site, or anything close—the Web's far too huge, disorganized, and fast-changing.

Many search sites are also becoming increasingly cluttered with features that have less and less to do with Web searching: weather reports, maps, free e-mail, chat forums, and more. For my tests, I focused on how they handle their bread-and-butter purpose: helping you track down information on Web sites. I tested each search site with a virtual scavenger hunt for a dozen items—everything from technical data about an old Panasonic printer to an audio clip of "Happy Birthday."

No single search site emerged as a runaway winner in every respect, but three—AltaVista, HotBot, and Yahoo—stood out from the crowd. Several others are also worthy resources, and even the weakest came up with links that the others overlooked.

Try These First

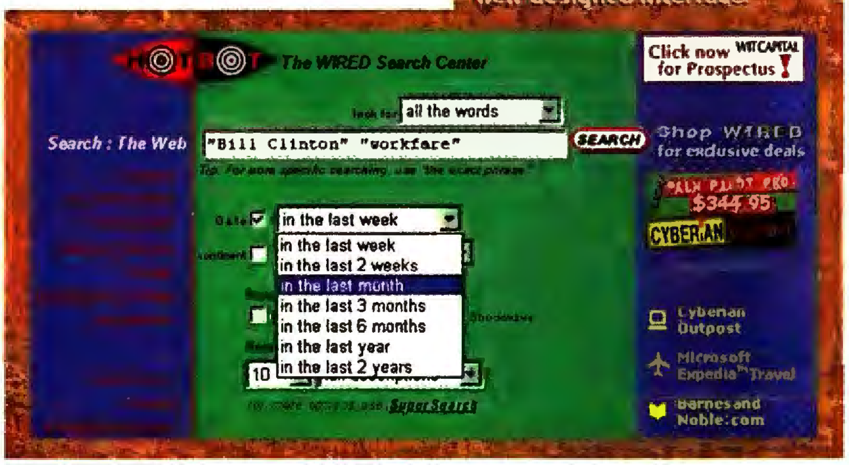
AltaVista (www.altavista.digital.com)

While other search sites hawk free e-mail and other sideline services, AltaVista remains a search engine, pure and simple. It doesn't even have a Web directory. But if you're worried that a site could elude your attention, AltaVista is the place to go. It returned the highest number of *relevant* hits for almost all of my searches.

It's also got the most sophisticated search options, including the ability to use wild cards ('xenophob*' will return references to both xenophobia and xenophobes, for example).

So what's the catch? AltaVista's advanced searches involve a somewhat arcane

IT'S EASY TO LIMIT a search by time frame with HotBot's well-designed interface.



look for: all the words

"Bill Clinton" "workfare"

Date ☑ in the last week

in the last week
in the last 2 weeks
in the last month
in the last 3 months
in the last 6 months
in the last year
in the last 2 years

10

setting your sites: top speedup tips for the major internet

ALTAVISTA

Refine searching. Say your search for Superman Action Toys got too many hits. A slick trick: Click the *Refine* button. Search results are regrouped into categories with a percentage ranking. Click the drop-down arrow next to each hit listed, and then select *include* or *exclude* on topics such as Superman, Kenner, and Toys to cut search time and get only relevant hits.

Results count. You can preset Advanced, Compact, or Detailed results. The best thing is to select *Advanced* so you can limit searches to specific dates and get rankings.

Parlez-vous English? Take a second to customize AltaVista by clicking on *Preferences.* Under Language, select *English.* Unless, of course, you want information returned in all foreign languages.

EXCITE

Power search. To fine-tune searches, click the *Power Search* link. You can restrict your search to selected sites, narrow the search with extra keywords or phrases, and get results by titles, summaries, or both.

More like this. When you find a document you like, click on the *More Like This* link next to the title. Excite will automatically conduct a new search for similar sites.

Smart searching. Instead of searching by keyword, try by idea or concept. Say you search for 'fountain pen'; Excite gives you the opportunity to redefine your query with words like 'pen', 'nib', and 'parker'.

Web guide. You can target searches for popular items to the 140,000 previewed sites in Excite's Web Guide. Results are returned faster than they'd be with general Web searches.

HOTBOT

Special searches. HotBot offers more fine-tuning options than a Quentin Tarantino movie has bullets. You can limit search to time frame, geography, and domain type (.org, .com, .gov, and so on).

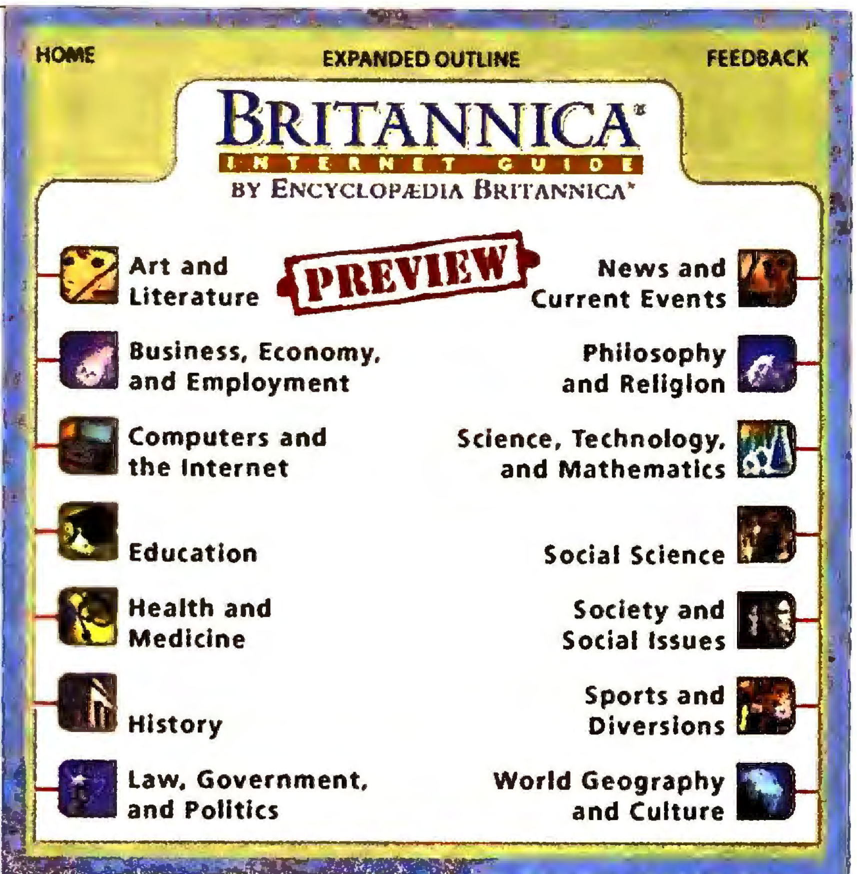
Shorter times. To cut down on information overload, especially on current and popular topics, limit your search to a shorter time frame—say, sites updated in the command-line interface. And the engine keeps tabs on so many sites that until you get good at refining your searches, you may be bombarded with too many hits.

HotBot (www.hotbot.com)
Once you get past its tacky mouthwash-green home page, you'll find HotBot one of the most well rounded search engines. Only AltaVista outdid it in the quantity of hits, and HotBot makes advanced searching considerably easier than AltaVista does. HotBot's interface works well for both simple keyword searches and tricky queries, such as those that restrict results to pages created in a certain geographical area or time period. Like AltaVista, Infoseek, Lycos, and WebCrawler, HotBot can search Usenet newsgroup postings; it also scans discussion forums at sites like Salon and Pathfinder.

Yahoo (www.yahoo.com)
Yahoo responds to searches in such an orderly, coherent way that you might almost forget that the Web is a morass of untamed information. It's by far the largest and richest directory, with some 725,000 cataloged sites. Looking for sites on astronomy? Yahoo links to 1000 of them. Dilbert? More than 60. Searches that don't result in Yahoo hits are passed along to AltaVista's search engine. Yahoo's major limitation: Unlike Lycos, it doesn't review sites, and its descriptions are too brief.

Best of the Rest

Britannica Internet Guide (www.ebig.com)
A highbrow, slightly stuffy directory, Britannica Internet Guide isn't the place to go for *X-Files* trivia, but it's a great help in tracking down quality sites on history, science, geography, and the arts. Though this new directory from *Encyclopædia Britannica* is small by Web standards (about 65,000 sites), the quality is high, with full descriptions and star ratings—both of which Yahoo lacks. Like Yahoo and LookSmart, Britannica Internet Guide passes queries on to AltaVista when they stump its own directory.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Computers and the Internet
Science, Technology, and Mathematics
Education
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Health and Medicine
Society and Social Issues
History
Sports and Diversions
Law, Government, and Politics
World Geography and Culture

FOR LINKS ON HISTORY, the sciences, and other serious matters, Britannica's new directory is a good stop.

LookSmart (www.looksmart.com)
Despite its initial appearance, this is a solid Web directory. LookSmart doesn't match Yahoo's huge database of sites—it's got about 50 sites on mountain biking, versus Yahoo's 700-plus—but it's got helpful descriptions of each site it does ▶

search engines and web directories

last week or month. Extend ranges as needed.

■ **SuperSearch.** Click the *SuperSearch* link for more fine-tuning options and restrictions. For best keyword search results, use the exact phrase—'Florida Marlins World Series' instead of, say, just 'Marlins'—and be sure to select *exact phrase* in the Search pulldown menu. This commands HotBot to return pages with those four words in sequence.

INFOSEEK

■ **Missing link.** To search for pages containing a specific link or URL, type the words 'link' or 'URL' in the search field—for example: 'link: www.pcworld.com' or 'URL: www.pcworld.com'.

■ **Targeted search.** As with AltaVista, you can specify or limit searches to Usenet newsgroups. You can also search through Infoseek's Web and news database. Finally, Infoseek speaks your language: Click *Worldwide Infoseek* to limit your search by country and/or particular foreign languages.

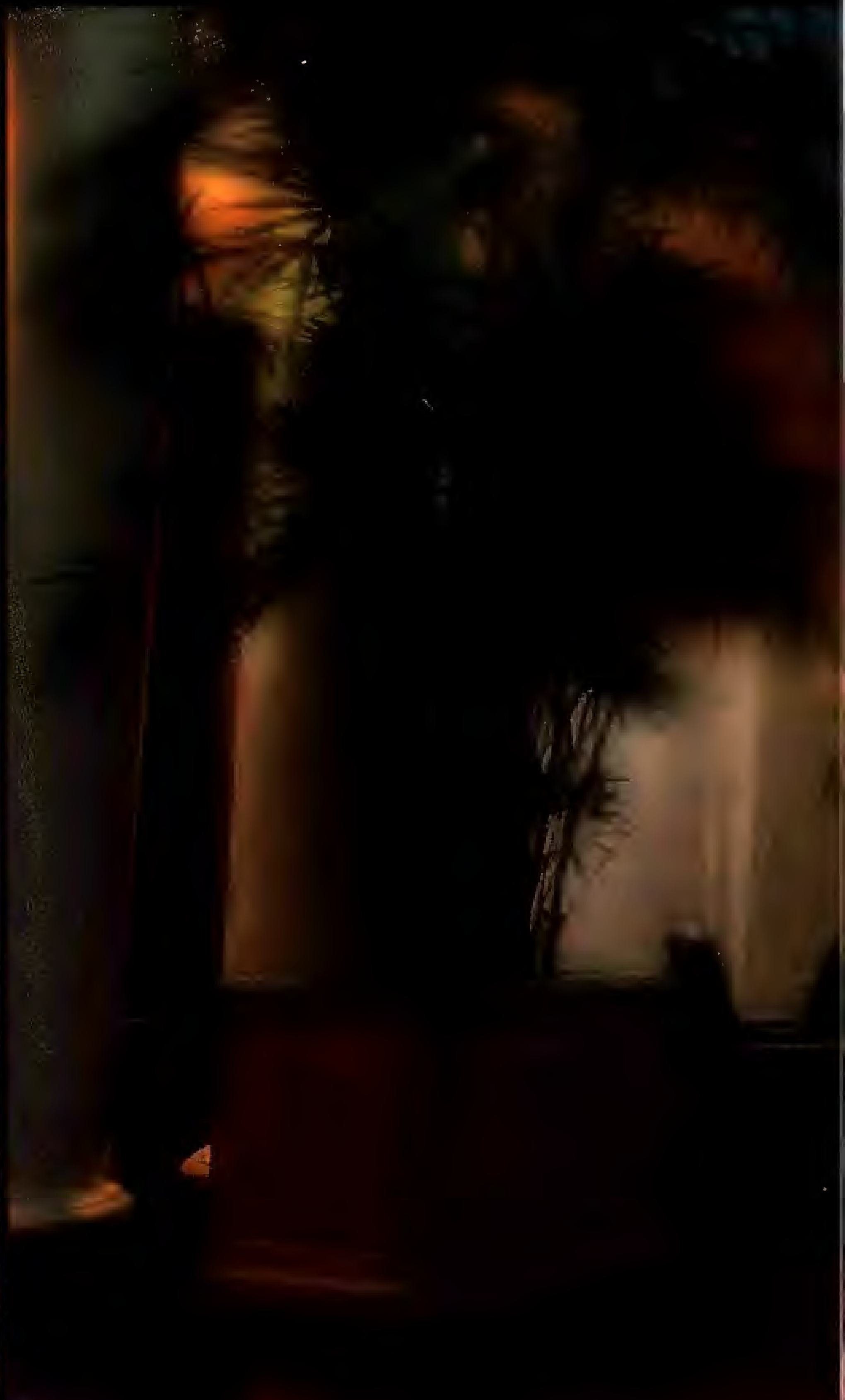
■ **Related topics.** After conducting a search, be sure to check out the Best Bets, Related Topics, and Related News categories listed on the left. While not as extensive as Yahoo, Infoseek prioritizes information based on category (like Yahoo) and Web page (like AltaVista).

YAHOO

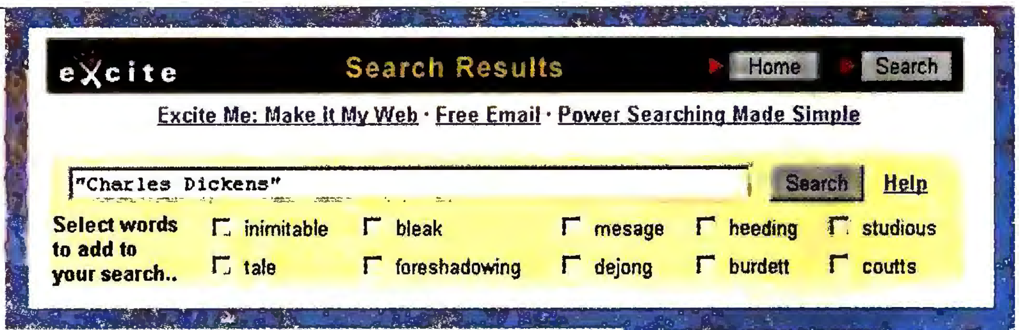
■ **Custom search.** Click *Options* to command Yahoo to search by categories, Web sites, or newsgroups. To limit results, you can specify listings posted from one day to three years ago.

■ **Think locally.** Instead of searching the entire Web or Yahoo's channel listings, take advantage of its regional databases: Yahooligans for kids and Yahoo Metros, which cover cities including Chicago, Los Angeles, Miami, and New York.

■ **Digging categories.** Yahoo indexes by category and then displays search results. While it takes a little longer than typing keywords, you're better off mouse-clicking through a category. To find information on, say, used cars, select *Autos* under Recreation, click *Search Only In Automotive,* then type the keyword used and click *Search.* —Michael Cahlin



scan, and a nifty treelike interface helps you narrow the focus of your search. As a result, LookSmart is one of the easiest directories to use. Like Yahoo and Britannica Internet Guide, LookSmart adds search engine features to its directory by providing built-in access to AltaVista.


excite Search Results Home Search

Excite Me: Make It My Web · Free Email · Power Searching Made Simple

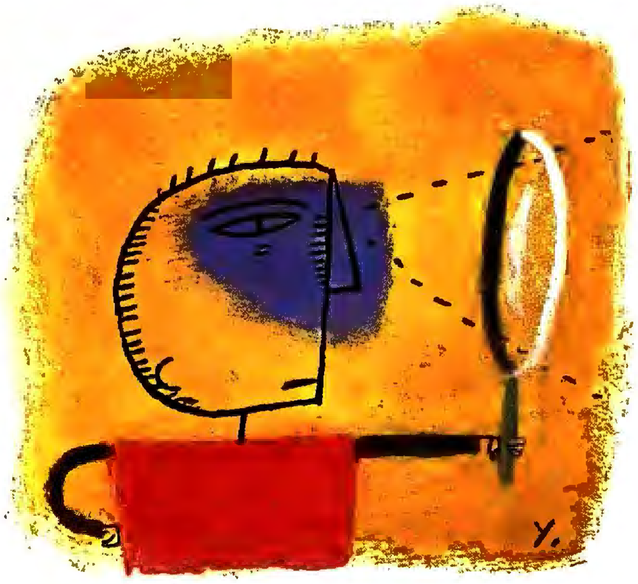
"Charles Dickens" Search Help

Select words to add to your search..
☐ inimitable ☐ bleak ☐ mesage ☐ heeding ☐ studious
☐ tale ☐ foreshadowing ☐ dejong ☐ burdett ☐ coutts

EXCITE SUGGESTS keywords you can use to refine your search, but they're not always on target.

Lycos (www.lycos.com)
Lycos didn't offer huge quantities of hits in response to my searches, but this directory/search engine hybrid has other virtues. Searching for images, sounds, or even recipes is a snap, and you can opt for an advanced search mode or a superfancy one that provides fine control over how it orders the sites it does locate. You can also restrict your search to cover only sites that Lycos deems among the best on the Net, with detailed reviews. But I still can't figure out why it always offers to do a Yellow Pages search on every query, even if that query was 'Amelia Earhart' or 'Swedish poetry'. (At press time Lycos was planning to integrate megasearch agent WiseWire into its Web Guides.) ▶

the ten essential rules of web searching



1 **Know where to go.** *Directories*—catalogs of sites organized by subject (Yahoo, for example)—are best if you want to quickly find information on a general topic (say, a biography of Pablo Picasso or a guide to Tex-Mex cooking). Search engines like AltaVista are best used for pinpointing specific pieces of information (say, an image of Picasso's *Guernica* or a recipe for pork tacos).

2 **Think small.** Be on the lookout for smaller or specific databases, advises Coco Halverson, a data cyberlibrarian who has taught classes on Web searching at the University of Southern California. For a bunch of specialized search engines and reference tools, check out Internet Sleuth (www.isleuth.com) and All-in-One Search Page (www.albany.net/allinone).

3 **Be specific.** "The best queries consist of terms, words, or phrases that exist only in the documents you want," advises Halverson. Stay away from common words such as 'baseball' or you'll wind up with thousands of useless responses. "Use as many unique keywords as possible."

4 **Learn the lingo.** Make sure that you use quotation marks for names and phrases. Learn to use Boolean operators—words like 'and', 'or', and 'not'—that let you find info by playing two keywords off each other—like 'comic books AND Superman' or 'comic books NOT Batman'. Alas, search language is not standardized on all search sites, so you must first check the site's help section to see which version it uses.

5 **Watch your spelling.** Few things waste more time on a Web search than misspelling a keyword, laments Brad Hill, the author of *World Wide Web Searching for Dummies, 2nd Edition* ($24.99, IDG Books, 1997, 800/762-2974). For example, a search for 'potatoe' will not be as bountiful as one for 'potato'. Similarly, a search for 'Dan Quail' will not result in any information about former vice president Dan Quayle.

6 **Launch multiple browser windows.** Fire up your browser, then open a second browsing window. (In Netscape, select *New Browser* from the File menu; in Internet Explorer, select *New Window* from the File menu.) "Anchor one window on the search results page and use the other to track down data," suggests Hill. This is exactly the idea behind IE 4.0's new search pane. Click the *Search* button, and various search engines appear on the left side of the screen, with results in the right-hand pane.

7 **Keep moving.** Don't look beyond the first page of search results, advises Hill. It's better—and faster—to try another search using different keywords.

8 **Leave your mark.** When you find a site that looks interesting, bookmark it or simply print the first page. Don't linger. Stay focused on the hunt.

9 **Check the URL.** If the Web address is long or has a tilde, Hill says, that's a quick tipoff you're looking at a personal Web page. Unless you're looking for obscure or technical info, you can move on.

10 **Go get help.** "The rules for one [site] may differ from another—or may have changed since your last search," says Halverson. Even if it's not your style to stop to ask for directions, search technique gold can be found in every search engine's help section. —M. C.

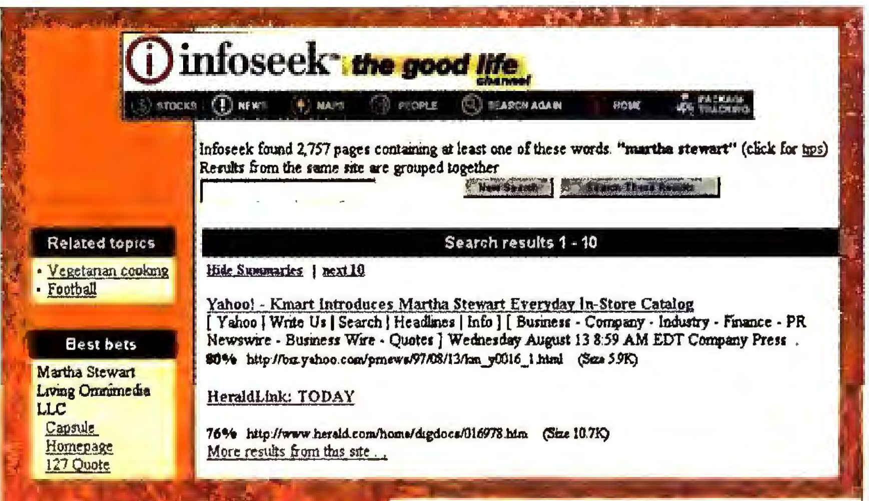
Back of the Pack

Excite (www.excite.com)

They should call it Frustrate, not Excite. To be fair, this directory/search engine always found lots of links relating to my search queries, and its well-designed power search mode lets you perform Boolean queries just by pointing and clicking. Unlike nearly every competitor, however, Excite doesn't begin by telling you how many hits it found—you've got to go to a different screen for that essential information. And its screens are crowded with features that sound useful until you try to use them. For example, a query for 'Norman Rockwell' suggested 'whys', 'slipcase', and 'appearing' as related terms, and confidently pointed me to electronics manufacturer Rockwell International as my first link.

Infoseek (www.infoseek.com)

Infoseek is an intriguing crossbreed between search engine, directory, and news service, but it's not a top choice for any of these functions. True, some features are slick and useful: When I searched for 'Hillary Clinton', I got not only results from the search engine but links to current news stories about the First Lady. But a feature that suggests related topics was often completely incoherent—when I searched for 'panda', it listed 'physics' and 'restaurant' as related topics.



Infoseek found 2,757 pages containing at least one of these words. "martha stewart" (click for tips)
Results from the same site are grouped together

Related topics
- Vegetarian cooking
- Football

Best bets
Martha Stewart Living Omnimedia LLC
Capsule
Homepage
127 Quote

Search results 1 - 10

Hide Summaries | next 10

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MARTHA GOES DEEP: An Infoseek search for 'Martha Stewart' suggests football as a related topic.

WebCrawler (www.webcrawler.com)

A sibling service to Excite—but with a different search engine, look, and feel—WebCrawler usually came up with the fewest links of any site here. When I searched for 'Warren G. Harding' it provided only 43 hits relating to the 29th president, versus more than 1400 from AltaVista. It includes a respectable Web directory but doesn't link it to the search engine; you navigate it separately, using a different interface than the search engine's. Ditto for the newsgroup search, based on Deja News (www.dejanews.com). And WebCrawler's help is maddeningly vague on what search features it does and doesn't support. ▶

THE WEB'S GREATEST HITS: HOW THE SEARCH SITES STACK UP

SEARCH SITES	Approximate number of directory entries[1]	Approximate number of search engine entries	Searches newsgroups	People and business finder	Pro	Con	Additional major features
AltaVista * www.altavista.digital.com	0	100 million	●	○	Finds lots of relevant sites for most searches. Potent search options.	No Web directory, refining searches requires sometimes complex command-line instructions.	none
Britannica Internet Guide www.ebig.com	65,000	100 million (via AltaVista)	○	○	Great source for sites on history and the arts and sciences.	Encyclopedic subject matter less topical than Yahoo's or LookSmart's from day to day.	none
Excite www.excite.com	100,000	50 million	●	●	Search engine finds lots of sites.	Overloaded with confusing features and clutter.	free e-mail, maps, news, shopping, travel
HotBot * www.hotbot.com	0	110 million	●	●	Easy to use, powerful, finds lots of sites.	No real Web directory.	message board searching, news, shareware guide
Infoseek www.infoseek.com	500,000	30 million	●	●	One-stop shopping for Web, newsgroups, and news searches. Large directory.	Web searches are less successful than with AltaVista and HotBot, suggests irrelevant topics.	maps, news, online reference works
LookSmart www.looksmart.com	16,000	100 million (via AltaVista)	○	○	Fun user interface, good site reviews.	No competition for Yahoo in number of sites covered.	links to magazine and shopping sites
Lycos www.lycos.com	[2]	[2]	●	●	Easy to use, especially when refining searches. Nice selection of features.	Lags behind AltaVista in breadth, some tools are more baffling than helpful.	chat, free e-mail, maps, news, shopping
WebCrawler www.webcrawler.com	5000	2 million	●	●	Decent Web directory.	Search engine comes up short on many queries, some features poorly integrated.	maps, news
Yahoo * www.yahoo.com	725,000	100 million (via AltaVista)	●	●	Huge, well-organized guide to what's on the Web. Easy to use.	Doesn't provide detailed descriptions of sites.	chat, free e-mail, maps, news

* An essential Web searching tool; should be one of your first stops.

● Yes ○ No

[1] As of December 1997.

[2] Lycos does not disclose this information

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Circle 133 on reader service card

THE WEB DELIVERS

Pushing Information

BY MICHAEL CAHLIN

YOU DON'T NEED to search the Web for information; you can have it come straight to your PC. Automatically. Behind the scenes. Downloaded *instantly*. News, stock quotes, sports scores, even software updates. You control what, when, where, and how much.

That's the idea behind push, or Webcasting, technology. Today there are two main push programs—Microsoft Internet Explorer 4.0's Active Channels and Netscape Communicator 4.03's Netcaster. Both work essentially the same way: Content is organized into *channels*—broad categories like business, sports, and entertainment—that are displayed on your desktop. Select the channels you like and subscribe to the push sites in each, and information is delivered periodically to your PC.

But not all push products are created equal. Both Netscape's and Microsoft's push products can handle software downloads and offer tons of channel providers.

Push products all have one thing in common: They're not easy to master. And without supervision, they can quickly overwhelm your computer's resources, especially when updating. However, by following the tips here, you won't get pushed around. In fact, you can push back.

Internet Explorer 4.0 (www.microsoft.com/IE 4.0)
Microsoft's fourth-generation browser has so many customization features you can almost hear the "Have It Your Way" Burger King theme. In fact, IE 4.0 brings you information four different ways. The easiest method is the prepackaged push channels that come in the Channel bar. But as with Netscape's Netcaster, they represent only a fraction of ▶

seven ways to make push work for you

1 Push or pull? Use a search engine such as HotBot to hunt down broader in-depth information about a particular topic, such as rare automobiles. Then, after you find a site that you want to revisit—for example, Supercars (www.supercars.net)—use push technology in products like IE 4.0's Active Channels or Netscape's Netcaster to send you new information regularly.

2 Keep your desktop clean. Rapidly changing information such as stock quotes or weather updates are the types of data to put on your desktop. If you don't need to look at this information every 15 to 20 minutes, then it doesn't need to be hogging desktop space (and PC resources). Deactivate it or eliminate it altogether.

3 Start slowly. As strange as it may seem, Microsoft and Netscape actually agree on something: When you first subscribe to a push site, set the software to download only one or two levels deep. You can always go grab more pages later. Too much data can overwhelm your hard disk, your Net connection, and your brain.

4 Work off-hours. To prevent your push software from bogging down your system (or your company's bandwidth), schedule information pickups for when you're not working. Or switch to manual settings so that you control where and when your push provider retrieves information updates, and how the information will be displayed on screen.

5 Channel power. A simpler solution is to update less frequently. Chances are you don't need to update every channel several times each day. Gather sports and entertainment news once a day, business updates two or three times, and stock quotes throughout. Your ultimate goal is to get in and out as quickly as possible, like a nimble digital ninja.

6 Off-peak experiences. In IE 4.0's Active Channels and Netcaster, you can configure each channel to look for data at a different time. Whenever possible, select off-peak hours. The most congested connect time is between 5 p.m. and midnight EST, so avoid updates at those times.

7 Cache catch. Multimedia goodies and storage-gobbling graphics can quickly overwhelm the hard disk space you've assigned to your push product's cache. Unless you have disk space aplenty, set your cache to no more than 3 to 5 percent of your total storage space. (On a 1GB drive, that's around 30MB to 50MB.) Then periodically empty the cache and use a commercial uninstaller to perform hard disk housekeeping chores. —M. C.

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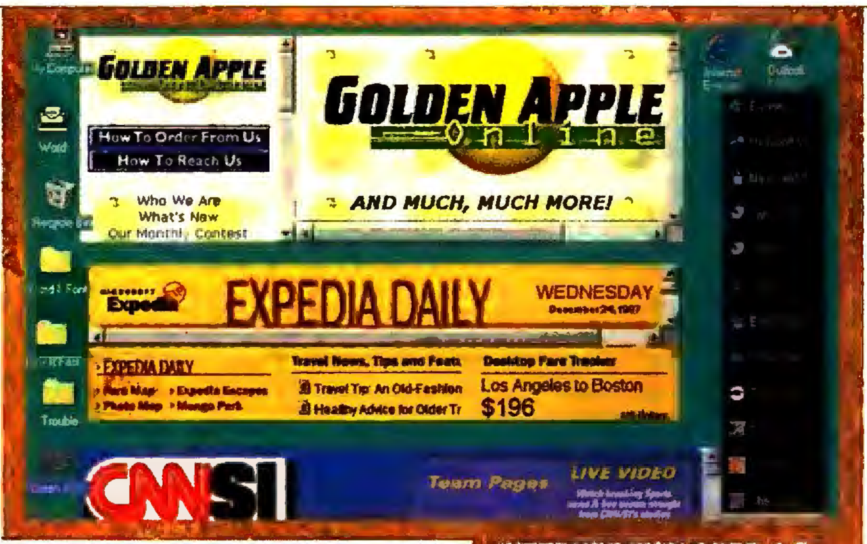
what's available. For example, you can turn pages in any Web site into a channel, provided the site contains IE 4.0's Add Active Channel button.

If the button isn't there, don't despair—you can still get information delivered using Internet Explorer's Add to Favorites option. This is similar to Netscape's Bookmarks, but with a twist: You can have IE 4.0 notify you when info at the site has changed, or even have it download pages for offline viewing.

Finally, IE 4.0 can transform your desktop into a live personal Web page. Instead of static wallpaper, you can attach stock tickers, news headlines, or other pieces of your favorite Web sites for a real Active Desktop. Talk about being wired! Here's how to fine-tune IE 4.0's push features without hassles:



INTERNET EXPLORER 4.0 lets you customize your desktop with "active" info.

Subscribe to any site. Browse any Web site, right-click on the page, and select *Add to Favorites*. When the 'Would you also like to subscribe to this page?' dialog box appears, you'll see two Yes options. Click the first one if you want to be notified when a page changes. Choose the second if you want IE 4.0 to download changed pages for offline viewing (see "Receive subscription information" below).

Activate Active Desktop. To toggle the Active Desktop on (and off), select *Start•Settings*, select *Active Desktop*, then choose *View As A Web Page*. (Or right-click any blank space on your desktop and select *Active Desktop*.)

Set subscription schedules. From the Favorites menu, Favorites bar, or Channels list in the Explorer bar, right-click any subscribed channel and select *Properties*. When the dialog box appears, click the *Schedule* tab. To create your own schedule, click the drop-down arrow, select *Custom Schedule* if it exists, and then click the *Edit* button. Clicking the *New* or *Edit* buttons summons the Custom Schedule dialog box to set the day (or days) and download times. When you're finished, click *OK*. To remove automatic update options permanently, click the *Manually* radio button. Warning: If you're accessing the Web through a modem, you must check the *'Dial as needed if connected through a modem'* box.

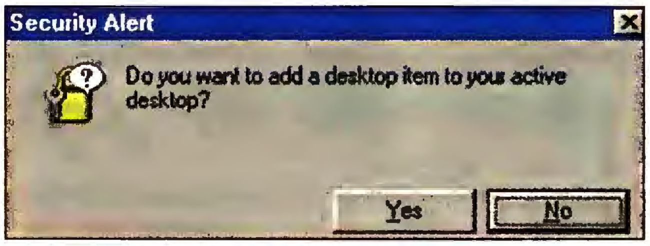
Receive subscription information. From the Properties dialog box (see above), select the *Receiving* tab. IE can notify you through e-mail when updates occur and/or automatically download pages for offline viewing—great if you're traveling. Click the *Advanced* button to specify what content and how much should be downloaded to your hard drive. By default, sound and video are turned off to save space.

Update easily. To force an update on all channels, go to the Favorites menu, then choose *Update All Subscriptions*.

To update a specific site, go to the Favorites menu, the Channels list or the Favorites list in the Explorer bar, or the Channel bar on the Active Desktop, right-

control active channels in ie 4.0

YOU CAN PUT Active Channels on your desktop in a few quick steps. There are a few pop-up windows that might give you pause, so follow the directions below carefully.


Security Alert

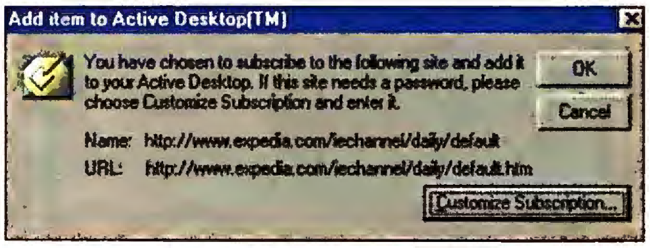
Do you want to add a desktop item to your active desktop?

STEP 1

Browse any site. Right-click the URL icon in the Address bar, and drag it to your desktop. Don't panic when you see the Security Alert. Click *Yes*.

STEP 2

Drop the icon anywhere on your desktop. You may be prompted to add a password. Add it here, click *OK*, and voilà! Your channel appears.


Add item to Active Desktop(TM)

You have chosen to subscribe to the following site and add it to your Active Desktop. If this site needs a password, please choose Customize Subscription and enter it.

Name: http://www.expedia.com/iechannel/daily/default

URL: http://www.expedia.com/iechannel/daily/default.htm

STEP 3

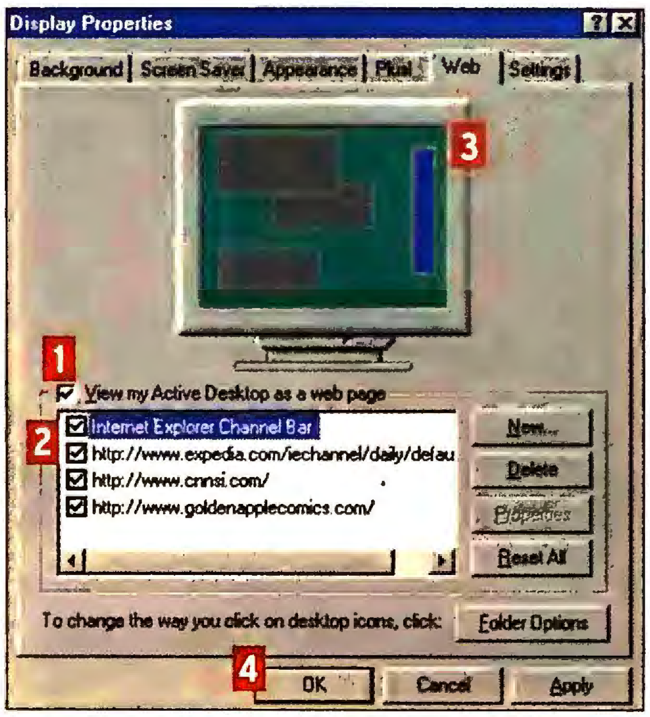
To delete or disable an Active Channel, right-click a blank desktop spot, select *Properties*, and click the *Web* tab.

1 Uncheck to disable channels on Active Desktop.

2 Uncheck to deactivate channels selectively.

3 All channels and the Channel bar are previewed here. Uncheck them and they disappear from this window.

4 To remove a channel permanently, highlight it and click *Delete*, then click either *Apply* or *OK*.


Display Properties

☑ View my Active Desktop as a web page

☑ Internet Explorer Channel Bar
☑ http://www.expedia.com/iechannel/daily/defau
☑ http://www.cnnsi.com/
☑ http://www.goldenapplecomics.com/

To change the way you click on desktop icons, click: Folder Options click the site, and select *Update Now.*

Unsubscribe, part I. Right-click the offending channel, select *Properties*, click the *Subscription* tab, then click the *Unsubscribe* button. To remove this channel or any prelisted channel from the Channel bar, right-click its button and select *Delete*. To get it back, click *Channel Guide* on the Links bar, search for the channel, select it, then click *Add to Active Channel*. (You can also try looking under the channel headings.)

Unsubscribe, part II. On the Favorites menu, select *Manage Subscriptions*, right-click on any channel, and select *Delete*. (You can also update from here and get to the Properties dialog box to unsubscribe.)

Disable and delete desktop channels Right-click on a blank desktop spot select *Properties*, and click the *Web* tab To completely disable Active Channels uncheck *View my Active Desktop as a wei page*. To disable a specific Active Channel, uncheck the box next to it. To remove a channel permanently, highligh the URL and click the *Delete* button.

Netscape Communicator 4.03

(www.home.netscape.com)

Netscape's new Communicator is actually a suite of Web utilities, including a browser, an e-mail package, and a push client dubbed Netcaster. Netcaster shares some of IE 4.0's traits, with a host of prefab channels and the ability to create channels or put Web content on your desktop. Once installed, however, Netcaster behaves with the quirks and pokiness of a new product. Just to be safe, don't make changes to Communicator's preferences with Netcaster loaded. It may crash your system.

Finding prepackaged channels. Launching Netcaster activates the Channel Finder interface automatically. It appears screen-right, and you click a cute satellite remote-control-looking icon to toggle it on or off your desktop. Like IE 4.0, Netcaster comes with preinstalled content providers; ABCNews.com, BusinessWeek, CBS Sportsline, and Disney are housed under the Business Focus and In General tabs. And as ▶

the fastest way to...

PUSH, *SHMUSH*. Do you think waiting for push information is for sloths? Here are 15 of the fastest darn tootin' ways to:

■ **Get business news quickly (www.wsj.com).** Sure, you can read the *Wall Street Journal*, but online you can search for just the stories you want without having to comb through page after ink-stained page.

■ **Find a company's Web address (www.four11.com).** You name the company, and this directory returns the Web address.

■ **Find out how much that condo costs (www.agmc.com).** Mortgage Calculators onscreen templates let you figure what your monthly payments will be.

■ **Find the way to San Jose (www.mapsonus.com).** A map is worth a thousand words. Maps on Us lets you quickly chart a route to your door or any other United States address and send the map and directions by e-mail.

■ **Find out what your life is worth (www.quickquote.com).** At QuickQuote you'll get free, fast comparisons of 1500 term life and annuity plans. Plug in a few numbers, and you'll know what you're worth—dead or alive.

■ **Find out where "they" live (www.whowhere.com).** Find a phone number and street address for just about anyone living in the United States.

■ **Get Uncle Max's e-mail address (www.four11.com).** At Four11 Directory Services, you can search through several directories for personal and business e-mail addresses, telephone numbers, and maps and directions, and while you're there, list yourself.

■ **Fight city hall (www.whowhere.com/GovtPages).** The first way to fight city hall is to find government officials online. Type in their names and titles, then get contact info. Not surprisingly, most have no e-mail addresses, just phone numbers and street addresses.

■ **Get free professional search help (www.findout.com).** Free online search help is yours. Fast? Not exactly. But if you're at your wit's end and ready to give up, the staff at FindOut could, well, find out.

■ **Understand technospeak (wombat.doc.ic.ac.uk).** Just check out FOLDOC (geekspeak for Free On-Line Dictionary of Computing). It's faster than *Funk & Wagnall's* and more informative.

■ **Get directory assistance (www.5551212.com/ACLOOKUP.HTML).** Look up area codes by city or find a city using the area code. At 555-1212.com's Fast Area Code Look-Up, you're the only operator—and you save the 50 cents to $1 charge for a directory assistance call.

■ **Find out when they're showing *Seinfeld* reruns (www.tvguide.com).** You'll never have to buy a *TV Guide* again—your schedules are online. Search by show titles, actors' names, and even descriptive words. Loaded with features, listings, and descriptions for TV shows and movies.

■ **Get the real WebTV (www.timecast.com).** What's playing on the Web now? Live events, audio, and video plus over 500 live radio and TV broadcasting sites on the Web.

■ **Find out how much your Microsoft stock is worth (www.quote.com).** Want live stock quotes? Quote.Com won't charge you, at least for the first 30 days. Get market help, conduct research, and check out news, bank rates, and more.

■ **Get cozy with El Niño (www.weather.com).** The Weather Channel shines with customizable five-city forecasts, satellite maps, and severe-weather alerts anywhere in the world. —M. C.

DELL DIMENSION® DESKTOPS FOR BUSINESS

Common features: ◆ Mini-Tower Model ◆ 512KB Integrated L2 Cache ◆ 3.5" Floppy Disk Drive ◆ Dell® Quiet Key® Keyboard ◆ Two Universal Serial Bus (USB) Ports ◆ MS® Office 97 Small Business Edition plus Bookshelf 98 ◆ McAfee VirusScan ◆ MS Windows® 95 ◆ MS Internet Explorer 4.0 ◆ MS IntelliMouse® ◆ 3 Year Limited Warranty† with 1 Year On-site^Δ^ Service **Upgrades:** ◆ HP® DeskJet® 722C, add $299 ◆ HP OfficeJet® 600, add $499 ◆ HP LaserJet® 6Lse, add $429

***NEW* DELL DIMENSION XPS D333** **333MHz PENTIUM® II PROCESSOR** FEATURING MMX™ TECHNOLOGY	**DELL DIMENSION XPS D300** **300MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY	**DELL DIMENSION XPS D266** **266MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY	**DELL DIMENSION XPS D233** **233MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY
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JUDGING FROM OUR PRICES, THE

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***NEW* DELL DIMENSION XPS D333** **333MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY	**DELL DIMENSION XPS D300** **300MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY	**DELL DIMENSION XPS D266** **266MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY	**DELL DIMENSION XPS D233** **233MHz PENTIUM II PROCESSOR** FEATURING MMX TECHNOLOGY
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- Microsoft Mouse
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Business Lease◊: $177/Mo., 36 Mos.
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Common Features: ◆ 512KB Integrated L2 ECC Cache ◆ Integrated PCI Ultra-Wide SCSI-3 Controller ◆ Intel Pro/100B PCI Ethernet Adapter ◆ HP OpenView™ NNM Special Edition ◆ 24X Max§ Variable SCSI CD-ROM Drive

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300MHz PENTIUM II PROCESSOR
DUAL PROCESSOR, RAID CAPABLE
WORKGROUP SERVER

Common features listed above plus:

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- 9GB Ultra-Wide SCSI-3 Hard Drive
- MS Windows NT Server 4.0 (10 Client Access Licenses)
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/ 3 Internal 3.5"
- 3 Year Next-Business-Day On-site^ Service
- 7x24 Dedicated Server Hardware Technical Telephone Support

$4699

Business Lease◊: $166/Mo., 36 Mos.
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DELL POWEREDGE 2200 SERVER
266MHz PENTIUM II PROCESSOR
DUAL PROCESSOR, RAID CAPABLE
WORKGROUP SERVER

Common features listed above plus:

- 64MB ECC EDO Memory
- 4GB Ultra-Wide SCSI-3 Hard Drive
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/ 3 Internal 3.5"
- 3 Year Next-Business-Day On-site^ Service
- 7x24 Dedicated Server Hardware Technical Telephone Support

★ *12/24GB Variable SCSI DAT Tape Backup Unit, add $849.*

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Common features: ◆ 512KB L2 Pipeline Burst Cache ◆ Modular Options Bay accepts 20X Max°° Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd Smart Li-Ion Battery ◆ **Stereo Speakers with 3D Surround Sound and Yamaha Software Wavetable** ◆ Smart Lithium Ion Battery ◆ Zoom Video and USB Ports ◆ Cardbus Ready/Fast IR1.1 ◆ Touchpad ◆ MS Windows 95 ◆ MS Internet Explorer ◆ Extendable 1 Year Limited Warranty†

***NEW* DELL INSPIRON 3000 M266XT**
266MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 144MB SDRAM Memory
- 4GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- Leather Carrying Case
- MS Office 97 Small Business Edition
- 6.9 Pounds*

★ *56K Capable** x2 Modem, add $149.*
★ *2nd Smart Li-Ion Battery, add $169.*
★ *3Com 10/100 Fast Ethernet Adapter, add $169.*

$3899

Business Lease◊: $138/Mo., 36 Mos.
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***NEW* DELL INSPIRON 3000 M266XT**
266MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 3.2GB ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- MS Office 97 Small Business Edition
- 6.9 Pounds*

★ *Upgrade to 80MB SDRAM, add $299.*
★ *Upgrade to a 4GB Ultra ATA Hard Drive, add $99.*
★ *56K Capable** x2 Modem, add $149.*

$2999

Business Lease◊: $109/Mo., 36 Mos.
Order Code #890207

DELL INSPIRON 3000 M233XT
233MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- MS Office 97 Small Business Edition
- 6.9 Pounds*

★ *Upgrade to a 266MHz Pentium Processor with MMX Technology, add $100.*
★ *Upgrade to 64MB SDRAM, add $199.*
★ *56K Capable** x2 Modem, add $149.*

$2799

Business Lease◊: $102/Mo., 36 Mos.
Order Code #890209

DELL INSPIRON 3000 M200ST
200MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- MS Office 97 Small Business Edition
- 6.4 Pounds*

★ *Upgrade to 48MB SDRAM, add $99.*
★ *Upgrade to a 4GB Ultra ATA Hard Drive, add $199.*
★ *Upgrade to MS Office 97 Professional, add $215.*

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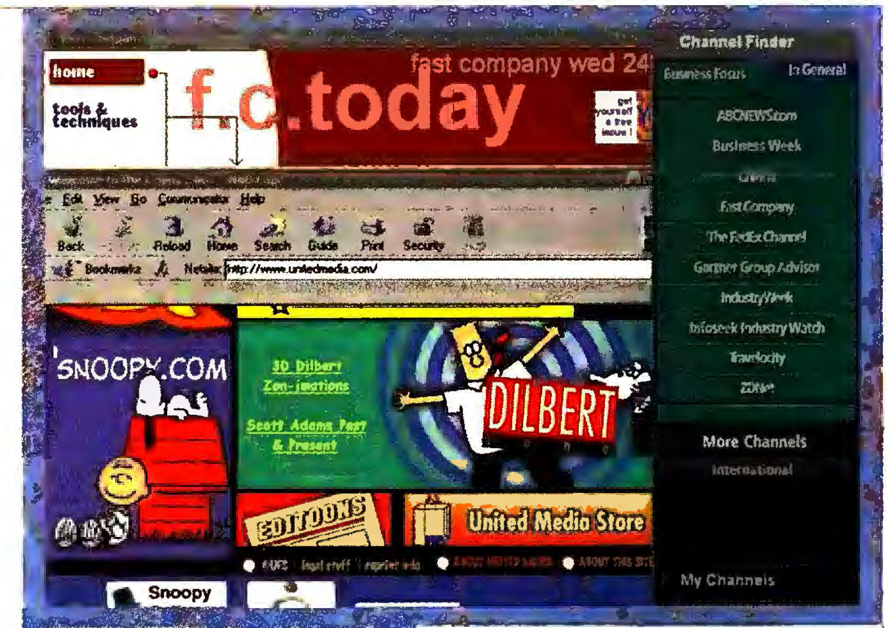
with IE 4.0, you have to subscribe to a site before you can download any content. Click a channel button for a description; click the *Preview Channel* button to see more.

Yet more channels. Clicking the *More Channels* button loads another Channel Finder that gobbles up your entire screen. Subject categories like Business News, Technology, Personal Finance, and Kids & Family are in rows across the top. Click a category, and the channels appear in the middle of the screen. Click a channel for a description. The Preview Channel works the same way. To exit, click the *Close* button.

Adding Netcaster channels. Found something you like? Click the *Add Channel* button. The first time you subscribe to any channel in Netcaster, you'll be asked to reregister with Netscape Member Services. You can click through the steps—supplying just an e-mail address—but if you don't register, you'll be nagged every time you subscribe to another channel. Each subscription process depends on the channel. Subscribing to FastCompany, for example, displays a dialog box with the channel name, URL, and downloading scheduler. If you subscribed correctly, your new channel appears under My Channels in Channel Finder. To launch your new channel, click its icon. You cannot change channel order in My Channels.



NETCASTER brings channel surfing to the browser, letting you customize as you go.

Create your own channels. Naturally, you're not limited to Netcaster offerings. You can turn any Web site you choose into a channel. In Channel Finder, click *New*. When the Channel Properties box appears, type the name and URL in the appropriate fields. (You can also copy the URL from Communicator's Address bar.) When you're done, click *OK*. *Voilà!* The new channel appears under My Channels.

The art of unsubscribing. Right-click on the channel's icon in the My Channels menu and select *Delete*. You can also click *Options* at the bottom of Channel Finder. When the dialog box appears, select *Delete*. When asked to confirm, click *OK*.

Customizing download content. Though not as robust as IE 4.0, Netcaster lets you change the volume of content to download. After you've subscribed, right-click on the channel in My Channels. Select *Properties*, then click the *Cache* tab.

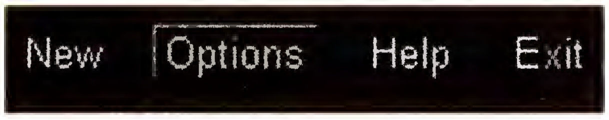
Customizing subscription settings. In Channel Finder, select *My Channels*, right-click on the specific channel, click *Properties*, then click the *General* tab. Check the box next to *Update this channel or site every*____, then click the down arrow and fill out the scheduling times.

However, unlike IE 4.0, Netcaster will not automatically dial in to the Web. You must be online and have Netcaster loaded. Leave the Update box unchecked to force an update. There is no "update all" option; it's a one-at-a-time job. Another annoying feature: Though you can move pop-up windows around the screen, you can't resize them, and anything behind them is hidden.

For more push technology tips and a look at the future of Internet searching, check out PC World Online at www.pcworld.com/march98/search. Michael Cahlin is a freelance writer based in Los Angeles. Harry McCracken is senior writer for PC World. ■

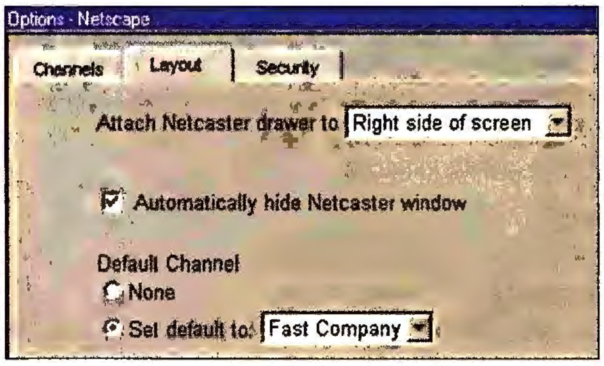
channel surfing with netcaster

WHILE IE 4.0 CAN attach many active Web pages to your desktop, Netcaster can load only one. Getting it to autolaunch can be trying, so follow these steps carefully.



STEP 1 In the Channel Finder, click *Options*.

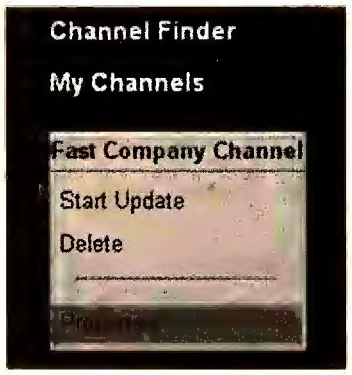
STEP 2 Click the *Layout* tab. Decide where you want the Netcaster drawer to appear on your screen. Below Default Channel, click the down arrow to select your default choice.



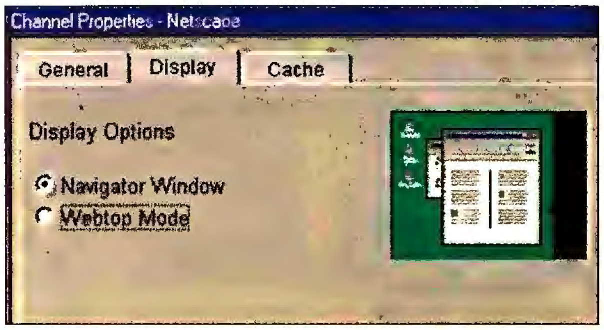
Attach Netcaster drawer to: Right side of screen

☑ Automatically hide Netcaster window

Default Channel
○ None
● Set default to: Fast Company



STEP 3 Now go back to the desktop. Under My Channels, right-click on the channel you selected in Step 2. Select *Properties*. The dialog below appears.



Display Options
● Navigator Window
○ Webtop Mode

STEP 4 To autolaunch a channel as a Webtop or in a browser, click the *Display* tab, then *Navigator Window* or *Webtop Mode*.

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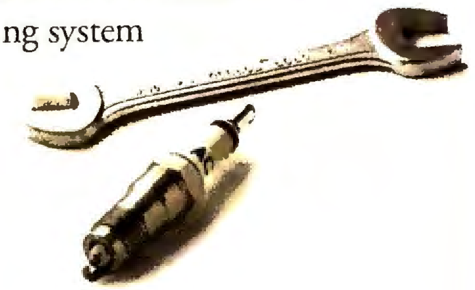

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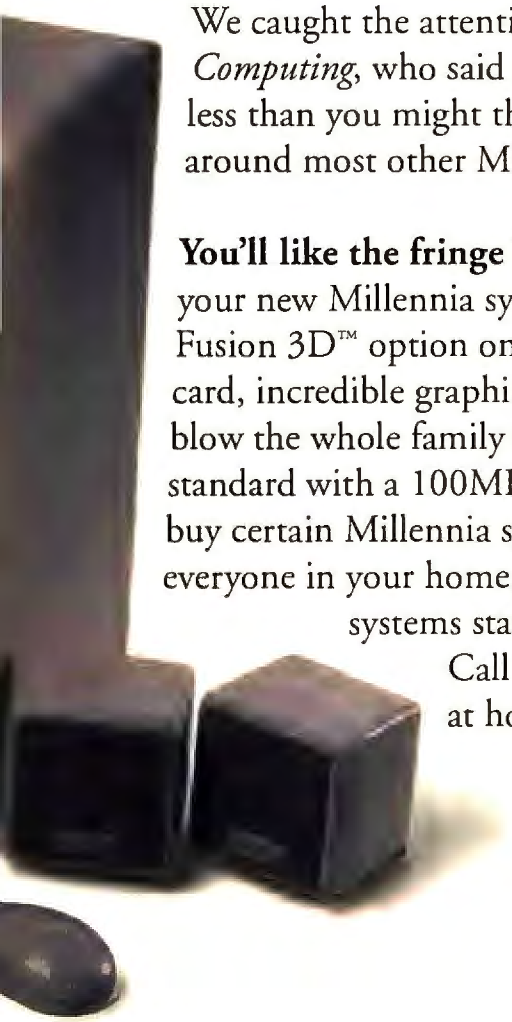
Nothing run-of-the mill here. Our flexible Millennia MME — the first desktop to incorporate both MMX™ technology and SDRAM — delivers better multimedia results than ever, and the USB features give you high-speed connectivity. We caught the attention of the editors at *Home Office Computing*, who said the Millennia MME "costs less than you might think and runs circles around most other MMX-based systems."

You'll like the fringe benefits. We custom build your new Millennia system to your exact needs. Add the Fusion 3D™ option on the XKU for awesome DVD technology, a super sound card, incredible graphics and more. Get multimedia sights and sounds that blow the whole family away! And remember, all Millennia models come standard with a 100MB Zip drive for virtually unlimited storage. When you buy certain Millennia systems, you'll get a software bundle of your choice for everyone in your home, and it's included with your purchase. Millennia systems start at $1,599, so you won't compromise power or price. Call Micron today — we'll make make you feel right at home!



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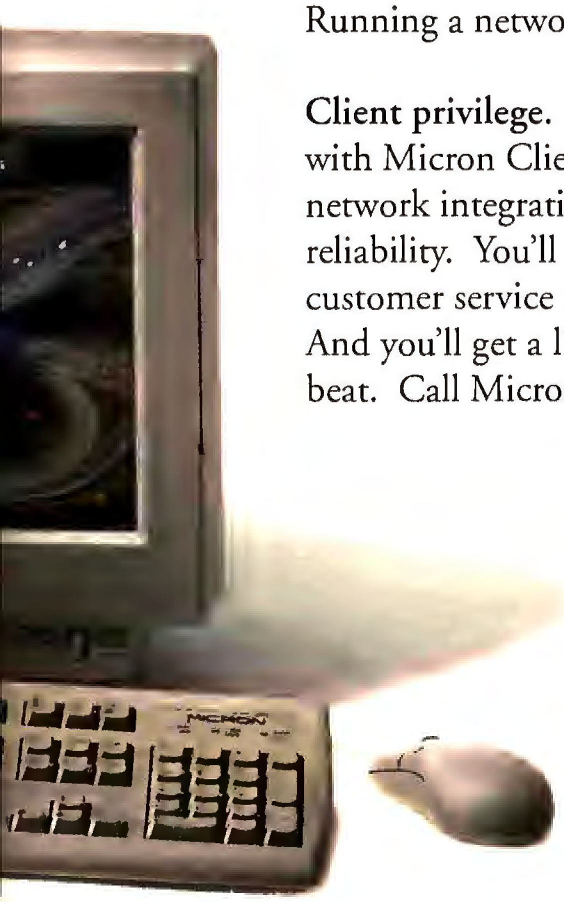

Business Solutions

NetFRAME® LV2000

Intel 233MHz Pentium® II processor
32MB ECC SDRAM
2GB Ultra Wide SCSI-3 hard drive
Microsoft® Windows NT™ Server 4.0 (10-user license)
NOS support (3 incident resolutions/1st year), 7x24

STANDARD FEATURES

- Single or dual Intel Pentium II processors
- 512KB integrated cache in SEC package
- ECC SDRAM option (4 DIMM slots)
- 5 expansion slots: 4 PCI, 1 ISA
- Integrated Adaptec PCI Ultra Wide SCSI-3 controller
- Intel EtherExpress™ Pro 100 NIC
- 12X SCSI-2 CD-ROM drive
- 10 drive bays: 4 external 5.25"/1 external 3.5"/ 2 internal 5.25"/3 internal 3.5"
- Intel LANDesk® Server Manager v.2.8
- Dedicated server technical support, 7x24
- 5-year/3-year Micron Power℠ limited warranty
- 1-year next-business-day on-site service*

$3,499
Bus. Lease $119/mo.

NetFRAME MV5000

Intel 300MHz Pentium II processor
64MB ECC SDRAM
4GB Ultra Wide SCSI-3 hard drive
Microsoft Windows NT Server 4.0 (10-user license)
NOS support (3 incident resolutions/1st year), 7x24

STANDARD FEATURES

- Single or dual Intel Pentium II processors
- 512KB integrated cache in SEC package
- Memory: ECC EDO or SDRAM option
- 9 expansion slots: 6 PCI, 2 ISA, 1 shared ISA/PCI
- Dual integrated Symbios Ultra Wide SCSI-3 controllers
- Intel EtherExpress™ Pro 100 NIC
- Embedded RAID upgrade option
- I$_2$0 ready via embedded Intel i960-RD
- 5 internal, hot-pluggable, hard drive array bays (Upgradable to 10)
- 1 (one) 360 watt hot-pluggable power supply standard (Upgradable to 3 for added redundancy)
- Rack Adapter Option
- Intel LANDesk Server Manager v.2.8
- Dedicated server technical support, 7x24
- 5-year/3-year Micron Power limited warranty
- 1-year next-business-day on-site service*

$5,699
Bus. Lease $181/mo.

ClientPro VXE

Intel 166MHz Pentium processor with MMX technology
Microsoft Windows NT Workstation

$1,149**
Bus. Lease $40/mo.

ClientPro MRE

Intel 233MHz Pentium processor with MMX™ technology
32MB SDRAM
2.1GB SMART Ultra ATA hard drive
15" Micron 500LX, .28dp (13.7" display)

- 512KB pipeline burst cache, DMI compliant, 2MB flash BIOS
- Network adapter with Wake-On-LAN technology
- 24X ATAPI variable speed CD-ROM drive
- S3 ViRGE graphics accelerator, 2MB EDO RAM
- Intel LANDesk Client Manager available
- Advanced hardware monitoring and power management features
- Chassis intrusion alert
- Microsoft Windows NT Workstation
- 5-year/3-year Micron Power limited warranty

$1,599
Bus. Lease $56/mo.

ClientPro 766Xi

Intel 266MHz Pentium II processor with MMX technology
64MB SDRAM
3.2GB SMART Ultra ATA hard drive
17" Micron 700FGx, .28dp (16" display)

- 512KB internal L2 secondary cache, DMI compliant, 2MB flash BIOS
- 32X ATAPI variable speed CD-ROM drive
- Network Adapter with Wake-On-LAN technology
- 4MB AGP 3D video
- Creative Labs SoundBlaster™ 16 soundcard w/speakers
- Microsoft Windows NT Workstation
- Intel LANDesk Client Manager available
- Advanced hardware monitoring and power management features
- Chassis intrusion alert
- 5-year/3-year Micron Power limited warranty

$2,399
Bus. Lease $84/mo.

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*On-site service for NetFRAME LV2000 and MV5000 server is provided by Digital Equipment Corporation and is optional.

**Price excludes monitor.

Performance Desktop Solutions

Millennia® MME 166

Intel 166MHz Pentium® processor
with MMX™ technology
32MB SDRAM
3.2GB Ultra ATA hard drive
15" Micron 500FGx, .28dp (13.7" display)

STANDARD FEATURES
512KB pipeline burst cache, flash BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
24X EIDE variable speed CD-ROM drive
32 voice wavetable stereo sound with speakers
3Com/US Robotics 56K x2 telephony modem*
PCI 64-bit 3D video, MPEG, 4MB EDO DRAM
Microsoft® IntelliMouse™, USB connections
Microsoft Windows® 95 and MS® Plus!
Microsoft Office 97 Small Business Edition
Choice of one Micron Software Solutions Pak
5-year/3-year Micron Power℠ limited warranty

$1,599
Bus. Lease $56/mo.

Intel 200MHz and 233MHz Pentium processors with MMX technology configurations also available.

Micron Software Solutions Paks

Quicken Financial Suite '98: Quicken Deluxe, Parent's Guide to Money, Quicken Financial Planner, Quicken Family Lawyer†

Home Productivity Pak: Compton Interactive Encyclopedia, Broderbund Print Shop Ensemble III, Crayola Magic 3D Coloring Book, Mindscape Mavis Beacon Teaches Typing, Creative Multimedia, The Family Doctor, Net Nanny†

EdVenture Pak: Creatures by Mindscape, Freddi Fish 2 by Humongous Entertainment, Schoolhouse Rock by Creative Wonders, Reader Rabbit: Kindergarten by The Learning Company, Dr. Suess Green Eggs and Ham by Broderbund†

Arcade Pak: X-Wing vs. TIE Fighter, Need For Speed 2, Command and Conquer: Red Alert, 4 button game pad†

Fusion 3D Option Pak

DVD-ROM, DVD software**
DVD PCI decoder card
AWE 64 ISA sound card, Cambridge MicroWorks:
2 speaker satellite with subwoofer stereo system
Fusion 3D game pak: Mech Warrior 2: Mercenaries D3D version, AH-64D Longbow, U.S. Navy Fighters '97, Command & Conquer, Formula 1 D3D version
Microsoft SideWinder Pro joystick

Available only on Millennia XKU systems

XKU Add $449

Millennia XKU

STANDARD FEATURES
82440LX chip set
512KB internal L2 cache, 2MB BIOS
Integrated 100MB Iomega Zip drive, 3.5" floppy drive
32X EIDE variable speed CD-ROM drive
32 voice wavetable stereo sound, Advent 009 speakers with subwoofer
3Com/US Robotics 56K x2 data/fax modem*
Diamond Viper V330 128-bit 3D video with 4MB SGRAM
Microsoft IntelliMouse, USB connections
Microsoft Windows 95 and MS Plus!
Microsoft Office 97 Small Business Edition
Choice of Micron Software Solutions Pak
5-year/3-year Micron Power limited warranty

Millennia XKU 266

Intel 266MHz Pentium II processor
(features MMX technology)
32MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,249
Bus. Lease $79/mo.

Millennia XKU 300

Intel 300MHz Pentium II processor
(features MMX technology)
64MB SDRAM
6.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,499
Bus. Lease $87/mo.

New!

Millennia XKU 333

Intel 333MHz Pentium II processor
(features MMX technology)
64MB SDRAM
8.4GB Ultra ATA hard drive
17" Micron 700FGx, .26dp (16" display)

$2,799
Bus. Lease $96/mo.

DVD drive with decoder card add $199.

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*Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

**The CD-ROM drive will be removed upon the purchase of the DVD upgrade.

†Available only on Millennia systems with Microsoft Windows 95.

Software upgrade may be required to achieve maximum transmission speeds. Software upgrades are available for download from Micron's Web page for free (www.micronpc.com).

Portable Solutions

Micron TransPort XKE

STANDARD FEATURES
512KB pipeline burst cache
128-bit, 2MB DRAM graphics
20X CD-ROM drive with AutoPlay® technology
Pick-a-Point™ dual pointing devices
16-bit stereo sound and microphone
56K fax/modem * ††
Dragon NaturallySpeaking Personal voice recognition software
CardBus and Zoomed Video
2 infared ports, S-Video, NTSC, game USB ports
Mobile Software Solutions
2 Modular expansion bays
Custom nylon carrying case
Microsoft® Windows® 95 and MS® Plus!
Microsoft Office 97 Small Business Edition
5-year/1-year Micron limited warranty

Micron TransPort XKE 233

233MHz Intel Pentium processor with MMX technology
64MB EDO RAM
3GB removable hard drive
13.3" TFT XGA display

$4,199
Bus. Lease $133/mo.

Micron TransPort XKE 266

266MHz Intel Pentium processor with MMX technology
64MB EDO RAM
5GB removable hard drive
13.3" TFT XGA display

$4,599
Bus. Lease $146/mo.

Micron TransPort™ VLX

166MHz Intel Pentium processor with MMX technology
16MB EDO RAM (40MB max.)
1.6GB hard drive
16X modular CD-ROM drive
Li-Ion battery
12.1" TFT SVGA, 800x600 display
256KB L2 pipeline burst cache
PCI bus with 128-bit graphics accelerator
MPEG compatible
Zoomed video-ready
Touchpad pointing device
Microphone and 16-bit stereo sound
2-way infrared port
Modular floppy drive
Microsoft Windows 95 and MS Plus!
5-year/1-year Micron limited warranty

$2,249
Bus. Lease $79/mo.

Extended VLX Portable Service Options

2nd and 3rd year parts and labor; 3-business-day turnaround for 3 years[4]	$269
2nd and 3rd year parts and labor; 7-business-day turnaround for 3 years[4]	$209

TransPort Options

VLX Options: Motorola Montana 33.6 fax/modem, Dragon NaturallySpeaking Personal voice recognition software, 3Com PCMCIA ethernet adapter, 10-Base-T, custom nylon carrying case, Samsonite leather carrying case, 2nd Li-Ion battery, 2.1GB primary hard drive upgrade, 8MB EDO RAM upgrade (24MB total), 24MB EDO RAM upgrade (40MB total)

XKE Options: Microsoft Windows NT 4.0, MicronDock™ multimedia port replicator with hot docking and built-in battery charger, Micron Executive™ desktop package: matching black monitor, mouse and keyboard, PCMCIA Ethernet adapter, 10/100 Base-T, leather carrying case upgrade, 2nd modular lithium-ion battery, primary and secondary modular HDD upgrade options up to 5GB, memory upgrade options up to 192MB, auto/air adapter, Multimedia Xcitement Pak

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MMX™ intel inside pentium® PROCESSOR

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Workstation Solutions

Powerdigm™

FEATURES AND OPTIONS
- Supports dual processors
- Supports IDE Ultra ATA and multiple Ultra Wide SCSI-3 hard drives
- 512KB pipeline burst cache, flash BIOS
- Memory upgradeable to 1GB ECC SDRAM
- 3Com Fast EtherNet 10/100 PCI network adapter
- 12/20X variable speed SCSI CD-ROM drive
- Optional support for dual monitors
- DMI, software and hardware management support
- Wavetable stereo sound with speakers
- Microsoft® IntelliMouse™
- Microsoft Windows NT® Workstation
- 5-year/3-year Micron Power℠ limited warranty

Powerdigm XSU

- **Intel 300MHz Pentium® II processor**
- **Samurai™ chip set**
- **Fire GL 1000 pro 8MB 66MHz PCI Open GL Professional 3D accelerator**
- **4GB Ultra-Wide SCSI-3 hard drive**
- **64MB ECC SDRAM**
- **19" Hitachi SuperScan CM751 (18" display) .26dp monitor**

$4,699

Bus. Lease $149/mo.

Powerdigm XSU

- **Dual Intel 300MHz Pentium II processors**
- **Samurai chip set**
- **128MB ECC SDRAM**
- **Fire GL 4000 15MB 3DRAM/16MB CDRAM**
- **4GB Ultra-Wide SCSI-3 hard drive**
- **Iomega 1GB Jaz SCSI drive**
- **21" Hitachi SuperScan CM801 (20" display) .26dp monitor**

$8,308

Bus. Lease $263/mo.

MMX™

pentium® II PROCESSOR

Other Systems Options

Multimedia Options

Cambridge speakers	$299
Advent AV370 Powered Partners stereo speakers with subwoofer	$199
Microsoft SideWinder™ 3D Pro joystick	$59
AWE 64 ISA sound card	$75

Storage/Media Options

Adaptec 2940U with Ultra SCSI	$175
Plextor 12/20 Plex SCSI internal CD-ROM drive[1] (upgrade from system with standard EIDE CD-ROM drive)	$100
Iomega Jaz SCSI drive with 1GB removable cartridge[1]	$299
Iomega Zip IDE drive with 100MB removable cartridge	$99
Iomega 6-pack of 100MB Zip cartridges	$99
Sony 4/8GB SCSI DDS-2 tape backup drive with tape and software[1]	$899
Seagate TR-4 4/8GB IDE tape backup w/software	$239
Seagate TR-4 4/8GB SCSI tape backup w/software	$279

Display/Video Options

19" Hitachi SuperScan CM751 (18" display) .26dp color monitor	$300
21" Hitachi SuperScan CM801 (20.0" display) .26dp color monitor	$650
Number Nine Revolution 8MB video card	$249

Software Options

Small Business Essentials: QuickBooks, Visio, Norton AntiVirus, Astound, Focal Point, American Yellow Pages	$179
CorelDRAW 7 (full retail version)	$299
Corel WebMaster Suite (full retail version)	$99

Printer Options

HP DeskJet 692C	$269
HP DeskJet 890Cxi	$429
HP LaserJet 6Lxi	$399
Lexmark 1000 Color Jetprinter	$140
Lexmark 2030 Color Jetprinter	$179
Lexmark 7200 Color Jetprinter	$399
Lexmark Optra E+ Laser printer	$399
Epson Stylus Color 600	$269
Epson Stylus Color 800	$399
Canon BJC - 80	$299
Canon BJC -250	$149
Canon BJC - 4300	$199
10ft. IEEE-1284 Printer Cable	$ 16

Communication Options

33.6 external data/fax modem	$299
56Kbps technology modem*	$99
56Kbps x2 telephony modem*	$119

Server Extended Service Options

2nd and 3rd year next-business-day[5] on-site service coverage[4]	$99
4-hour response[6] on-site service coverage[4] (8am - 5pm, M-F), 3 year	$798
4-hour response[6] on-site service coverage[4] (24 hours, 7 days per week), 3 year	$998
Other service options may be available, ask your system consultant	

Extended Desktop Service Options

Optional 1st year on-site service[3] coverage included	
2nd year on-site service[4] coverage	$79
2nd and 3rd year on-site service[4] coverage	$99
Other service options may be available, ask your system consultant	

Network Options

3Com 3C509B Etherlink III ISA combo network adapter	$79
3Com 3C905 EtherlinkXL PCI combo network adapter	$99
3Com OfficeConnect Hub 8/TCP	$149
3Com OfficeConnect Switch 140	$969

Other Options

APC Per7T surge suppressor	$39
APC Pro7T surge suppressor	$59
Microsoft Natural Keyboard (upgrade from standard keyboard)	$49

[1] Requires SCSI host adapter

[2] Upgrade from systems with standard Micron 17" 17FGx color monitor

[3] 1st year on-site service is available in the United States and in limited areas in Canada from third-party service provider per customer's agreement with provider

[4] 2nd year and 2nd and 3rd year offerings are available in the United States only. Extended services, if purchased after system shipment may have a higher cost.

[5] Service will be scheduled whenever possible, for the next business day after parts are received by the customer

[6] Available in certain locations, ask your system consultant for details

Some options and accessories available with system purchase only

*Maximum transmission speed of up to 56Kbps when downloading data and 33.6Kbps when uploading. However, actual performance is dependent upon numerous factors and observed transfer rates may be less than the maximum potentials.

MICRON POWER℠ WARRANTY

- 5-year limited warranty on microprocessor and main memory
- 3-year limited parts-only system warranty (1-year for TransPort systems)
- 1-, 2- or 3-year optional on-site service agreement for Micron desktop and server systems
- 30 days of free Micron-supplied software support for Micron desktop systems, 3 optional network operating system incident resolutions included for Micron server systems
- 30-day money back policy
- 24-hour technical support

The foregoing is subject to and qualified by Micron's standard limited warranties and terms and conditions of sale. Terms and conditions of sale may vary for specific configurations. Copies of the limited warranties may be obtained on our Web site or by calling Micron.

Micron Sales Hrs: Mon-Fri 6am-10pm, Sat 7am-5pm, Sun 10am-5pm (MT)
Technical Support Available 24 Hours A Day, 7 Days A Week
Toll-free from Mexico: 95-800-708-1755
Toll-free from Canada: 800-708-1758
Toll-free from Puerto Rico: 800-708-1756
International Sales: 208-893-8970
International Fax: 208-893-7393

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VIRUS KILLERS 1998

ILLUSTRATIONS BY JONATHON ROSEN

BY STAN MIASTKOWSKI

VIRUS. The word itself has a menacing hiss. And a computer virus can be as evil as it sounds, snaking its way into your PC, posing an occasional annoyance or a serious threat to your data. Now, with the explosion of pesky macro viruses that infect Microsoft Word and Excel documents, the tentacles of the computer virus problem reach even further into our work. ▶

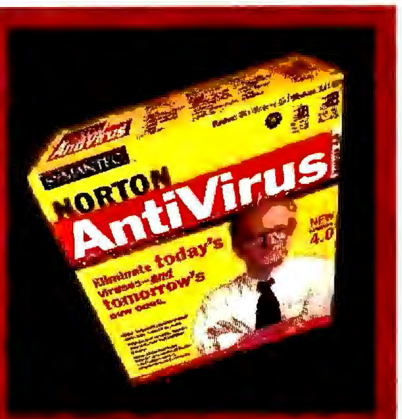
THIS YEAR, MACRO VIRUSES ARE RUNNING RAMPANT. WHICH ANTIVIRUS PROGRAM IS YOUR BEST DEFENSE?

No one working on a PC is risk free. Even the manuscript of this article infected eight *PC World* editors' machines with the Cap virus. Talk about your wicked irony. Unfortunately for this particular virus, its victims each had eight antivirus weapons that we were testing for this story: Dr Solomon's Anti-Virus 7.0, F-Prot Professional 2.15, IBM AntiVirus 3.0.1, Inoculan AntiVirus 5.0 for Windows 95, McAfee VirusScan 3.0, Norton AntiVirus 4.0, PC-cillin Anti-Virus 3.0, and ThunderByte Anti-Virus Utilities 8.0.3.

As when we last reviewed antivirus software ("Virus Killers," March 1997), almost any of these packages does a nice job of finding and eradicating most viruses, including macro viruses. The key is to keep the products' library of *signatures*—binary code that helps identify viruses—current. And that's one area where these packages differ most. When you buy, look closely at the updating that the vendor offers. If keeping signature files up-to-date is too costly or difficult, you won't do it as often, which means you won't be as well protected against the latest viruses. Check out the package's interface and scanning features, too. Just about every one is easy to install, but the best are also easy to use and offer many scanning options as well.

Our Best Buy is Norton AntiVirus 4.0. At $50, it is priced about the same as other packages on the market, and comes chock-full of scanning options. Norton holds your hand through virus detection and removal and tells you exactly what's going on at each step of the way, which few of the others do. Most important, it comes with free automatic updates of signature files for as long as you own the program.

NORTON AntiVirus 4.0's detection and removal rates for both wild and zoo viruses are the best here, though the product could have done better with our infected boot record. Its interface is outstanding, walking you step by step through myriad options and delivering effective handholding when it finds a virus. Rounding it out is great documentation, a versatile scheduler, and unlimited free virus-signature updates that are easy to get from the Web or through Symantec's LiveUpdate service.



BEST BUY

MACRO ATTACK

THE MAJOR PLAYERS in the antivirus software market haven't changed much in the last year. And neither has the number of computer viruses. Experts estimate that over 15,000 viruses exist today, with 6 to 9 new ones appearing daily, but that's not as bad as it sounds: Old viruses drop out of circulation, and most viruses live only in research labs—the *zoo*, in virus hunters' lingo. Others never make it beyond their creator's PC or the underground virus-writing Web sites and bulletin boards—often because they're too poorly written to work as intended.

The bottom line: About 260 viruses are now "in the wild" (in general circulation). Not the best news, but it could be worse.

What *has* changed? Infection rates have increased due to the prevalence of macro viruses. According to Steve White, senior manager of research and development for IBM's antivirus research center, macro viruses now account for 75 percent of outbreaks, due in part to the popularity of Word and Excel and the sharing of documents created with them through networks, the Web, floppy disks, and e-mail. (Luckily, viewing an e-mail attachment rather than launching it averts infection.)

Fortunately, most macro viruses aren't lethal—they simply reproduce themselves without causing damage. And protecting yourself from infection isn't difficult.

ANTIVIRUS SOFTWARE FEATURES COMPARISON

PRODUCTS	Street price (10/15/97)	Platforms supported	Preinstallation scan	Creates emergency boot disk	Scan scheduler	Automatic virus updates	Online program updates	Tech support (hours per weekday)	Toll-free phone support
Dr Solomon's Anti-Virus 7.0	$50	Windows 95, 3.*x*	●	●	○	○	●	12	○
F-Prot Professional 2.15	$50	Windows 95	○	●	●	○	●	24[2]	●
IBM AntiVirus 3.0.1	$49	Windows 95, NT, 3.*x*; DOS, OS/2	●	●	●	○	●	12	●
Inoculan AntiVirus 5.0 for Windows 95	$40	Windows 95	●	●	●	○	●	12	○
McAfee VirusScan 3.0	$49	Windows 95, NT, 3.*x*; DOS, OS/2	●	●	●	●	●	12	○
Norton AntiVirus 4.0	$50	Windows 95, NT Workstation	●	●	●	●	●	9	●[3]
PC-cillin Anti-Virus 3.0	$45	Windows 95, 3.*x*	●	●	●	●	●	9	○
ThunderByte Anti-Virus Utilities 8.0.3	$100	Windows 95, NT, 3.*x*; DOS, OS/2	●	○[1]	●	●	●	10	○

Best Buy ● Yes ○ No

[1] Creates emergency boot floppy in DOS version only. [2] Including Saturday and Sunday. [3] Support requires a fee.

INFECTION ROUTES

and How to Avoid Them

Other than keeping your antivirus program up-to-date, here's how to stay safe.

Don't download and run. Scan files you copy from the Net before executing them.

Sharing means caring. Assign passwords to users to protect your network.

Is nothing sacred? Even commercial CD-ROMs and floppies should be scanned.

Know your friends. Scan e-mail attachments.

Cover your A:. Set the write-protect tab on floppies; don't leave them in the drive.

To test the packages, we sought the help of virus guru Joe Wells, who tracks viruses' circulation in his monthly WildList (find the archives at www.virusbtn.com). He tested detection on 271 wild and 6227 zoo viruses, and removal on 17 wild viruses, including the 5 most common (see "The Wicked List").

Four packages—Dr Solomon's, F-Prot Professional, IBM AntiVirus, and Norton AntiVirus—detected every wild virus. Inoculan, McAfee, and ThunderByte missed a couple. PC-cillin missed five but still did well, statistically speaking.

We saw more variation in zoo viruses. Dr Solomon's did best, PC-cillin worst. Happily, zoo viruses aren't likely to escape from the labs in which they're studied.

We also conducted speed tests. If you'll be sweeping your entire hard drive frequently, beware of Inoculan: It took almost an hour to scan 1.4MB of data.

CLASS OF '98

VIRUS KILLING MAY not have changed much lately, but vendors rework their products' prices, interfaces, and features in hopes of better sales. In the last 12 months, prices for antivirus software have fallen from an average of $85 to around $50. And if you buy a PC or a utilities package, you may get an antivirus program bundled with it.

Still, keep an eye out for inflated claims. Dr Solomon's offers "new" Web scanning abilities, but so did all of last year's packages. The next danger may come from infection of Java and ActiveX applets, but as of this writing no such viruses are in the wild. Most vendors say they are monitoring the problem; McAfee claims to offer protection in its new $29 WebScanX.

Hyperbole aside, most of these packages are good deals. They all check for viruses as you access a file, and all can scan on demand, whenever it's convenient. Each package, however, has its own personality, gimmick, and support plan, and you should pay attention to their shortfalls and benefits. F-Prot Professional and ThunderByte, for example, are best suited for networks.

THE BEST DEFENSE

THE QUESTION should no longer be *whether* you'll buy an antivirus package, but which one it will be. Fortunately, just about all of these programs are easy to install and use, and relatively cheap. When it comes to PC viruses, the best defense is a good offense. And we've got your lineup right here.

Dr Solomon's Anti-Virus 7.0

PRO: Perfect wild virus detection and repair, nearly flawless with zoo viruses, clean interface

CON: No scheduler, doesn't check floppy drive at shutdown, only one free update

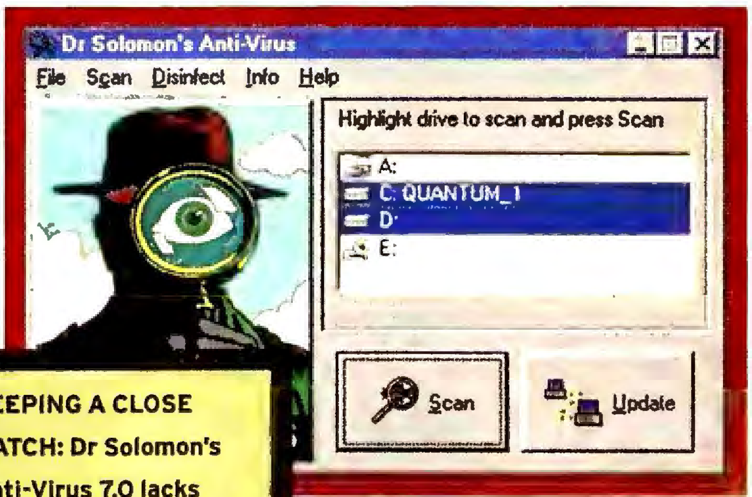
THE NEW $50 Dr Solomon's Anti-Virus 7.0—like its predecessor, the $85 Anti-Virus Toolkit—excelled at sniffing out infections, catching every wild virus and more zoo viruses than any other package in our tests. Dr Solomon's Advanced Heuristic Analysis not only checks virus signatures, it also scans for software behavior that *looks* viruslike. Most products claim "heuristic" abilities, but Dr Solomon's version didn't create false alarms.

Dr Solomon's modifies your autoexec.bat file to load a small but effective DOS virus scanner at start-up. And unlike most packages, Dr Solomon's includes a handy bootable "SOS" floppy that also lets you quickly check a PC for viruses. The program has a clean, simple interface.

In some ways, though, version 7.0 is no better than the old Toolkit. It's the only package here that doesn't have a scheduler and doesn't check the A: drive at shutdown. Another big consideration is that a year's subscription to Web-based updates costs another $29.99. Most programs offer free updates for at least a year.

By March, Dr Solomon's Anti-Virus Deluxe will be available. According to the company, the $70 package will include a scheduler, a year of free monthly updates, and a new technology called WebGuard. (Details and evaluation units weren't available at press time.) *$50 street; Dr Solomon's Software, 800/960-9095, 617/273-7400, www.drsolomon.com*

READER SERVICE NO. 750



Highlight drive to scan and press Scan

KEEPING A CLOSE WATCH: Dr Solomon's Anti-Virus 7.0 lacks some advanced features, but it has a clean interface and good virus-fighting abilities.

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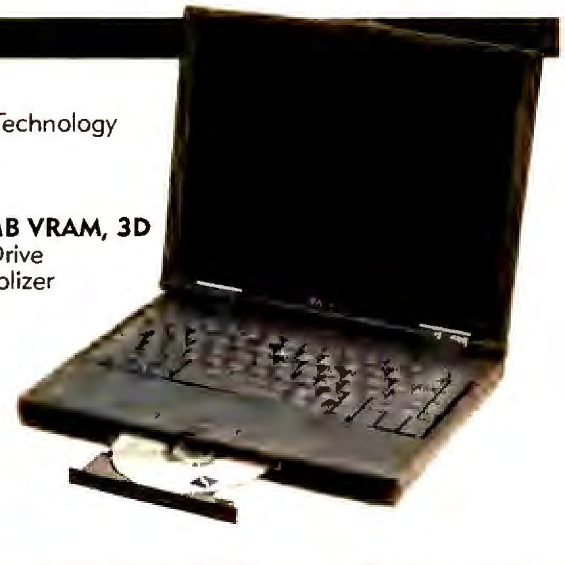
SEANOTE**



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Circle 226 on reader service card

F-Prot Professional 2.15

PRO: Perfect wild virus detection and repair, extensive networking options

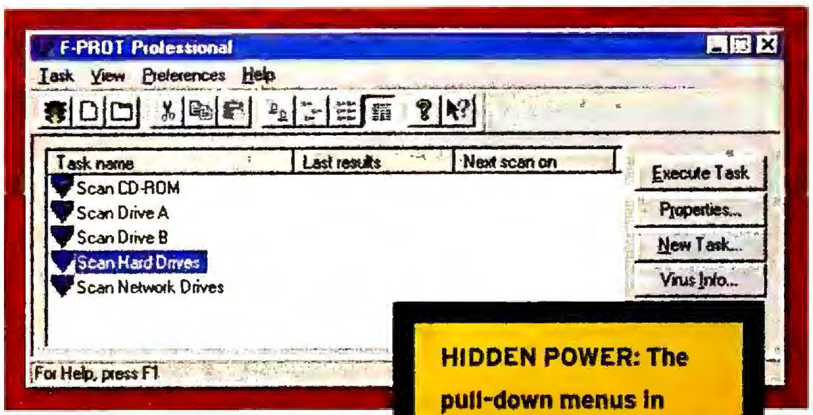
CON: Missed some zoo viruses, registering for updates is a pain

IT'S CHEAP AND simple enough for stand-alone use, but Command Software Systems' F-Prot Professional is really for networks. At $50, this heavy-duty program costs half its 1996 price. But if you have only one PC, F-Prot offers more than you'll ever use. For instance, you can install it on a file server and choose which action it takes when it finds a virus—from automatic disinfection to notifying management personnel. It can scan at set times or after a fixed period of PC inactivity. As with Inoculan and IBM, you can include or exclude files and directories in scans.

Still, F-Prot could be good for individuals. It was one of only four packages that detected all wild file viruses. It missed 6 percent of zoo viruses—about average.

The company offers unlimited free signature and program updates. It makes you register first and get a user name and password, unlike the other packages. But once you do, you'll get reminders to update, which is easy: Just visit the company's Web site and click *Download Now.*

Like all the packages, F-Prot has its quirks. For example, it doesn't check viruses that existed before the program was installed. The interface is also a little confusing, especially the busy main screen. But extra options are neatly tucked away in drop-down menus, and you can easily find out when a scan was last done.



Task name	Last results	Next scan on
Scan CD-ROM		
Scan Drive A		
Scan Drive B		
Scan Hard Drives		
Scan Network Drives		

HIDDEN POWER: The pull-down menus in F-Prot Professional 2.15 offer extensive options, although the package is designed mainly for networked users.

A new version of F-Prot provides even more network features, including automatic virus-signature updates from a central server. (Pricing was not available at press time.) *$50 street; Command Software Systems, 800/423-9147, 561/575-3200, www.commandcom.com*

READER SERVICE NO. 751

IBM AntiVirus 3.0.1

PRO: Perfect wild virus detection and repair, good zoo virus detection, nice mix of features, fastest scan time, supports all major operating systems

CON: Updating is too complex, problems removing some macro viruses

BIG BLUE has now replaced the drab corporate packaging of IBM AntiVirus's prior versions with a box that stands out on a shelf. Inside the box, however, things aren't as hunky-dory. You do get a good virus hunter with an easy-to-use interface and a nice variety of options, but the program makes updating so hard that you may find it not worth the time.

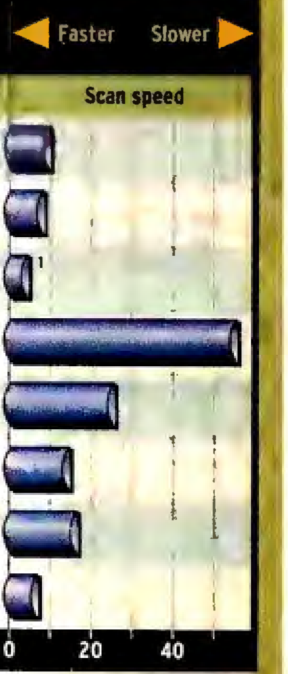
IBM AntiVirus fares well on the features front. It supports several operating systems: Windows 95, 3.*x*, and NT, as well as DOS and OS/2. You can set various protection levels, including searching for viruslike activity. You can also set up automatic periodic scans and specify which drives or directories to check. ▶

TEST REPORT

A Photo Finish for Antivirus Effectiveness

Dr Solomon's, F-Prot, IBM, and Norton tie for perfect wild virus detection and repair.

ANTIVIRUS PROGRAMS	Wild boot virus detection (percent)	Wild file virus detection (percent)	Wild macro virus detection (percent)	Wild virus repair (percent)	Zoo file virus detection (percent)	Zoo macro virus detection (percent)	False positives
	Detection and repair						
Dr Solomon's Anti-Virus 7.0	100	100	100	100	99.9	97.5	none
F-Prot Professional 2.15	100	100	100	100	91.2	96.1	none
IBM AntiVirus 3.0.1	100	100	100	100	98.4	95.7	none
Inoculan AntiVirus 5.0 for Windows 95	100	100	98.2	100	93.9	91.4	6
McAfee VirusScan 3.0	100	99.9	99.1	100	98.3	98.6	none
Norton AntiVirus 4.0*	100	100	100	100	96.7	95.9	none
PC-cillin Anti-Virus 3.0	98.9	99.6	100	100	67.3	97.3	3
ThunderByte Anti-Virus Utilities 8.0.3	100	100	99.1	100	98.8	96.3	none



¹First scan to build database in IBM AntiVirus took 17:04. Time listed represents normal usage.

HOW WE TEST On an Acer Pentium-150 PC, Joe Wells of the Antivirus Test Lab at Wells Research tested each package's ability to detect 92 wild boot viruses, 121 wild file viruses, 58 wild macro viruses, 5480 zoo file viruses, and 747 zoo macro viruses, plus multiple strains of each virus; and to remove 17 wild viruses, including the 10 most commonly reported. Each test used the most current signatures available on the package vendor's Web site as of October 16, 1997.

19
18" VIEWABLE

Like Dr Solomon's, this program comes with a bootable floppy disk that you can use to check any system for viruses. And we like IBM's simple interface: Click the large *Push Here* button to start a scan.

IBM AntiVirus's powerful neural network technology detected all 271 of the wild viruses and a fairly high 97 percent of zoo viruses in our tests. But it had some trouble repairing wild macro viruses: Unlike all other packages except ThunderByte, it twice deleted both the virus and its macro, rather than leaving the macro intact.

Unlimited virus-signature updates are available free from IBM's Web site, but the program doesn't warn you when it's outdated, as most do. Instead, you must keep checking the site for updates, which are a pain to incorporate: Unlike its competitors, IBM makes you compare your current signature dates to those on the Web site, then copy the new signature file manually. *$49 street; IBM, 800/742-2493, 512/434-1554, www.av.ibm.com*

Inoculan AntiVirus 5.0 for Windows 95

PRO: Great interface, extensive scanning options, cheapest package here, near-perfect wild virus detection and repair

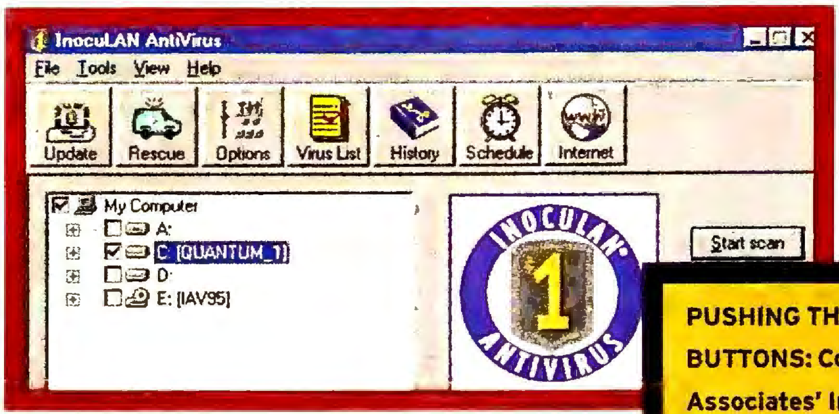
CON: Relatively weak zoo virus detection, lots of false positives, slowest scan time, may clash with STB Nitro 3D graphics card

COMPUTER ASSOCIATES' Inoculan gets the prize for most-improved package. Once clunky and hard to use, it's been totally redesigned and now brims with well-implemented features. At $40 the lowest-cost product here, Inoculan is clearly meant for stand-alone rather than networked PCs, unlike prior versions.

Why isn't it a Best Buy? Though it missed only 1 of the 271 wild viruses, Inoculan had several other testing problems. The program conflicted with the driver for our STB Nitro 3D graphics card (which the company says won't happen when the driver is updated). It also missed more zoo viruses than any program except PC-cillin and erroneously identified six clean files as infected. And when we dosed our PC with the Antiexe.A virus, Inoculan hung and didn't tell us to use a recovery disk, as it should have. Computer Associates says that the problem is specific to Antiexe.

Inoculan's user interface, accessible yet laden with features, explains clearly what's happening. And the default options, such as automatic scanning within all compressed files, are more comprehensive than those of any other package we reviewed.

Beyond that, Inoculan can do different types of scans (such as quick or thorough) and has unparalleled options for including and excluding drives, files, and directories. Also unique is its Danger Watch, which temporarily heightens protection after a virus attack. A quibble: We needed three (rather than one) 1.44MB floppies to create an emergency rescue disk. ▶



☑ My Computer
☐ A:
☑ C: [QUANTUM_1]
☐ D:
☐ E: [IAV95]

PUSHING THE RIGHT BUTTONS: Computer Associates' Inoculan has an updated interface and a raft of easy-to-comprehend features.

THE WICKED LIST

Viruses to Watch For

OF THE 250-plus computer viruses in circulation, only a handful are common. Ranked by frequency of appearance, here are the current top five. A year ago Concept was the only macro virus in the group; now it's joined by four others.

1. CONCEPT The first and most famous of the Word macro viruses, it was developed to prove that the concept of a macro virus was viable. It doesn't cause damage, but it does infect Word's normal.dot template file and displays a pop-up box containing only the number 1. If your PC is hit with Concept, any document you save using Word's Save As option will be infected.

2. CAP This Word macro virus is more annoying than damaging; it deletes all existing macros and replaces them with its own. Because Cap is a self-mutating virus, it continues to change macros as long as it is resident. Cap isn't difficult to remove, but re-creating your obliterated macros can be time-consuming.

3. WAZZU A macro virus infecting Word's AutoOpen macro, Wazzu causes damage to every Word document you open. Each time the virus spreads, it moves a few words around and randomly inserts 'Wazzu' in the document.

4. NPAD Like Concept, NPAD is a virus that infects Word's normal.dot file. It doesn't do much damage, but every 23 times any Word document is opened, it displays the message 'DOEUNPAD94, v.2.21'.

5. MDMA A Word macro virus with some nasty tricks up its sleeve, MDMA triggers on the first day of the month after infection. The damage it can cause varies depending on the operating system, but it's worst under Windows 3.*x* and DOS, where it changes your autoexec.bat file so that the next time you boot the system all the files on your hard disk are deleted. On machines running Windows 95, the MDMA virus modifies the settings for Sticky Keys, High Contrast, and Network Logon. It also erases all Windows Help files and deletes certain system files. After removing the virus, you will usually have to reinstall Windows 95, too.

Virus list courtesy of Dr Solomon's Software.

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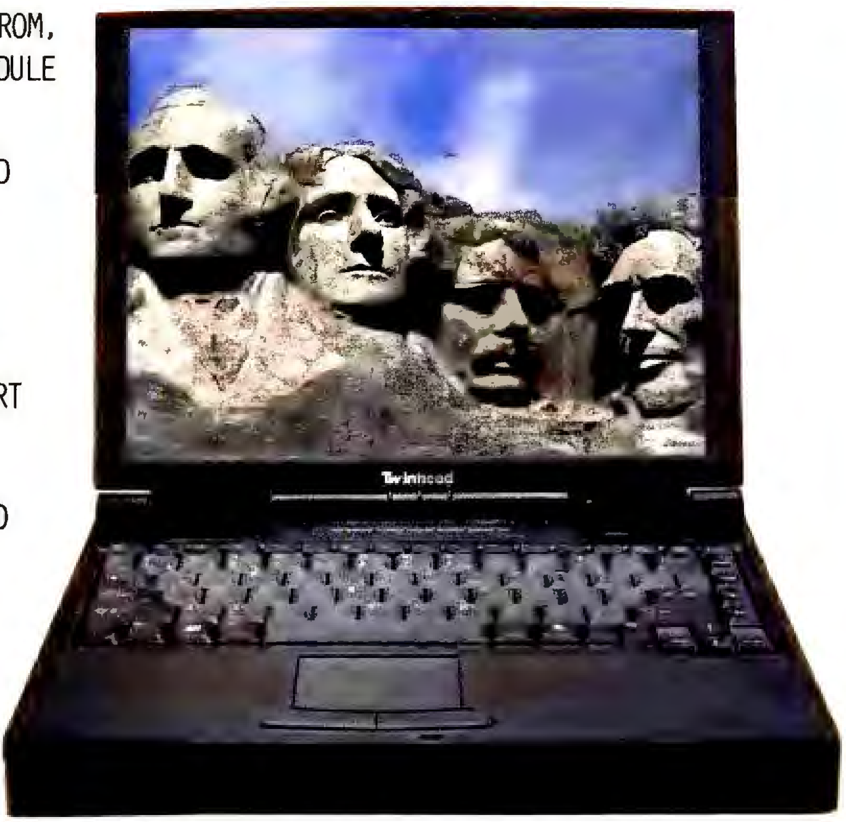

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Inoculan's scans were the slowest, but the program is thorough: It puts infected files in a quarantine folder and brings up a disinfection wizard.

The company offers one year of free program and virus-signature updates from its Web site.

Despite its glitches, Inoculan AntiVirus's excellent interface and generous options make it a good pick. *$40 street; Computer Associates Int'l, 800/243-9462, www.cai.com/cheyenne/desktop*

READER SERVICE NO. 752

McAfee VirusScan 3.0

PRO: Near-perfect detection of all viruses, useful configuration options, supports all major operating systems

CON: Confusing update policy, some advanced options are hard to find

THE LATEST INCARNATION of Network Associates' McAfee VirusScan is a capable $49 antivirus package with a solid mix of options such as ScreenScan, which scans for viruses when your screen saver starts up. In our lab tests, the program missed only 2 of 271 wild viruses and found most of the zoo viruses, too.

VirusScan is one of the simplest programs to install, and it's the only one here to offer a "compact" installation if you're short on hard drive space. During installation it can create an emergency boot disk, but you'll need to provide your own preformatted, bootable floppy—and only the read-me file tells you this.

You won't find fancy icons in McAfee VirusScan's rather plain user interface, but the basic tools are easy to find. It gets confusing only when you attempt to locate the more advanced options—they're scattered throughout the program's tabbed and drop-down menus.

You can download free updates of virus-signature files when McAfee VirusScan tells you that it needs updating. Or you can sign up at installation (or later) for the free service that lets you know by e-mail when updates are available. Aside from this handy service, VirusScan's update policy is confusing. The

A Portrait of the VIRUS WRITER as a Young Man

MIKE ELLISON SEEMS the antithesis of the virus-writer stereotype—a wild-eyed computer geek with evil on his mind. Instead, he is soft-spoken, intense, and highly intelligent. At 22, he's a full-time software engineer at a major high-tech company in Texas. But from ages 14 to 18, Ellison was better known as "Stormbringer," the creator of several sophisticated viruses. His history as a virus writer—from enthusiastic computer novice, to player in the virus underground, to early retiree—is apparently typical, putting the spotlight on a little-understood and much-feared fraternity. (And a fraternity it is: Ellison has never run across a woman virus writer.)

Not surprisingly, Ellison didn't start off creating viruses. In 1990 at age 14, he was teaching himself C and assembly language. When his computer became infected by some viruses, he used his programming knowledge to disassemble them. Ellison then sought out several BBSs (this was pre-Web). There his skills were quickly recognized. His analytical prowess won him a contest advertised in the virus newsletter *Crypt*, and Ellison—now Stormbringer—joined Phalcon/Skism, an infamous group of virus writers and hackers whose base was a BBS in New York City. (One of its mottoes: "Hard at work to make your life a living hell.")

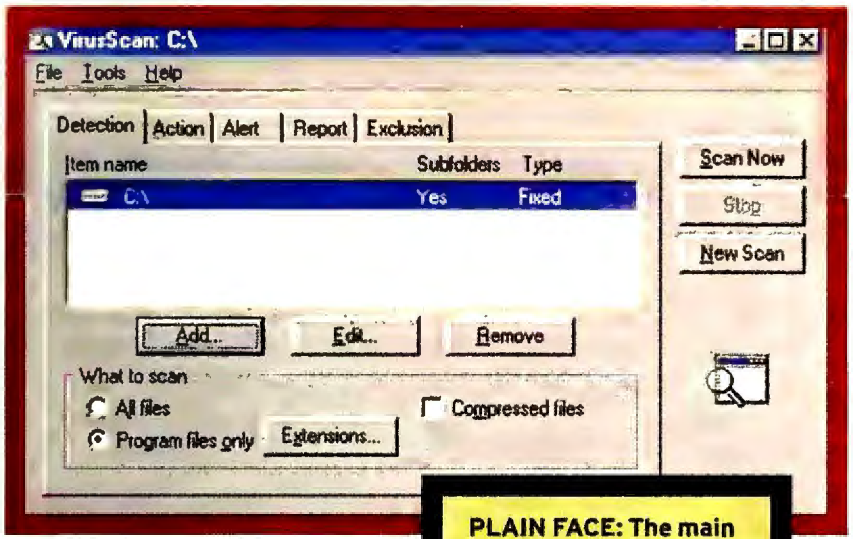
As his expertise increased, Ellison wrote several viruses, but he says he "always had doubts" about what he was doing and never intended to release his viruses beyond the underground. When a "vengeful person" used one of Ellison's viruses to infect someone's PC, Ellison decided he'd had enough. After removing the virus from the unfortunate victim's system, he quit writing viruses—for good.

Who creates viruses, and why? Confirming what experts say, Ellison believes that virus writing is "a teenage thing": The oldest virus writer he's known was only 24. Most writers' pseudonyms come from heavy-metal bands or science fiction. For most, creating maverick code is "a puzzle, a game," Ellison says. And when they're through writing viruses, "they grow up and work in the software industry."

However, Ellison is also quick to defend the fraternity, saying it's made up of "very bright people who just want to do something unique and new." He admits that the group contains a wide variety of individuals, including a few spiteful kids who want to create malicious, damaging viruses. But the average virus writer surely doesn't fit the harsh description written by self-styled virus expert Ross Greenberg: "an impotent adolescent, incapable of normal social relationships...They have no worth." Still, Ellison admits with a chuckle, "the most aggressive virus writers are those without a social life."

Today, Ellison is philosophical about the future of computer viruses. While he thinks many virus writers are becoming more careful not to release their creations, he worries that the ease with which macro viruses are introduced is making their development more accessible. He believes that some writers are developing complex viruses designed to infect Windows 95 and NT PCs. So far they haven't succeeded, but Ellison feels it's only a matter of time. He predicts that virus creation engines—applications that generate viruses—will become available and let anyone so inclined create a virus. The engines could be "the nightmare of the nineties," Ellison says.

As frightening as this scenario sounds, not all predictions come true. For the foreseeable future, we're well covered with the antivirus utilities at hand.



Item name	Subfolders	Type
C:\	Yes	Fixed

What to scan
○ All files
● Program files only
☐ Compressed files

PLAIN FACE: The main interface of McAfee VirusScan leads you through basic scans, but tweaking the package to your preferences requires some effort.

company says it will provide free program updates for a year after purchase, and free virus-signature updates for the life of the product. But in fact you might not get free virus updates for as long as you own VirusScan: The company doesn't guarantee that future signature updates will be compatible should the program change drastically. *$49 street; Network Associates, 408/988-3832, www.networkassociates.com*

READER SERVICE NO. 753

Norton AntiVirus 4.0

PRO: Perfect wild virus detection and repair, good zoo virus detection, fine-tuned interface

CON: The customization levels can be confusing

EARNING OUR Best Buy honor this year is Symantec's Norton AntiVirus 4.0, a feature-packed program with almost perfect test results, a superb interface, and the best documentation of the lot. The $50 package has so many features that it's nearly overwhelming; fortunately, even its most basic options are strong.

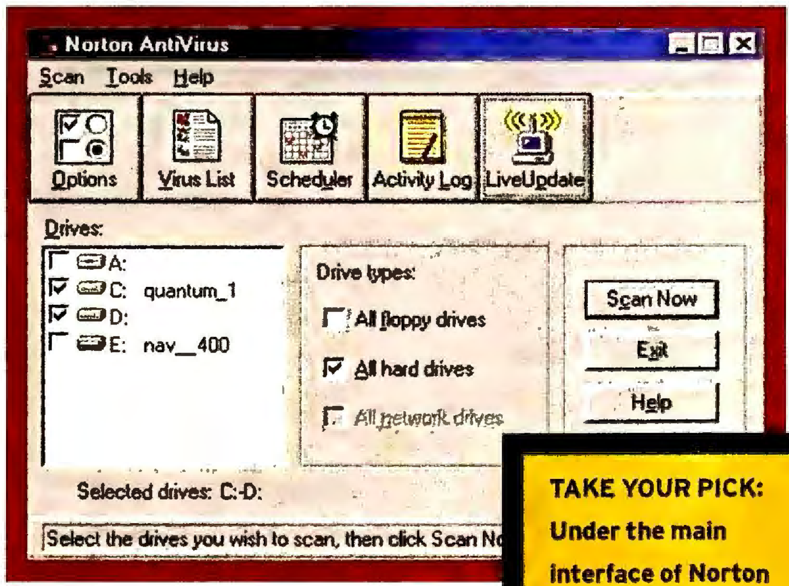
Most every Norton AntiVirus screen gives you logical choices. If that and the outstanding printed documentation isn't enough, the CD-ROM has a more detailed manual in electronic format. The on-screen help is also excellent: When the program finds a virus, it leads you step by step through the removal process.

Norton's virus detection is very strong, too: It detected and removed all the wild viruses we threw at it, and missed only 4 percent of zoo viruses. However, when we infected the main boot record with the Antiexe.A virus, the program, like Inoculan, locked up without telling us how to recover. Symantec says this is most likely a problem with the video card driver, and the company is working on a patch.

Norton AntiVirus has the most extensive options of any package here—one of its greatest assets, and the closest thing to a drawback we found. While you can fine-tune it in numerous ways, there are so many options that it's possible to accidentally turn off something essential, such as background scanning.

You can choose how the program responds when it finds a virus; for example, it can shut down your PC. A Heuristic Sensitivity Level lets you decide how aggressive you want the program to be in searching for viruslike activity.

Symantec offers several free options for updating virus signatures, too. For instance, you can retrieve updates manually from the company's Web site (you'll be reminded when your files are out of date).



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TAKE YOUR PICK: Under the main interface of Norton AntiVirus 4.0 lie a huge number of customization options.

However, it's much handier to have the program's LiveUpdate service check regularly for new virus signatures. You don't have to do a thing; it uses an FTP connection to download the files automatically.

The Deluxe version of Norton AntiVirus, which we didn't test, costs an extra $20. It adds several features, including file encryption and what the company says is protection against malicious Java and ActiveX controls. *$50 street; Symantec, 800/441-7234, 541/334-6054, www.symantec.com*

READER SERVICE NO. 754

PC-cillin Anti-Virus 3.0

PRO: Near-perfect record in wild virus detection and repair, extensive options

CON: Multiple false positives, worst detection of zoo file viruses, somewhat confusing interface

IN THE PAST YEAR, PC-cillin has undergone an interface overhaul. What was once colorful but confusing has been cleaned up and is now better integrated. However, it isn't perfect yet. You will still run into dead ends, as when the program can't disinfect a file and doesn't offer further instructions. More frustrating is the way PC-cillin's cocreators, TouchStone Software and Trend Micro, handle virus-signature updates. Both companies offer updates, and while the contents of the files are the same on their respective Web sites, the names are different. (We used TouchStone's signatures because its Web site is listed on the package.)

PC-cillin's MacroTrap feature is supposed to offer extra protection against macro viruses; it seemed to work in our tests. Like most of the other packages, PC-cillin caught and eradicated all the wild macro viruses we threw at it. And it did an even nicer job detecting zoo macro viruses. On the other hand, PC-cillin detected just 67 percent of zoo file viruses, compared to over 90 percent for all the other programs. And like Inoculan, PC-cillin generated false positives.

We liked PC-cillin's feature-filled interface, which provides detailed information on the program's options. The SmartMonitor is one of the most versatile background scanners around, and you can set PC-cillin to scan at regular intervals.

TouchStone offers free unlimited updates of virus-signature files at its Web site. Like Norton AntiVirus, PC-cillin can check automatically for update files, but it offers more interval choices— ▶

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READER SERVICE NO. 755

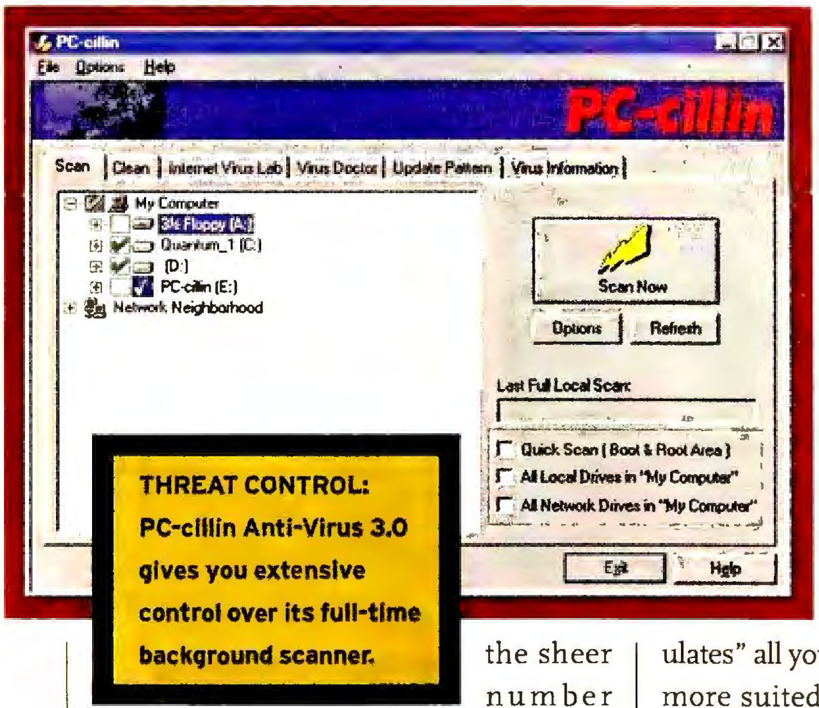
ThunderByte Anti-Virus Utilities 8.0.3

PRO: Nearly perfect in detecting wild viruses, good zoo virus detection, comprehensive advanced options, supports all major operating systems, fast

CON: Most expensive, deletes files and macros when repairing wild viruses, no rescue disk option, difficult setup, can't uninstall completely

THUNDERBYTE ANTI-VIRUS Utilities 8.0.3 is a vastly different program from the one we reviewed a year ago—and we're still not particularly fond of it. NovaStor/Authentex updated the interface and the program's virus detection and removal engine. It's now optimized for Windows 95 and includes new features such as the ability to scan compressed files (which we didn't test) and to integrate with Windows Explorer for fast checking of disks, directories, and files. It also provides benefits for networked users: Like F-Prot Professional, ThunderByte can be installed and updated from a server.

However, there are disadvantages to using it with stand-alone PCs. For one, the sheer number of installation options it offers—more than any other program—make ThunderByte difficult and time-consuming to set up. At $100, it's also the most expensive package we tested.



THREAT CONTROL: PC-cillin Anti-Virus 3.0 gives you extensive control over its full-time background scanner.

The update policy, though, is straightforward: You can get free updates for both macro virus signatures and the program itself through ThunderByte's free Live Internet Update option, which can be set to check for new files on a weekly or daily basis. You can also subscribe to a year of mailed updates on floppy disk, but that costs an exorbitant $100.

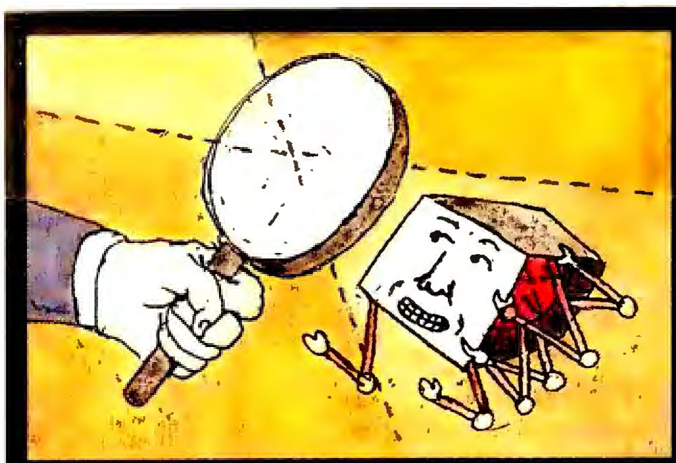
Unlike every other program we tested, ThunderByte has no rescue disk option in Windows 95 to help you restart your system if a virus locks it up. And when we infected the main boot record, ThunderByte asked us for a "clean diskette," at which point the average user would be stymied—the instructions are buried deep in the manual. (Note that Inoculan and Norton AntiVirus also had trouble with the infected main boot record.)

ThunderByte is the most intrusive of the packages here. It automatically "inoculates" all your files, an advanced function more suited to corporate networks that keeps a hidden file in every directory to help the program sense viruslike activity. Even after we uninstalled ThunderByte, we found these virus-data files scattered all over our hard disk, and we couldn't cut the program from the right-mouse menu. (The vendor says this will be fixed in future updates; for now we were offered a rather complicated fix.)

ThunderByte now actively removes viruses when it detects them. It no longer requires you to reboot from a floppy disk, then use a separate utility for disinfection. Although the old-fashioned floppy method is still the most cautious, it's too slow, and virus-removal technology is now reliable enough to safely work straight from the interface.

ThunderByte gave mixed results on our tests: It detected about 98 percent of zoo viruses on average, but there were anomalies with wild virus repair. For instance, on file viruses it automatically deleted some files rather than repair them. With wild macro viruses, it removed both the infection *and* the macro, unlike every other package here except IBM AntiVirus. *$100 street; NovaStor/Authentex Software, 613/599-5584, www.authentex.com*

READER SERVICE NO. 756



How to Spot A HOAX

A LITTLE-NOTED aspect of computer virus history is the large role that hoaxes play. The popularity of the Internet has allowed rumors and misinformation to spread like a bad cold in winter, and individual PC users as well as corporate installations can see their work come to a crashing halt when rumors of a new virus spread. The most famous hoax, the spurious Good Times virus, caused havoc in 1996, and there have been many more instances since then.

What's the best way to avoid perpetuating a hoax? Check any suspicious virus warnings against the Computer Incident Advisory Capability Web site, maintained by the U.S. Department of Energy to track virus hoaxes on the Internet (ciac.llnl.gov/ciac/CIACHoaxes.html). You can also watch for hoax tip-offs, such as these suggested by virus expert Joe Wells: excessive exclamation points in the message, claims of extreme destructiveness, and, ironically, recommendations to spread the information—just like a virus.

online *Find an expanded version of "The Wicked List" at www.pcworld.com/march98/antivirus. Stan Miastkowski is a* PC World *contributing editor. Testing conducted by Joe Wells, who runs the Antivirus Test Lab at Wells Research and compiles the monthly WildList.*

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Rent an Office ON THE WEB

ILLUSTRATION BY BRIAN STAUFFER

With just Internet access and a credit card, you can get an electronic office on the Web. Nice idea, but is it any better than e-mail and phone conferencing?

YOU'VE GOT A GOOD TEAM for this project, but they're all over the map. You're on the East Coast, your boss works on the West Coast or on the road, and in between you command a small army of new-age telecommuters and contract workers who are frequently missing-in-action.

If you're lucky, everyone's on a wide area network that offers e-mail and a host of other useful services. If not, you need an alternative. Here's a ▶

BY BRAD GRIMES

new one: Create your own virtual office on the Web. It's relatively cheap, it's easy, and anyone with an Internet connection can be a part of it.

You now can rent Web-based workgroup applications for as little as $5 a month per user. These easy-come, easy-go services let you post messages about a project, store documents, hold chat sessions, send alerts, and track deadlines. The software runs on someone else's server, and you view its easy-to-grasp interface using an ordinary Web browser. Online help minimizes the need for training, and everything you do is password-protected and for your group's eyes only.

Will these services make your team work better, or would sending e-mail and picking up the phone work just as well? To find the answers, we rented online work spaces from four companies: Changepoint, HotOffice Technologies, Lotus, and Concentric (offering Netscape Virtual Office). We also looked at a fifth product, Instinctive Technology's ERoom, which should be available for rental from ISP Computer Associates–NetHaven by the time you read this.

Before You Sign the Lease

If you have...	Use...	Because...
fewer than five people in your group	e-mail and a phone	it's easier and in the long run, can be less expensive.
a large group that needs to communicate a lot	HotOffice	it has built-in e-mail, group discussion, and chat functions.
a large group that needs to collaborate on documents	ERoom or HotOffice	they have the best document management and revision tracking features.
a large group that needs to manage projects	Involv Project Collaboration	it has the best project management features and integrates with Microsoft Project.
a large group that needs to post lots of files and messages but doesn't need them organized	Lotus Instant Teamroom	although its project and document management features are weak, it comes with unlimited server space.
a large group and the know-how to build a Web site	Netscape Virtual Office	it gives you your own full-featured intranet, with FTP, chat, e-mail, and more–but it's not necessarily easy to use.
a large group, adequate funds, and enough time	group applications on your own private network	none of these rentable services match the security, control, reliability, speed, and functionality of an in-house network with customized applications.
a large group that works on many different projects simultaneously	ERoom	it lets you set up separate workspaces for each project and invite different groups of people to join in.

We found that if your workgroup is small—say, five people or fewer—these applications may be *less* efficient than e-mail and a phone. E-mail works perfectly well for a few people collaborating on a document, for instance. And phone conferences often are more efficient than an electronic bulletin board—if you can get everyone into the conference call.

But as your group gets bigger and your projects get more complex, phone calls and e-mail barrages get more cumbersome and less effective. That's when renting a Web-based work space can start saving plenty of time and money.

The applications need to be useful and easy to use, and you need the right mix of features. HotOffice Virtual Office Service,

VIRTUAL OFFICE SERVICES FEATURES COMPARISON

SERVICE	Monthly rate	Storage space (MB)	Send/receive e-mail	Group discussion	Chat	Shared file storage	Document management	Project management	Web links
Changepoint Involv Project Collaboration	$25 per user	1	●/○	●	○	●	limited	●	●
HotOffice Virtual Office Service	$19 for 1 user, $99 for 10 users, $199 for 25 users	10 per user	●/●	●	●	●	●	limited	●
Instinctive ERoom	$25 per user	50 for 5 users, 100 for 10 users, 300 for 25 users	○/○	●	○	●	●	●	●
Lotus Instant Teamroom	$14.95 per user	unlimited	○/○	●	○	●	limited	limited	○
Netscape Virtual Office	$29 for 1 user, $39 for 3 users, $119 for 10 users, $249 for 25 users	25 for 3 users, 50 for 10 users, 100 for 25 users	●/●	●	○	●	○	○	●

● Yes ○ No

easily the most practical of the for-rent work spaces we examined, includes electronic bulletin boards, an online chat program, document management tools, e-mail, and other features.

Other work space services are far less useful. Changepoint's Involv Group Discussion, for example, merely lets you post online messages. And even if you like a service, Internet bottlenecks and glitches can conspire to make it less useful.

HOW DO YOU OPEN AN OFFICE?

TO SET UP YOUR OWN work space, just go to the Web site where the software is being rented and sign up. You'll be asked to fill out a form and hand over your credit card number, just as if you were buying goods over the Web. Shortly, often within minutes of submitting your order, you'll receive an e-mail confirming that your work space has been established and giving you instructions for logging on.

Once you've entered your new work space, you can invite other people to join you. The more people you add to your work space, the higher your monthly credit card charge—up to $29 per user (including yourself), depending on which service you choose. (Changepoint will bill a corporate account; the other services require a credit card.) Involv, ERoom, and Lotus Instant Teamroom automatically send e-mail to each person you invite to your work space, complete with user name and password. You're in charge of who does what in your workgroup. You can set it up so that some people can make changes or delete documents, while others can only participate in the discussions. In most cases, administering a workgroup is relatively simple (with the exception of Netscape Virtual Office).

Keep in mind that the rental companies charge per month *per user*. A workgroup of ten people using Changepoint's Involv Project Collaboration will cost you $250 a month. Lotus Instant Teamroom, Netscape Virtual Office, and HotOffice cost less for ten people—$150, $119, and $99, respectively. So if you need to use your virtual work space for many months, the costs can add up—although they're still small potatoes compared to building your own in-house solution.

Also, if you'll be posting large files, you'll start gobbling up the megabytes, and additional storage costs extra for all these services except Lotus Instant Teamroom.

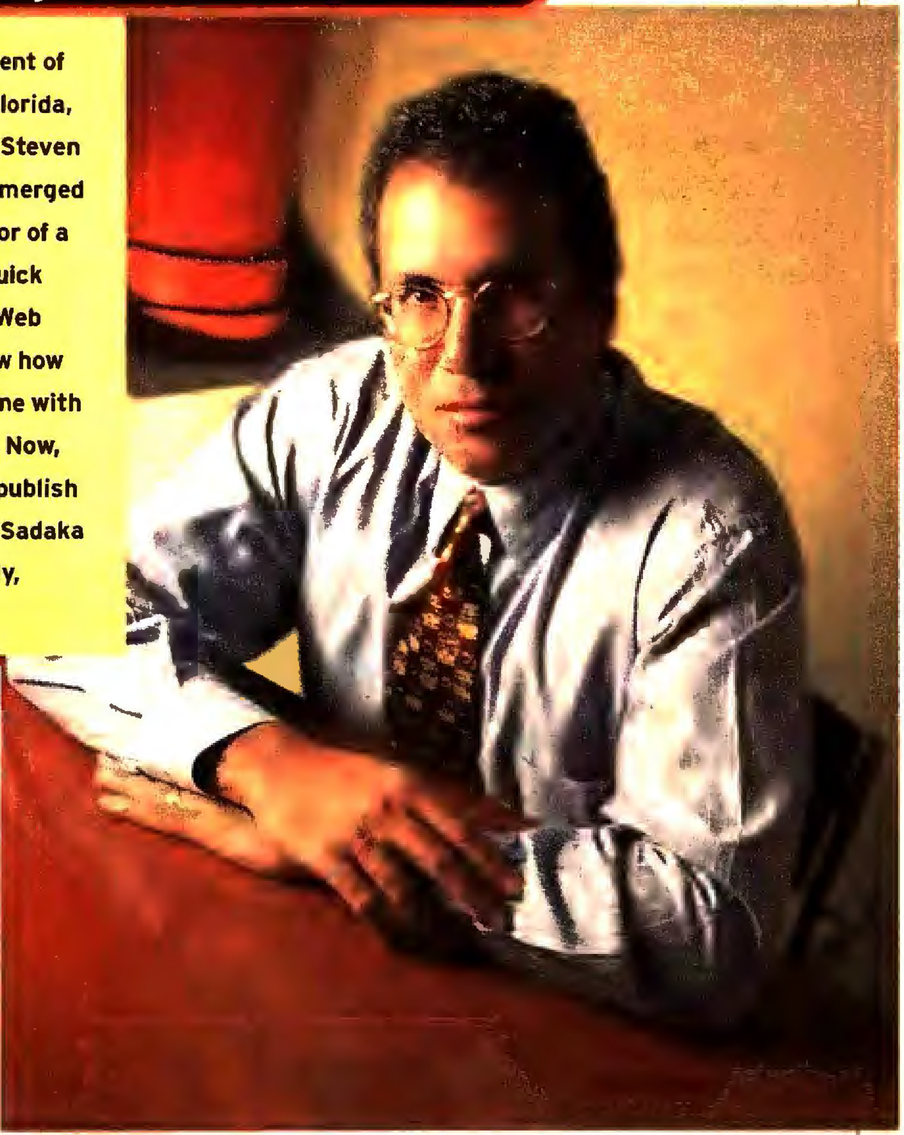
CAN YOU KEEP A SECRET?

WITH AN IN-HOUSE OFFICE NETWORK, you know the server is somewhere in the building, and you probably know the person who keeps it running. But with Web-based work spaces, your information exists on someone else's server, and you have no idea where it is or who's in charge.

Case in point: When one of our testers was unable to log into Changepoint's Involv Project Collaboration work space, we called the company for help. A Changepoint product manager called us back and said the problem had been solved. "How?" we asked. "I changed his password and logged in as him," the product manager said.

Yikes! It's something any network manager could do—whether it's your in-house geek or the folks running any of these services—but we didn't know this guy from Adam. The folks at Changepoint assured us that our data was safe, and we have no reason not to believe them. But if you're uncomfortable with the prospect of nonemployees having complete access to your data, you may want to think twice about using any of these services. And if your data is extremely sensitive, you need a pricier network that your company can control.

Checking Into the Online Office



Steven Sadaka, president of the Fort Lauderdale, Florida, executive search firm Steven Douglas Associates, emerged the proud administrator of a virtual office after a quick visit to the HotOffice Web site. "I don't even know how to use Word, and I'm fine with this system," he says. Now, when his researchers publish a candidate's resume, Sadaka can read it immediately, wherever he is.

PHOTOGRAPH MICHAEL PRICE

Regardless of how sensitive the project is, when you're ready to close down your workgroup, you want your data back. But the vendors haven't given much thought to easy ways of archiving your data. Netscape Virtual Office offers no archiving service—users must download their important data before closing the workgroup. You'll also need to download files from Involv Group Discussion or Project Collaboration programs, but Changepoint will send you a comma-delimited text file that contains all the messages posted to your workgroup. Users can also export a text file of the group's content at any time.

▶

Check Out These Office Spaces

THOUGH FAR FROM MATURE, virtual office services are tools that can solve real-world problems today. The trick is matching your needs to the right product. No service does it all, and some are best suited to specific tasks. Here's how the four we looked at stack up. Since ERoom wasn't for rent yet as we went to press, we evaluated the stand-alone software.

Changepoint Involv **Disjointed Parts**

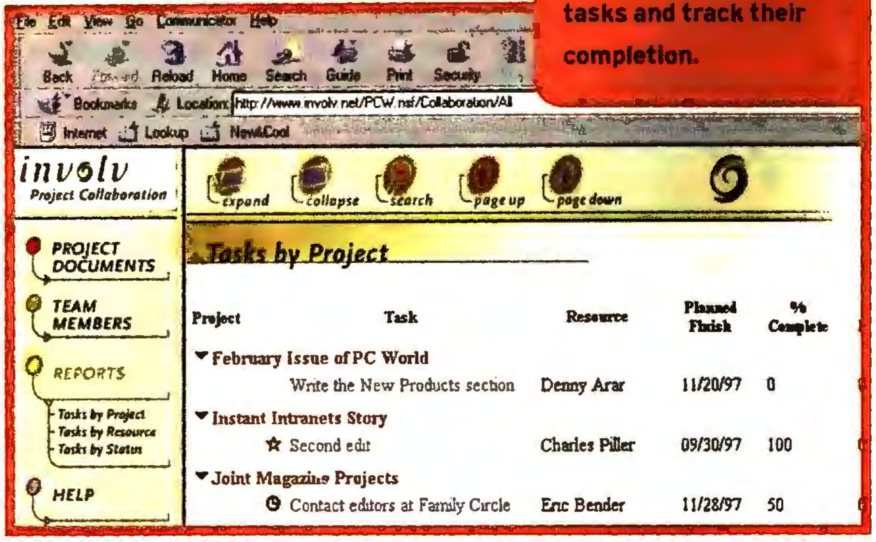
CHANGEPOINT rents three general-purpose programs: Involv Group Discussion, Involv Project Collaboration, and Involv Resource Locator. They range from $5 a month per user to $25 a month per user.

Project Collaboration is the most complete workgroup tool, and the only one of the three we'd use on a daily basis. It lets you post messages, store documents, and manage projects. Anyone given manager rights can add projects and assign tasks to other team members, who then receive e-mail informing them about the new assignment, with start and end dates and the approximate number of hours required. These users can enter how many hours they've dedicated to the task and how much longer it will take. The manager can then view the group's progress by project, resource, or task.

We found the other two applications less useful. Group Discussion is a forum where you can post messages but nothing else, not even file attachments. Resource Locator is a virtual in/out board that lets you tell coworkers where to find you.

Performing routine tasks in Project Collaboration is tedious. To mark a task completed, you must open the task document, select edit mode, click the *Completed* check box, then resave the document. And all the Involv applications are grindingly slow.

INVOLV PROJECT COLLABORATION lets you assign project tasks and track their completion.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Internet Lookup New&Cool
involv Project Collaboration
expand collapse search page up page down
PROJECT DOCUMENTS
TEAM MEMBERS
REPORTS
Tasks by Project
Tasks by Resource
Tasks by Status
HELP

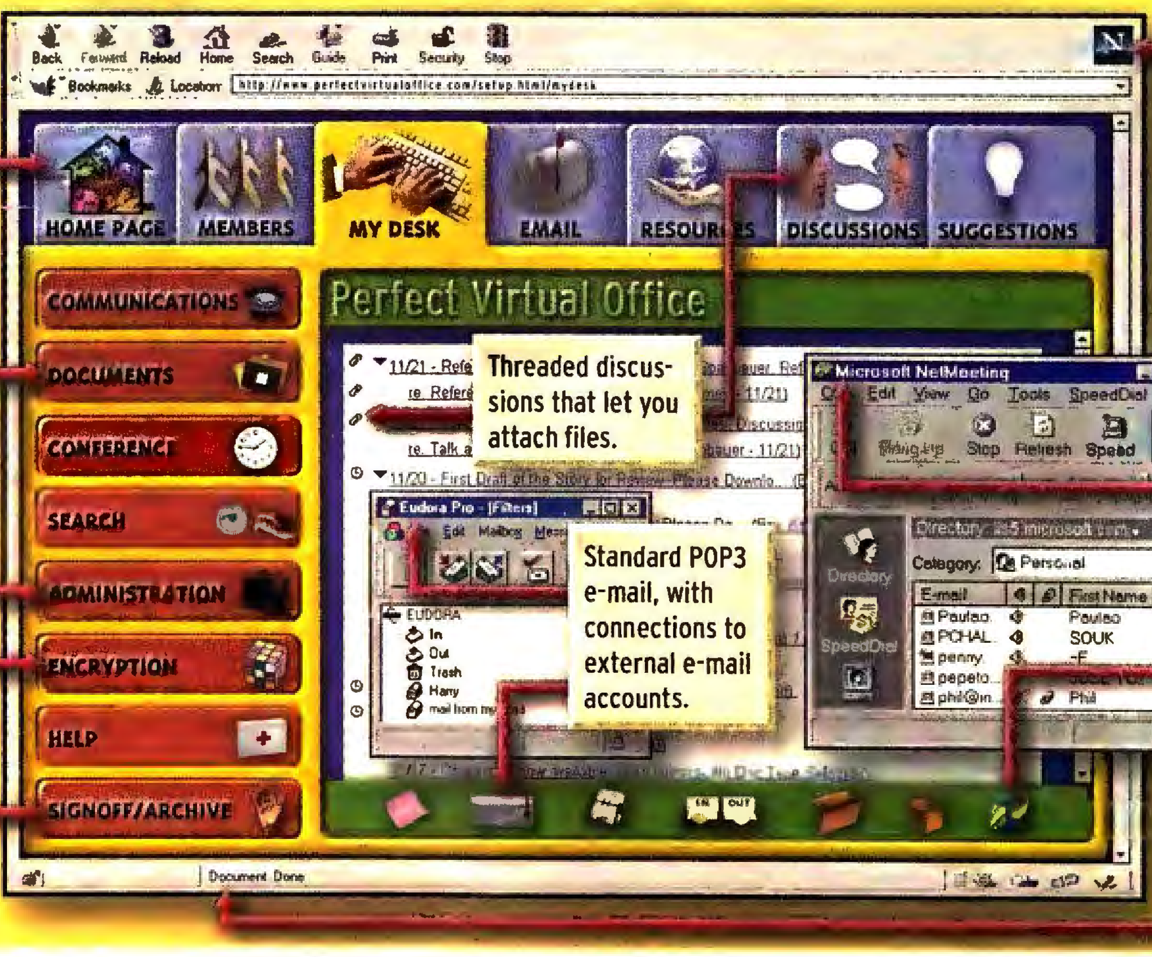
Tasks by Project

Project	Task	Resource	Planned Finish	% Complete
February Issue of PC World				
	Write the New Products section	Denny Arar	11/20/97	0
Instant Intranets Story				
	☆ Second edit	Charles Piller	09/30/97	100
Joint Magazine Projects				
	Contact editors at Family Circle	Eric Bender	11/28/97	50

Despite these irritations, Involv Project Collaboration is the best service we looked at for managing projects. You can send e-mail to coworkers' outside e-mail addresses. And when you're done with a project, Involv makes it easy to close shop. Just go to the company's home page, click *Close Account*, and enter your user name and password. *Involv applications; $5 to $25 a month per user, depending on application ($25 a month per user for Project Collaboration); Changepoint; www.involv.com* ▶

Planning a Virtually Perfect Office

None of the current crop of virtual offices offers everything we'd like to see. Here are the top items on our wish list:



A common workgroup home page you can add links to.

An easy-to-use document center.

Easy setup and administration.

Bulletproof security for all operations.

Easy shutdown and data archiving.

Threaded discussions that let you attach files.

Standard POP3 e-mail, with connections to external e-mail accounts.

Compatibility with Internet Explorer 3 or later and Netscape Navigator 3 or later.

Built-in Microsoft NetMeeting support for voice and videoconferencing.

Performance as quick as any other Web site you browse.

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For Windows 95
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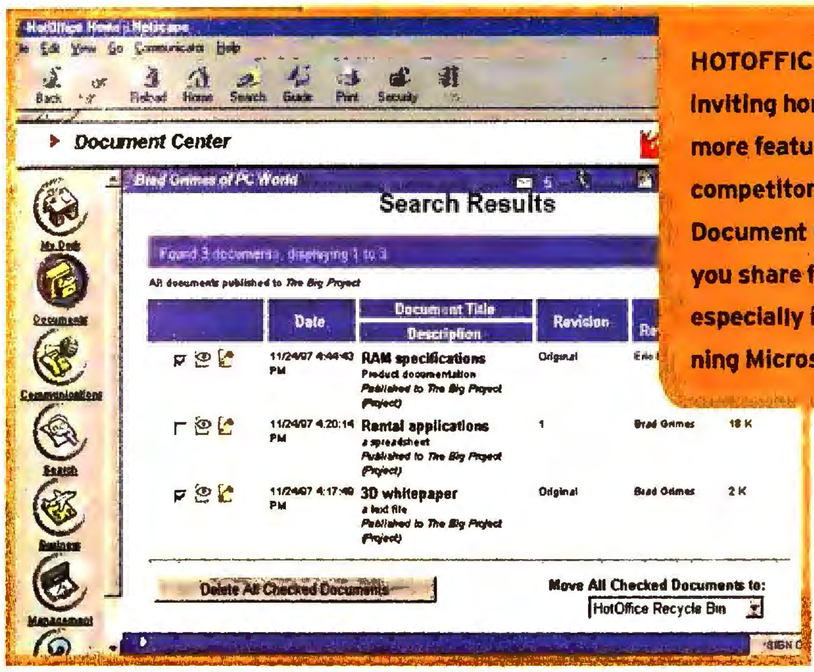
Remote DeskLINK
From the Makers of LapLink


Document Center

Brad Grimes of PC World

Search Results

Found 3 documents, displaying 1 to 3

All documents published to *The Big Project*

	Date	Document Title Description	Revision	Re[illegible]	
☑	11/24/97 4:44:43 PM	**RAM specifications** Product documentation *Published to The Big Project (Project)*	Original	Eric [illegible]	
☐	11/24/97 4:20:14 PM	**Rental applications** a spreadsheet *Published to The Big Project (Project)*	1	Brad Grimes	18 K
☑	11/24/97 4:17:49 PM	**3D whitepaper** a text file *Published to The Big Project (Project)*	Original	Brad Grimes	2 K

Delete All Checked Documents

Move All Checked Documents to: HotOffice Recycle Bin

HOTOFFICE provides an inviting home page and more features than its competitors. Its Document Center lets you share files easily, especially if you're running Microsoft Office.

HotOffice **The Hot Spot to Collaborate**

OVERALL, HOTOFFICE IS CLEARLY the best of the services, with the most features and the most inviting interface. It's also one of the least expensive, at $10 a month per user for ten users.

Starting at your "desk"—a sort of HotOffice home page—you choose from discussion, chat, e-mail, and document management "furnishings" that perform relatively quickly, even over a dial-up connection. You can personalize your desk with links to favorite Web sites or to the parts of HotOffice that you use most frequently. In addition, HotOffice lets you link to other Web sites (say, to use a search engine, get stock quotes, or track FedEx shipments) without leaving the application.

Each member of your workgroup receives a HotOffice e-mail account, which you can use for internal messages or for communicating with people at external e-mail addresses. You can even schedule when some messages will be delivered—specify when you want to send out reminders of a pending deadline, for example—and arrange for HotOffice to pick up mail from your other accounts.

HotOffice is the only Web-based work space we looked at that provides online chat, and this feature works great. If you'd prefer to use Microsoft's more powerful NetMeeting, HotOffice can identify who's online and available for a NetMeeting conference, but it doesn't launch the utility and connect to the other party. The bulletin board feature is straightforward, but it does not allow you to attach a file to a bulletin board message.

In fact, the only way you can share documents with the workgroup, aside from attaching them to e-mail, is to post them to the HotOffice Document Center using the HotOffice Publishing Wizard. (You must first download the free 658KB HotOffice Starter Kit.) If you use Microsoft Office 95 or 97, it's easier because HotOffice adds an icon to the toolbars of Microsoft Word, Excel, and PowerPoint. Just click the icon, and off goes the file.

HotOffice's project management features are weak, however; you can't assign deadlines or track a group's progress. All you can do is establish a project name and then arrange documents and bulletin board messages under the project heading—it's more a way of organizing different types of data than managing a project.

Getting help is a bumbling process. When you click the Help button, you get a description of whatever work space you're currently in, such as the Document Center. To get a list of all the help topics, you need to scroll down and click on Feature Index. In addition, HotOffice occasionally has trouble handling attachments that come from America Online. Overall, though, HotOffice is the one virtual work space we would use every day.

HotOffice; $19 a month for 1 user, $99 for 10 users, $199 for 25 users; HotOffice Technologies; www.hotoffice.com

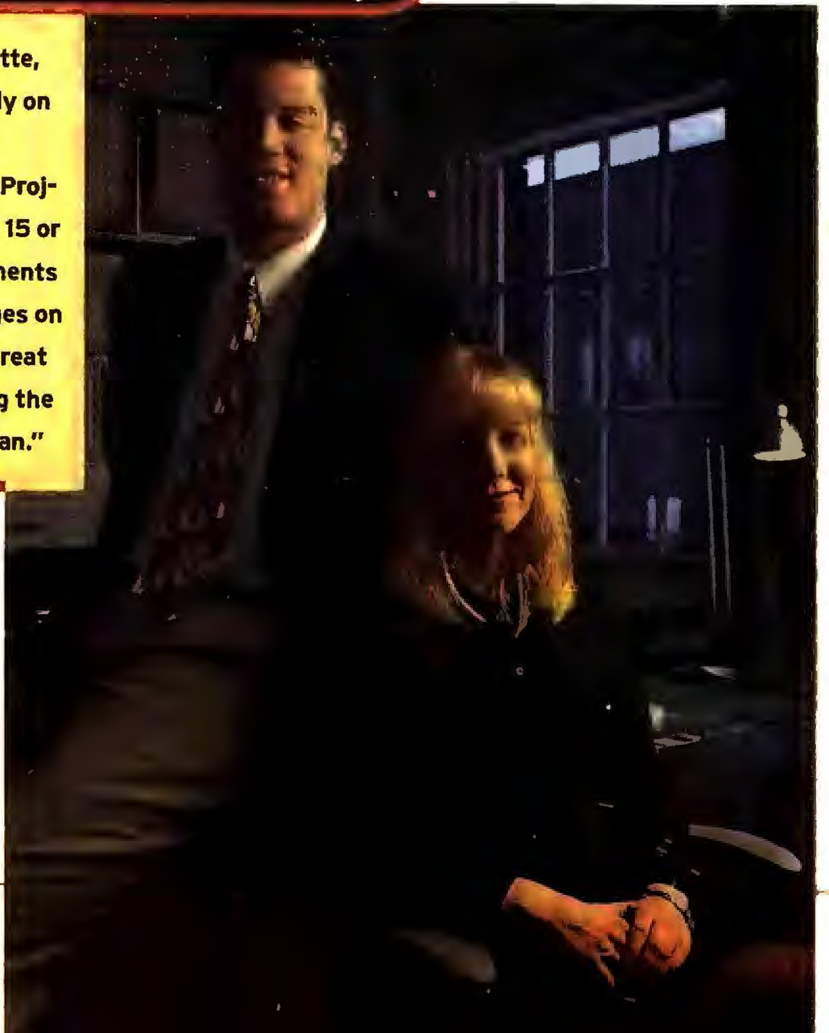
Instinctive ERoom **Easy Newcomer**

INSTINCTIVE TECHNOLOGY'S ERoom just squeaked into this comparison. At press time, the only way to use this product was to buy it and install it on your own Windows NT Server–based LAN (see *New Products*, December 1997). But Instinctive has recently gotten the software rental religion; by the time you read this, ERoom should be available for rental from ISP Computer Associates–NetHaven, with more ISPs expected to join in (to find one, start at Instinctive's Web site).

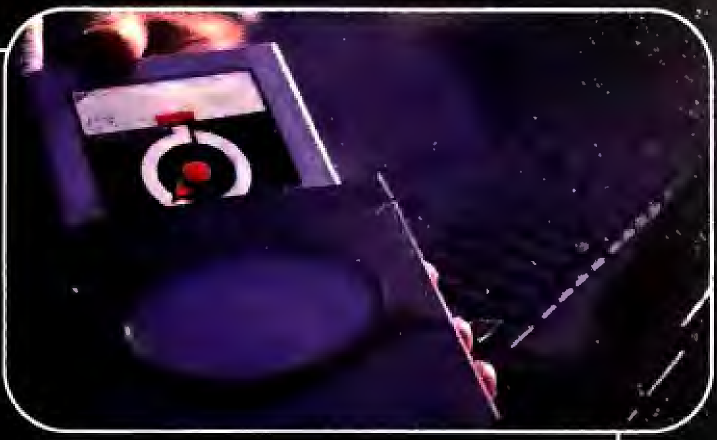
Once you have put your credit card away, you don't need much expertise to set up workgroups—just click a but- ▶

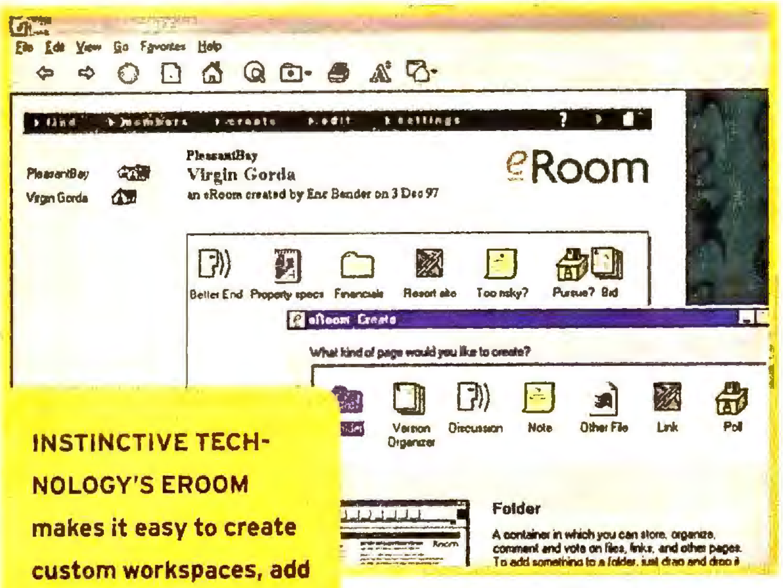
K[redacted]pi[redacted]veryone on the Same Page

Andrea Shaw and Justin LaFayette, partners with Toronto's DWL, rely on Changepoint's Involv to manage intranet/extranet development. Projects last for months and involve 15 or more people in different departments at the client. "The project changes on a daily basis," says Shaw. "It's great knowing that everyone, including the client, is working on the same plan."



PHOTOGRAPH: EDWARD GAJDEL

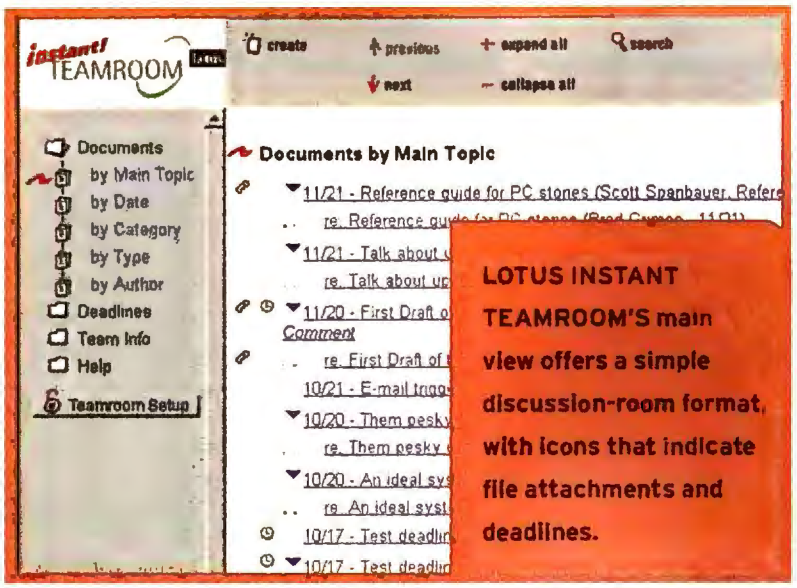



eRoom
PleasantBay
Virgin Gorda
an eRoom created by Eric Bender on 3 Dec 97
Better End
Property specs
Financials
Resort site
Too risky?
Pursue? Bid
eRoom Create
What kind of page would you like to create?
Version Organizer
Discussion
Note
Other File
Link
Poll
Folder
A container in which you can store, organize, comment and vote on files, links, and other pages.

INSTINCTIVE TECHNOLOGY'S EROOM makes it easy to create custom workspaces, add members, and manage projects, but it's one of the costlier services.

ton to start a new ERoom work space, add members, and the system automatically e-mails invitations containing the ERoom URL, user name, and password. You can also link ERoom to an existing e-mail system to invite people outside your company to join the workgroup. Sharing documents with ERoom is as easy as dragging a file from your Windows desktop into the ERoom window. Team members can edit the documents and keep track of the revisions, and kibitz in the discussion area.

ERoom offers a very slick interface and should work well for long-term projects, but lacks e-mail integration and isn't cheap. *ERoom; $25 a month per user; Instinctive Technology; www.instinctive.com*



LOTUS INSTANT TEAMROOM'S main view offers a simple discussion-room format, with icons that indicate file attachments and deadlines.

Lotus Instant Teamroom **Too Simple**

LOTUS INSTANT TEAMROOM is a straightforward, easy-to-use virtual meeting place where you and your coworkers can share ideas. It's also one of the cheapest general-purpose tools in the bunch: $14.95 per user per month with unlimited server space for discussions, tracking projects, and storing files. It's fast over dial-up connections, which means a lot if you're on the road.

But Instant Teamroom is too simple. Basically, everything ▶

Hanging Out Your Own Shingle

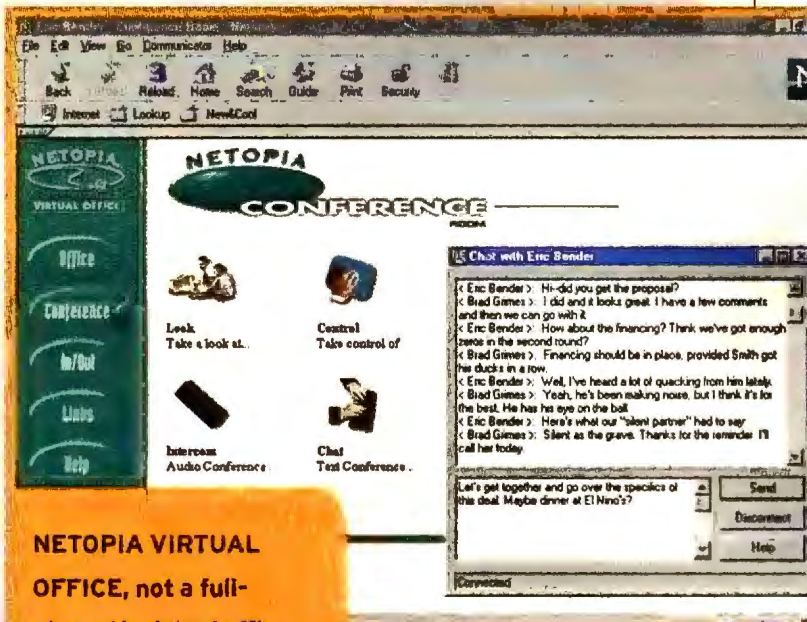
NOT EVERYONE needs the collaboration tools of a full-strength virtual office suite. But whether for business or pleasure, most of us could benefit from an interactive outpost on the Web that's accessible to anyone, 24 hours a day.

Netopia Virtual Office 2.0 gives you your own interactive Web page, hosted for a song by the ISP GeoCities, where friends and clients can drop by to discuss projects and share files. As with virtual office work spaces, you invite participants to your office and create user names and passwords for them. Visitors "knock" at your Netopia Virtual Office door to let you know they're there; a message pops up on your screen, and you can decide whether to let them in. If you're away from your PC, you can leave a message telling visitors when you'll be back.

Netopia integrates well with Microsoft's free NetMeeting conferencing utility for making phone calls over the Internet, sharing applications, or holding videoconferences. If you don't have NetMeeting on your PC but you still want to be heard, a neat little intercom program lets you talk to visitors—provided both of you have a microphone and speaker. It also includes a handy remote access program. When you go home at night, you can access your office computer using the browser on your home system.

But Netopia can't be considered a true workgroup application—its chat feature is strictly one-on-one, and there's no discussion group. And all communication goes through the office owner—visitors cannot talk to one another. In fact, if the owner's PC isn't connected to the Internet, visitors to the site are limited to uploading and downloading files. To check in on your own virtual office while on the road, you need to have Netopia client software running on whatever PC you log on from.

The good news is, you don't have to pay for every visitor you invite to your office. Best of all, Netopia is inexpensive; by your second year, the service costs only $1.67 a month. **Netopia Virtual Office for Windows;** first year $50, each additional year $20; Netopia; www.netopia.com



< Eric Bender >: Hi-did you get the proposal?
< Brad Grimes >: I did and it looks great. I have a few comments and then we can go with it.
< Eric Bender >: How about the financing? Think we've got enough zeros in the second round?
< Brad Grimes >: Financing should be in place, provided Smith got his ducks in a row.
< Eric Bender >: Well, I've heard a lot of quacking from him lately.
< Brad Grimes >: Yeah, he's been making noise, but I think it's for the best. He has his eye on the ball.
< Eric Bender >: Here's what our "silent partner" had to say
< Brad Grimes >: Silent as the grave. Thanks for the reminder. I'll call her today.

Let's get together and go over the specifics of this deal. Maybe dinner at El Nino's?

NETOPIA VIRTUAL OFFICE, not a full-strength virtual office despite its name, nevertheless lets you chat, share documents, and launch NetMeeting.

NO BRAINER.

- ✓ Redundant T3 connections to Internet
- ✓ Virtual domain (www.yoursite.com)
- ✓ 1 GIG of data transfer per mo.
- ✓ 25MB disk space
- ✓ Advanced control panel
- ✓ Secure transactions
- ✓ POP accounts
- ✓ Mail forwards
- ✓ Auto responders
- ✓ Anonymous virtual FTP
- ✓ HTML script
- ✓ FrontPage 98 support
- ✓ Choice of Unix or NT
- ✓ Detailed statistical reports

You don't have to be a Nobel Prize winner to figure out who offers the best value in web services. With ValueWeb℠, $19.95 gets you more standard features than any other web hosting service out there: encrypted transactions, full CGI-bin access, CyberCash and FrontPage 98 support. Most important, our high performance UNIX/NT servers, redundant T3 connections and 24/7 network monitoring ensure that your site is always open for business. That's what ValueWeb℠ is all about. More web services for less money. And that's why we're growing faster than the Web itself!

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is organized in a discussion-group hierarchy that you can view by date, author, or topic. There's no way to manage documents in a central location; they simply appear as file attachments to messages. Project deadlines appear as documents; to see the date of the deadline you must open the document. When the deadline passes, no indication is given in the main document window.

As in Changepoint's Involv Project Collaboration program, marking a task completed requires several steps.

Instant Teamroom is one of several work spaces we looked at that doesn't offer a chat area, nor does it let you send or receive e-mail. Moreover, the version of Instant Teamroom we looked at—version 1.01—didn't support Internet Explorer. Future versions will support IE 4.*x* but none of the previous IE versions. *Lotus Instant Teamroom; $14.95 a month per user; Lotus; www.lotus.com/instant*

Transcending Transatlantic Phone Tag

Need to take on large projects with international clients? Involv allows partners Carol Gorelick and Carter Crawford of the New York-based consulting firm Solutions for Information & Management Services to do just that. The latest venture—installing identical infrastructures at offices in London and New York—meant coordinating six companies. Using Involv for the project planning and status reporting did away with time-consuming meetings and Gorelick's greatest bane: "All that phone tag."

PHOTOGRAPH: JOHN ABBOTT

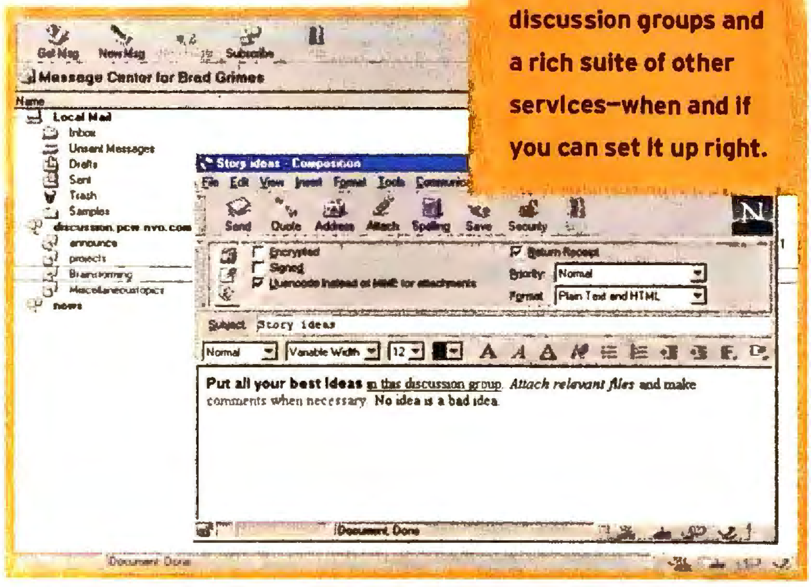
Netscape Virtual Office **Build It Yourself**

LIKE ITS COMPETITORS, Netscape Virtual Office lets you post documents, send messages, and host online discussions. Unlike the others, it's very difficult to use.

When you sign on with NVO, you're building your own intranet on someone else's server. You get a Web address, a POP3 address, an SMTP address, an FTP address, a discussion server address, plus more user names than you can commit to memory. Adding users is a chore. You have to specify whether the user is a sysop or a sysop master; whether they get POP3 dial-in services or FTP services; and what their log-file levels are for POP3, SMTP, FTP, and dial-up services.

Sound incredibly confusing? It is, and the help for each of these choices is only semiuseful. And after you do all that, you still must personally notify the new users that they have been added to the workgroup—NVO won't send automatic notifications.

Once open for business, NVO is very powerful. You use your FTP server to share documents; you get an e-mail account; you can brainstorm using the discussion group; and you can edit and post your own Web pages to make the whole place feel like home—a nice touch lacking in every other service. Group scheduling wasn't available when we looked at NVO, but Netscape says it's coming soon. *Netscape Virtual Office by Concentric; $29 a month for 1 user, $39 for 3 users, $119 for 10 users, $249 for 25 users; Netscape; www.netscape.com/netcenter/vo*



☐ Encrypted
☐ Signed
☑ Uuencode instead of MIME for attachments
☑ Return Receipt
Priority: Normal
Format: Plain Text and HTML
Subject: Story ideas
Normal | Variable Width | 12

Put all your best ideas in this discussion group. *Attach relevant files* and make comments when necessary. No idea is a bad idea.

NETSCAPE VIRTUAL OFFICE provides discussion groups and a rich suite of other services—when and if you can set it up right.

Why Own When You Can Rent?

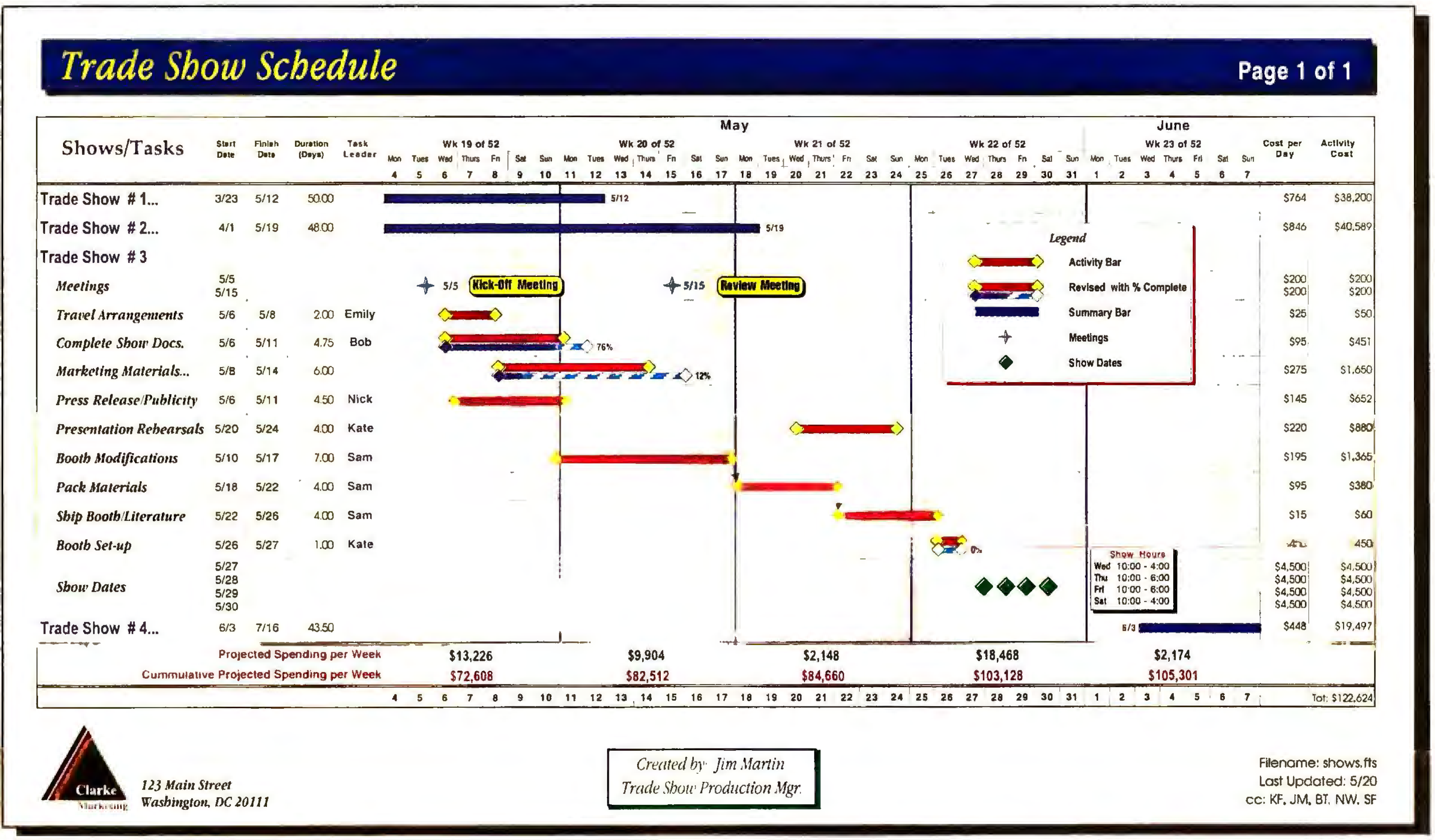
RENTING A WORK SPACE on the Web is ideal for short-term projects, shoestring operations, collaborations between different companies, or small businesses that don't want to go through the hassle of setting up their own network services. Work space rentals are easy to set up and shut down. But they have a long way to go, and even the best (HotOffice, or newcomer ERoom, in our opinion) may not work for you. To find the right solution, try it out first—all the workgroup applications we looked at except Lotus Instant Teamroom offer trial periods.

If a virtual office does fit your needs, you'll be helping to pioneer what may soon become a commonplace business tool. General-purpose rentware may catch on at your local Internet service provider, despite high software licensing fees and steep learning curves. Several ISPs already hawk rentable applications geared toward specific professions, like accounting and human resources. But as with any new technology, tread cautiously. The productivity you lose may be your own.

For more information on virtual office tools, visit www.pcworld.com/www.pcworld.com/march98/virtual_office. Brad Grimes is a senior associate editor for PC World. *Technical writer Caron Schwartz Ellis of Boulder, Colorado, also contributed to this story.* ■

New Version 5.0

Project Scheduling Made Easy.



Trade Show Schedule

Page 1 of 1

Shows/Tasks	Start Date	Finish Date	Duration (Days)	Task Leader	Cost per Day	Activity Cost
Trade Show # 1...	3/23	5/12	50.00		$764	$38,200
Trade Show # 2...	4/1	5/19	48.00		$846	$40,589
Trade Show # 3						
Meetings	5/5 5/15				$200 $200	$200 $200
Travel Arrangements	5/6	5/8	2.00	Emily	$25	$50
Complete Show Docs.	5/6	5/11	4.75	Bob	$95	$451
Marketing Materials...	5/8	5/14	6.00		$275	$1,650
Press Release/Publicity	5/6	5/11	4.50	Nick	$145	$652
Presentation Rehearsals	5/20	5/24	4.00	Kate	$220	$880
Booth Modifications	5/10	5/17	7.00	Sam	$195	$1,365
Pack Materials	5/18	5/22	4.00	Sam	$95	$380
Ship Booth/Literature	5/22	5/26	4.00	Sam	$15	$60
Booth Set-up	5/26	5/27	1.00	Kate	[illegible]	450
Show Dates	5/27 5/28 5/29 5/30				$4,500 $4,500 $4,500 $4,500	$4,500 $4,500 $4,500 $4,500
Trade Show # 4...	6/3	7/16	43.50		$448	$19,497

	Wk 19 of 52	Wk 20 of 52	Wk 21 of 52	Wk 22 of 52	Wk 23 of 52
Projected Spending per Week	$13,226	$9,904	$2,148	$18,468	$2,174
Cummulative Projected Spending per Week	$72,608	$82,512	$84,660	$103,128	$105,301

Tot: $122,624

Show Hours
Wed 10:00 - 4:00
Thu 10:00 - 6:00
Fri 10:00 - 6:00
Sat 10:00 - 4:00

Clarke Marketing
123 Main Street
Washington, DC 20111

Created by Jim Martin
Trade Show Production Mgr.

Filename: shows.fts
Last Updated: 5/20
cc: KF, JM, BT, NW, SF

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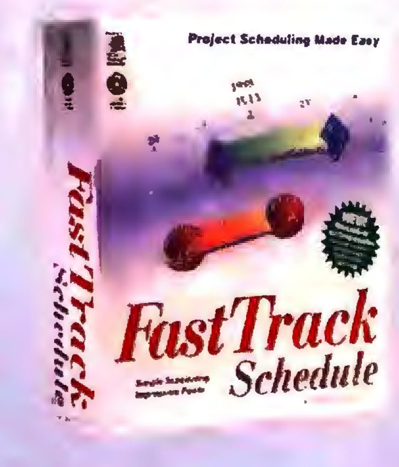

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- 24X Max Variable CD-ROM Drive
- Creative Labs AWE64 Value Sound Card
- Iomega 100MB Zip Drive
- Yamaha Stereo Speakers with Subwoofer
- 56K Capable US Robotics X2 Internal Data/Fax Modem
- Microsoft Windows 95
- Lotus SmartSuite, Adobe PageMill, and Adobe PhotoDeluxe
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- 24X Max Variable CD-ROM Drive
- Creative Labs AWE64 Value Sound Card
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- 4.0GB SCSI Hard Drive with 512K Cache
- 17" Flat Square Color Monitor
- Matrox Millennium II 4MB Video Card
- 24X Max Variable CD-ROM Drive
- Creative Labs AWE64 Value Sound Card
- Yamaha Stereo Speakers with Subwoofer
- 56K Capable US Robotics X2 Internal Modem
- Microsoft Windows 95
- Lotus SmartSuite, Adobe Pagemaker® 6.5, Adobe Photoshop® 4.0, Adobe Illustrator® 7.0, Adobe PageMill, and Adobe PhotoDeluxe
- Microsoft IntelliMouse
- PS/2 Keyboard

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UmaxStation 9100/300

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- 24X Max Variable CD-ROM Drive
- Creative Labs AWE64 Value Sound Card
- Iomega 100MB Zip Drive
- Yamaha Stereo Speakers with Subwoofer
- 56K Capable US Robotics X2 Internal Modem
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- ELSA Gloria-L Video Card
- 4x/6x Yamaha Recordable CD-ROM
- Iomega Jaz Drive
- Iomega Ditto™ 3200 Tape Drive
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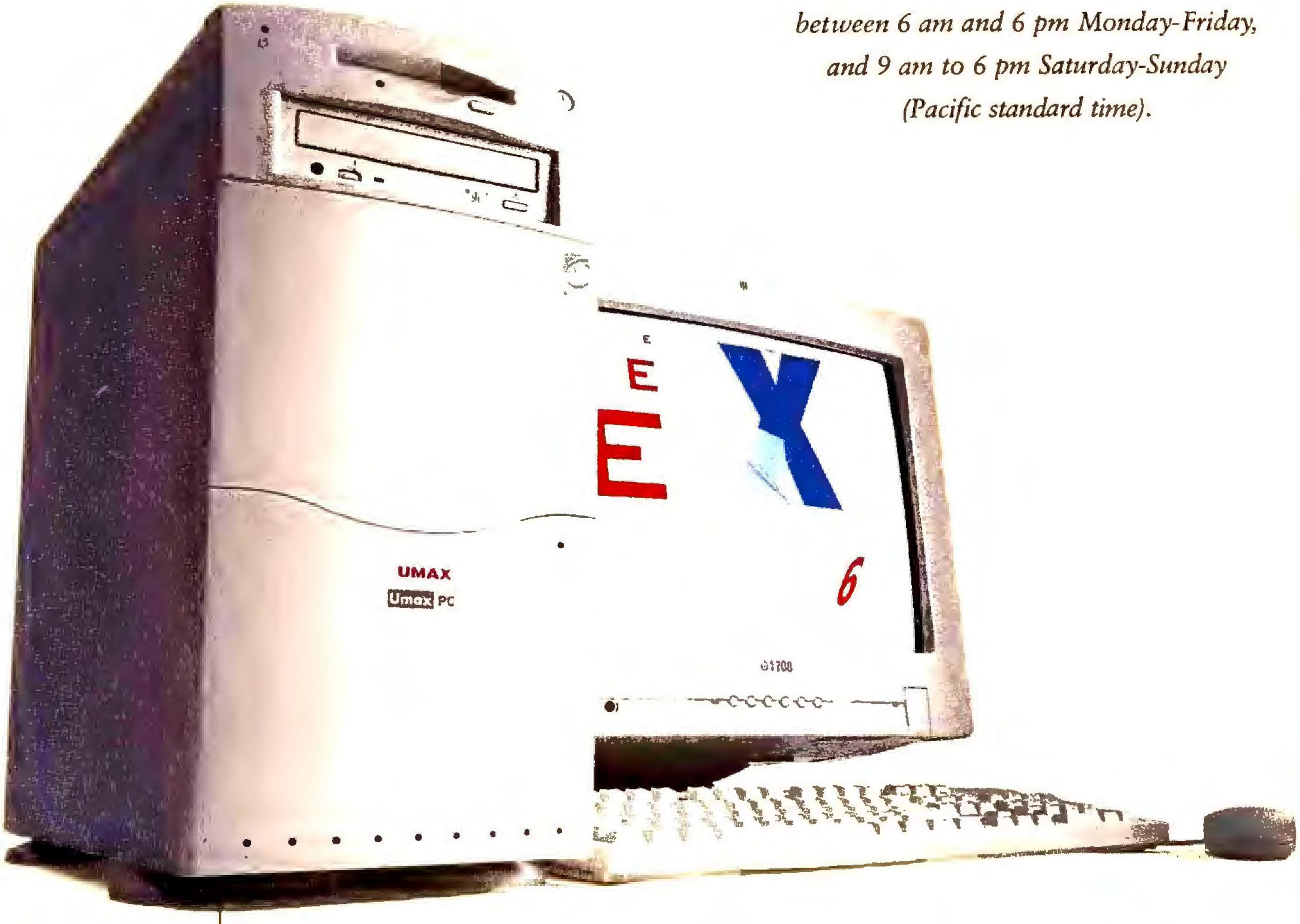

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- ATI 3D Xpression 4MB WRAM Video Card
- 24X Max Variable CD-ROM Drive
- Sound Blaster Compatible Sound Card
- Amplified Speakers
- 56K Capable K56Flex Internal Modem
- Microsoft® Windows® 95
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- Microsoft IntelliMouse
- PS/2 Keyboard

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A monthly update of the best desktop PCs, notebooks, printers, monitors, graphics boards, and modems

PC WORLD

TOP 100

PENTIUM II-300s:

Power To THE People

EDITED BY MICHAEL DESMOND

NONE FASTER: The Dell Dimension XPS D300 tops our power list.

SPEED PLUS THRIFT: NEC's $2199 Direction SPL 300 is the fastest budget desktop.

PHOTOGRAPHS: MARC SIMON ICONS: JEFFREY PELO

GET CONNECTED: Micron's ClientPro 766Xi sports networking capability.

REMEMBER WHEN most companies offered pension plans, and baseball players stayed on the same team year after year? Then you probably remember how Intel's fastest CPUs used to command huge premiums, appearing in professional-minded PCs costing $10,000. Well, we can't do much about the complexities of 401(k)s and free agency, but we can tell you that even the fastest Intel CPUs are now almost always affordably priced.

This month saw a charge of affordable power PCs based on Intel's 300-MHz Pentium II processor, led by the Dell Dimension XPS D300. This loaded midtower jumps straight to the top of our power desktops chart, and comes decked out with a DVD-ROM drive, an internal Iomega Zip drive, and an enormous 9.1GB hard disk. Behind it, five new PII-300 chartmakers, each priced at less than $3000, help rewrite our power list—in fact, more than half of all systems on the chart now use PII-300 CPUs. Check out the $2199 NEC Direction SPL 300 midtower, the first 300-MHz system to break into the Top 20 Budget Desktops chart.

This month introduces the new Dell Dimension XPS D266, a $2229 midtower that grabs the top budget spot thanks to its fast performance and Dell's superior support and reliability. With its fast, 14X–32X CD-ROM drive and a 17-inch monitor, the D266 will appeal to home and office buyers. Farther down the chart, NEC's SPL 300 shatters all budget performance records with a 269 score on PC WorldBench tests. Cash-strapped speed freaks should consider this midtower.

With Pentium II systems now trickling onto the budget chart, only one new non-Intel–based PC emerges in our rankings. The $1899 DirectWave MVP VK6-233 uses a fast-but-cheap AMD K6-233 CPU and comes loaded with 64MB of SDRAM, a 17-inch monitor, and a 7GB hard disk—a configuration no other system on the budget chart can match. One catch: We've yet to see a non–Intel-based system that provides support for AGP, so if you want to be able to get the most from hot AGP-based games and applications when they finally appear, you may want to stick with a Pentium II PC for now.

BIGGER ISN'T ALWAYS BETTER

YOU THINK baseball players' salaries are spiraling out of control? Take a look at the typical hard disk. Monstrous 8GB and 9GB disks are becoming standard issue on power desktops—more than twice the size of those available a year ago. Behind the move: Microsoft's new FAT32 file system. FAT32 is a boon in a couple of important ways: First, it makes these gargantuan hard drives possible by allowing Windows 95 to recognize disks larger than 8GB. FAT32 also decreases the size of the smallest unit of storage on disks. On a 1GB FAT16 partition, even a teeny 1-byte file occupies 16KB, while the same file on a 1GB FAT32 partition occupies only 4KB. There is one catch, though:

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following section should answer most of them.

How do the charts work? The Top 20 and Top 10 charts are evolving lists of the best PCs, monitors, modems, printers, and graphics boards we've tested. System charts are divided by price. Power desktops cost $2250 or more; power notebooks cost $2750 or more. We compare new products to previously reviewed hardware, updating the charts to reflect price cuts and other changes.

Where do you get your prices? We estimate street prices based on vendor information and our own research, including surveys of retail outlets. We recheck all prices every month.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 80s is among the best and one in the 70s is above average.

What does the PC WorldBench score mean? It's a measure of how fast a PC is in relation to our baseline machine, a Dell P75t configured with 8MB of RAM, a 540MB hard drive, and no secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline unit.

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. So a budget PC that is rated "expensive" is high priced only in relation to other budget PCs. Word scores for other categories are relative to all desktops or all notebooks.

Check out *PC World*'s Top 400 reviews online. Go to PC World Online (www.pcworld.com/hardware/t2010) to explore our Top 400, which provides comprehensive reviews and ratings for products in 16 categories. Search by vendor, peruse the latest Top 10 and Top 20 charts, or build custom charts from our product review database using your own criteria. You'll also find reviews not available in print.

According to Microsoft officials, FAT32 may not work with disk utilities and other software programs that interact directly with the disk file system unless they are updated for FAT32.

The standard monitor size is getting bigger, too. An increasing number of vendors are sending us 19-inch monitors with their power desktops. This month, five systems that appear on the Top 20 Power Desktops chart feature these big screens. These units provide about 18 inches of viewable area—about 2 inches more than you find on most 17-inch tubes. The drawback: You can buy a standard 19-inch display for about the same price you'd pay for a very high-end 17-inch monitor, but it won't look as good

UP AND COMING

YOUR FIRM may lack a pension plan, but it probably has a network—a likelihood that PC vendors now recognize. Two new PCs on our power chart come with network cards: The Micron ClientPro 766Xi and AST Bravo MS 6300 include 10/100-megabits-per-second ethernet cards plus client management software for enabling remote access, monitoring, and upgrades. You'll pay more for the sophistication, and many network-equipped PCs forgo niceties like modems, speakers, and bundled apps, so shop carefully.

The addition of new features has prompted a change in the way we rate product value. This month, we've updated our scoring to give more credit for DVD-ROM drives, bigger hard disks, and other enhancements. As a result, fully loaded power desktops receive higher feature scores than they did in past months, while bare-bones designs score somewhat lower. This month's Dell Dimension XPS D300, for example, moves to the top spot on the power chart thanks in part to the value of its DVD-ROM drive and vast 9.1GB hard disk. By the same token, the overall ratings for many budget systems actually retreated, because we no longer award full points to systems with 32MB of RAM or hard drives 4GB or smaller.

This month we took a sneak peek at the first DVD-equipped notebooks. These portables play both stunning MPEG-2 video from disc and your favorite CD-ROMs. But you have to pay extra for the obsolescence protection these models offer. For our take, see Top 10 Notebooks.

OVER AND OUT

THE NUMBER of PC companies quietly closing their doors or suddenly dropping product lines seems to be on the upswing. In December, as we were going to press, four vendors gave up the ghost. MIS, a small company whose computers have appeared on our charts, stopped answering its phones last fall, while Unisys disclosed in January that it was ceasing production of PCs. Even big players dropped bombshells. Toshiba dropped its Infinia line of home PCs, and Power Computing, the prominent Mac clone maker, ceased production of Intel desktops, then shut down altogether. But don't panic. In "Surviving AWOL Vendors," we identify some steps you can take to obtain service for your orphaned hardware.

SURVIVING AWOL VENDORS

JUST BECAUSE a computer company offers a three-year warranty doesn't mean the vendor will be around to back it up. Ask anyone who's bought a system from MIS or Power Computing, both of which went out of business in the past couple of months. At least buyers of Toshiba's Infinia home PCs can breathe a sigh of relief—the company says it will continue to support this recently discontinued product line.

So what can you do to avoid getting stranded by your vendor?

◆ Tilt the odds in your favor by purchasing from a large, established computer company that's been around for at least a few years.

◆ Watch for online complaints about service problems and shipping delays. Companies under fiscal pressure may suddenly lay off support staff and slow down expensive service operations, creating a wave of complaints. Check relevant Internet newsgroups and information service forums on CompuServe, America Online, and elsewhere.

◆ Call the Better Business Bureau to see if any complaints have been lodged against the company. You can also check with the attorney general's office in the vendor's home state.

◆ Pay for all purchases with a credit card. If a dispute arises or the product fails to arrive as promised, you stand a chance of getting your money back after notifying the credit card company.

If your vendor has gone south, don't lose hope—you may still be able to find support for your PC's hardware. Driver updates are usually available directly from the component manufacturer's Web site—and often a new driver can resolve existing conflicts with graphics and audio hardware. Component makers' Web sites may also provide tech-support resources—including phone numbers, message boards, and documentation—that can help you resolve problems with your orphaned computer. You may even be able to get component vendors to service parts still under warranty. Finally, Internet newsgroups and online service forums provide an excellent place to post questions to fellow PC owners.

No, these approaches won't solve all your technical problems, but they may keep your system working for years longer than the company that built it lasted.

Michael Desmond is a senior associate editor for PC World. *Assistant Editor Mick Lockey, Associate Editors Vince Bielski and Andrew Brandt, Senior Associate Editor Bryan Hastings, Staff Editor Grace Aquino, and freelance writers Nancy Canning, Jon Jacobi, Alex Jorge, Jeff Kuta, and James A. Martin contributed to the Top 100. Testing for the Top 100 was performed by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, and Mike Salayko of the PC World Test Center. See page 14 for contact information.* ▶

ILLUSTRATION: JEFFREY PELO

TOP 20 POWER DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (12/1/97)	CPU	Comments
1	★ Dell Dimension XPS D300 800/388-8542 www.dell.com	n/a	NEW	$3049	Pentium II-300	Very fast, loaded PII-300, 2X DVD-ROM drive, 9.1GB hard disk, Zip drive.
2	★ Gateway 2000 G6-266 800/846-2000 www.gateway.com	3	Feb 98	$2811	Pentium II-266	$188 price drop, quick good-looking midtower, big 19-inch monitor, ethernet.
3	★ Gateway 2000 E-3110 300 800/846-2000 www.gateway.com	n/a	Feb 98	$2989	Pentium II-300	$504 price cut, very fast, loaded PII-300, AGP graphics card upgraded to 8MB.
4	★ Dell OptiPlex GXa266 800/388-8542 www.dell.com	2	Nov 97	$2586	Pentium II-266	$181 price drop, great design, ethernet, AGP, fine support.
5	★ Quantex QP6/300 SM-3x 800/896-4898 www.quantex.com	4	Dec 97	$2599	Pentium II-300	Another $200 off very fast, affordable PII-300, AGP, great support policies.
6	Micron Millennia XKU 300 888/634-8799 www.micronpc.com	5	Nov 97	$3397	Pentium II-300	Additional $222 off ultrafast PII-300, great 19-inch monitor, AGP.
7	Unicent Avanta L300 800/308-3614 www.unicent.com	n/a	Feb 98	$2649	Pentium II-300	Cousin of last month's L266, $150 price cut, upgraded modem and CD-ROM.
8	DirectWave MVP VX2-300 800/882-8108 www.directwave.com	8	Jan 98	$2499	Pentium II-300	$300 drop on superfast well-configured tower, excellent support policies.
9	Quantex QP6/300 SM-4X 800/896-4898 www.quantex.com	n/a	NEW	$2999	Pentium II-300	Near-twin of number 5 has bigger screen and hard disk, better audio.
10	CyberMax SuperMax PII 300 800/437-4596 www.cybmax.com	n/a	NEW	$2599	Pentium II-300	Very fast PII-300 has 8GB hard disk; no sound card or modem, poor manuals.
11	Sys Technology Sys Performance Pro 300LA 800/613-9963 www.systechnology.com	11	Feb 98	$3210	Pentium II-300	Fastest PC has top-notch components; limited online support, slim manuals.
12	AST Bravo MS 6300 800/876-4278 www.ast.com	n/a	NEW	$2570	Pentium II-300	Very fast corporate midtower includes ethernet, 17-inch display.
13	Sys Technology Sys Performance 233M2 800/613-9963 www.systechnology.com	9	Jan 98	$2544	Cx6x86MX-PR233	$175 off Cyrix-powered corporate PC, strong features; limited online support.
14	Kingdom Pentium II-300 800/385-3436 www.kingdomcomputers.com	n/a	NEW	$2697	Pentium II-300	Second-fastest PC ever tested, home office software, top-notch graphics.
15	Sys Technology Sys Performance 233K6 800/613-9963 www.systechnology.com	12	Nov 97	$2519	AMD K6-233	$183 off well-designed PC; average performer, limited online support.
16	Micron ClientPro 766Xi 888/634-8799 www.micronpc.com	n/a	NEW	$2899	Pentium II-266	Nice design, ethernet; a bit pricey for a PII-266, small 3.2GB hard disk.
17	Netis Starburst 300 800/577-7526 www.netistech.com	n/a	NEW	$2700	Pentium II-300	Generic business PII-300 midtower; lacks software and AGP graphics card.
18	Kingdom Pinnacle 266/S 800/385-3436 www.kingdomcomputers.com	10	Feb 98	$2497	Pentium II-266	$100 price drop on solidly configured small-office PC; generic components.
19	Vektron Vision II Super PowerStation PII-300 800/725-0026 www.vektron.com	n/a	Feb 98	$2695	Pentium II-300	$300 price cut puts this PII-300 on chart, 19-inch monitor.
20	HP Brio 8178 800/724-6631 www.hp.com/go/smallbiz	13	Jan 98	$2343	Pentium MMX-233	Neat design on SOHO PC; small monitor, slowest on power chart.

★ Best Buy See features chart, page 226; test report, page 230.

n/a = not applicable

[1] For more information about all products in this table, circle reader service no. 908.

[2] Insufficient data to give a rating.

IF YOU'VE BEEN PINING FOR A POWERFUL SYSTEM, now is the time to buy. Our chart ratings now add emphasis to features such as DVD-ROM drives, large hard disks, and Accelerated Graphics Port graphics. Falling Pentium II prices also help six new 300-MHz systems, including the top-rated Dell Dimension XPS D300, make the chart. Several even include network cards and software. The NEC PowerMate Enterprise 300 and Premio Shadowhawk LX300, two other new power machines we tested this month, both feature loaded configurations, ethernet cards, and networking utilities. Unfortunately, their above-$3000 prices and relatively low PC WorldBench scores kept these office desktops off the chart.

SCORECARD

★ Overall rating	PC WorldBench score/performance	Features and design	Vendor's system reliability	Price	Vendor's support quality/policies	Reader service number [1]
89	272/outstanding	very good	above average	average	above average/best	685
88	263/very good	outstanding	average	average	above average/best	686
86	268/outstanding	very good	average	average	above average/best	687
86	259/very good	good	above average	inexpensive	above average/best	688
86	269/outstanding	very good	average	inexpensive	average/best	689
86	270/outstanding	very good	above average	expensive	above average/best	690
85	270/outstanding	very good	[2]	inexpensive	[2]/best	691
84	272/outstanding	good	[2]	inexpensive	[2]/best	692
83	268/outstanding	good	average	average	average/best	693
81	270/outstanding	good	[2]	inexpensive	[2]/best	694
81	277/outstanding	very good	[2]	expensive	[2]/good	695
81	265/outstanding	good	average	inexpensive	below average/best	696
81	259/very good	very good	[2]	inexpensive	[2]/good	697
80	273/outstanding	good	[2]	inexpensive	[2]/fair	698
80	251/good	very good	[2]	inexpensive	[2]/good	699
80	259/very good	satisfactory	above average	average	above average/best	700
79	266/outstanding	good	[2]	inexpensive	[2]/fair	701
79	264/outstanding	good	[2]	inexpensive	[2]/fair	702
79	268/outstanding	good	[2]	inexpensive	[2]/good	703
78	239/good	good	average	very inexpensive	average/fair	704
Scorecard weightings ▶	Performance 25 percent	Features 25 percent	Reliability 15 percent	Price 15 percent	Quality/policies 10 percent each	

This Month's Best Buys

1 DELL DIMENSION XPS D300

PRO: Outstanding performance, largest hard disk on chart, DVD-ROM and Iomega Zip drives

CON: Limited expandability

The power chart may be littered with muscle-bound Pentium II-300 systems, but the Dell Dimension XPS D300 stands apart. Its second-generation DVD-ROM drive turns CD-ROM discs at a spin rate of up to 20X and also reads CD-Recordable and CD-Rewritable media. Its PC WorldBench score of 272 ranks among the highest, though the $3049 price is a bit steep.

The 9.1GB hard disk is the largest we've seen—you'll need Microsoft's FAT32 file system to access more than 8GB of that. The sharp 17-inch display provides sufficient viewing area, but it lacks sophisticated controls. Our Dimension XPS D300 came with an internal Iomega Zip drive as well as Microsoft Office 97 Small Business Edition—both welcome additions. The 4MB STB Velocity 128 3D AGP graphics card performed well in 2D tests and supports AGP texturing features. Creative Labs' Sound Blaster AWE64 board provides top-notch audio and gets a boost from the nifty Altec Lansing ACS-290 speaker-subwoofer set.

Dell Dimension XPS D300

We struggled with the Dimension's case—the tabs along the back of the sliding edge lack purchase—but the back ports feature color coding and symbols. Inside, the modem and sound card take up both ISA slots, leaving just two free PCI slots. The one free DIMM socket allows RAM upgrades, since DIMMs—unlike SIMMs—may be added singly. There are only three free drive bays.

Dell's documentation is better than most. We liked the fold-out setup guide but would welcome greater technical depth. Support policies include a three-year parts and one-year labor warranty, with 24-hour toll-free phone support.

If you demand top performance and want to run emerging AGP and DVD software, the D300 is a clear Best Buy.

2 GATEWAY 2000 G6-266

PRO: Very good performance, high-quality components, big monitor, network adapter

CON: Curved top of midtower case makes it hard to stack external components

The $2811 Gateway 2000 G6-266 nudges up to second place, following a $188 price cut. Notably, this fast Pentium II-266 midtower is one of two Best Buy systems outfitted with a 19-inch monitor, for comfortable viewing at 1280-by-1024–pixel resolution.

The G6-266 comes ready for office duty, thanks to a fast 3Com PCI 10/100 ethernet adapter. And unlike many network-ready systems, the G6-266 also includes a 56-kilobits-per-second ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 POWER DESKTOPS

STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/viewable diagonal (inches)	Screen pitch (mm)	CD/DVD-ROM drive speed
1	Dell Dimension XPS D300*	Pentium II-300	64	512	9.1	STB Velocity 128 3D	4/SGRAM	17/15.8	.26	DVD-2X
2	Gateway 2000 G6-266*	Pentium II-266	64	512	6.4	STB Velocity 128 3D	4/SGRAM	19/18	.26	12X-24X
3	Gateway 2000 E-3110 300*	Pentium II-300	64	512	8.4	Permedia II AGP	8/SGRAM	19/17.9	.26	12X-24X
4	Dell OptiPlex GXa266*	Pentium II-266	32	512	3.2	ATI 3D Rage Pro	4/SGRAM	17/15.8	.26	12X-24X
5	Quantex QP6/300 SM-3x*	Pentium II-300	64	512	6.4	Diamond Viper V330	4/EDO DRAM	17/16	.28	12X-24X
6	Micron Millennia XKU 300	Pentium II-300	64	512	6.4	Diamond Viper V330	4/SGRAM	19/18	.22	12X-24X
7	Unicent Avanta L300	Pentium II-300	64	512	6.4	Matrox Millennium II	4/WRAM	17/15.7	.26	14X-32X
8	DirectWave MVP VX2-300	Pentium II-300	64	512	7	Matrox Millennium II	4/WRAM	17/16.1	.26	12X-24X
9	Quantex QP6/300 SM-4X	Pentium II-300	64	512	8	Diamond Viper V330 AGP	4/SGRAM	19/17.9	.26	12X-24X
10	CyberMax SuperMax PII 300	Pentium II-300	64	512	8	Diamond Viper V330 AGP	4/SGRAM	17/16	.26	12X-24X
11	Sys Technology Sys Performance Pro 300LA	Pentium II-300	64	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.9	.26	12X-24X
12	AST Bravo MS 6300	Pentium II-300	32	512	4.3	ATI 3D Rage II+	2/SGRAM	17/15.7	.28	12X-24X
13	Sys Technology Sys Performance 233M2	Cx6x86MX-PR233	32	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.9	.26	12X-24X
14	Kingdom Pentium II-300	Pentium II-300	64	512	6.4	ATI 3D Rage Pro	4/SGRAM	17/15.7	.26	12X-24X
15	Sys Technology Sys Performance 233K6	AMD K6-233	32	512	6.4	Number Nine Revolution 3D	8/WRAM	17/15.9	.26	12X-24X
16	Micron ClientPro 766Xi	Pentium II-266	64	512	3.2	Diamond Viper V330	4/SGRAM	17/16	.26	12X-24X
17	Netis Starburst 300	Pentium II-300	64	512	6.1	Matrox Millennium II	4/WRAM	17/15.9	.26	12X-24X
18	Kingdom Pinnacle 266/S	Pentium II-266	64	512	4.3	Hercules Terminator 3D	4/EDO DRAM	17/15.8	.26	12X-24X
19	Vektron Vision II Super PowerStation PII-300	Pentium II-300	64	512	7	Matrox Millennium II	8/WRAM	19/17.9	.26	12X-24X
20	HP Brio 8178	Pentium MMX-233	32	512	6.2	Matrox Millennium II	4/WRAM	15/13.7	.28	12X-24X

* Best Buy

[1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

[2] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

[3] Six years on CPU and main RAM, one to five years on other parts.

[4] After one year, support drops to 9 hours on weekdays, with no weekend support.

modem, although the speakerphone-capable unit—based on x2 technology—will not function with DOS-only programs. The STB Velocity 128 3D video card is one of the better AGP boards on the market, while an Ensoniq AudioPCI wavetable card and Boston Acoustic satellite speakers and subwoofer provide terrific sound.

Nifty design touches enhance this corporate PC. The sides and top of the light-gray case curve outward subtly—a nice contrast to square, putty-colored boxes—though the curvy top means you can't place external peripherals or disks there. Better yet, we found the case simple to remove: A side-panel grip at the back makes it easy to pop off. There's also lots of expansion room, with a neat interior and plenty of available slots, memory sockets, and drive bays.

Gateway 2000 G6-266

The G6-266's distinctive keyboard has large keys and a row of special buttons at the top to control sound level and play audio CDs or even a TV and radio if you hook the system to a home entertainment center.

We love Gateway's documentation. The glossy, well-organized manual offers concise help and nice color illustrations. Excellent support policies include a three-year warranty on parts and labor and 24-hour toll-free tech support. Our readers have rated Gateway's service above average.

3 GATEWAY 2000 E-3110 300

PRO: Large hard disk, fast, includes network card

CON: No modem

Gateway 2000's E-3110 300 roars into Best Buy territory thanks to a deep $504 price cut. At $2989, the price of this business PC is now low enough to bring it out of the shadow of the similarly configured E-3110 266. Outstanding performance, excellent support policies, and welcome networking features make the E-3110 300 attractive to anyone needing a full-featured office PC.

This stylish midtower comes standard with 64MB of RAM and a large 8.4GB hard disk. The E-3110 300 also includes a 3Com 100-megabits-per-second ethernet card and Intel LANDesk Manager software for remotely servicing networked

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max RAM (MB)	Maximum secondary cache (KB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56[1]	Sound Blaster AWE64	midtower	384	512	1	2/1	2	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56[1]	Ensoniq AudioPCI	midtower	384	512	2	3/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
not included	Sound Blaster 16	midtower	384	512	2	3/2	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
not included	integrated Crystal 4326B	midtower	384	512	2	2/1	7	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56[2]	integrated	midtower	192	512	1	3/3	4	3/1	24	Sat., Sun.	BBS, WWW
56[1]	Sound Blaster AWE64	midtower	384	512	1	2/0	3	3/1	24	Sat., Sun.	BBS, CIS, WWW
56[1]	Ensoniq AudioPCI ES1370	midtower	384	512	2	3/1	3	5/3	24	Sat., Sun.	BBS, WWW
56[2]	Sound Blaster AWE64	midtower	384	512	1	4/1	4	3/3	24	Sat., Sun.	BBS, WWW
56[2]	Ensoniq AudioPCI	midtower	384	512	2	3/3	3	3/1	24	Sat., Sun.	BBS, WWW
not included	none	midtower	384	512	1	3/3	5	3/1	24	Sat., Sun.	BBS, WWW
56[1]	Sound Blaster AWE64	midtower	512	512	2	3/2	4	varies[3]/5	24[4]	Sat., Sun.[4]	WWW
not included	ESS AudioDrive ES1869	midtower	384	512	2	2/1	6	3/3	24	Sat., Sun.	AOL, BBS, CIS, WWW
56[1]	Sound Blaster 32 PnP CT3600	midtower	256	512	5	3/2	3	varies[3]/5	24[4]	Sat., Sun.[4]	WWW
56[1]	Ensoniq AudioPCI	midtower	1024	512	3	3/2	4	varies[5]/1	15.5	Sat.	WWW
56[1]	Sound Blaster AWE64	midtower	512	512	5	3/2	3	varies[3]/5	24[4]	Sat., Sun.[4]	WWW
not included	Sound Blaster AWE64	midtower	384	512	2	3/1	3	3/1	24	Sat., Sun.	BBS, CIS, WWW
56[1]	Sound Blaster CT4170	midtower	384	512	1	3/1	3	1/3	10	Sat.	BBS, WWW
56[2]	Vibra 16	midtower	512	512	2	2/3	2	varies[5]/1	15.5	Sat.	WWW
56[1]	integrated	midtower	384	512	2	3/0	4	3/1	24	Sat., Sun.	WWW
56[1]	AzTech 100B PnP Audio	midtower	256	512	4	2/2	3	3/3	16	Sat.	AOL, CIS, WWW

[5] Five years on CPU and main RAM, three years on other parts.

PCs; however, the system lacks a modem. The sharp 19-inch monitor is terrific for high-resolution work and includes convenient on-screen controls. This month, Gateway upgraded the graphics system with an AGP board that uses the Permedia II chip and 8MB of SGRAM.

The documentation is well written, but the motherboard manual that came with our test machine was for a different model. Gateway 2000's three-year warranty covers parts and labor and includes free on-site service. Phone support is available around the clock, and a variety of online support is available as well.

Gateway 2000 E-3110 300

4 DELL OPTIPLEX GXA266

PRO: Great design, Trinitron monitor, highly expandable, built-in ethernet

CON: No modem, skimpy software bundle

Number two last month, the Dell OptiPlex GXa266 tumbles to fourth place despite a $181 price cut, due largely to changes in the way we rate PC features. At $2586, the OptiPlex is the least expensive Best Buy system and offers networking and upgrade features tailored for any office.

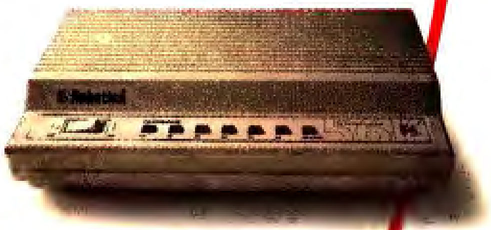
So why did its overall value score drop from 90 to 86? This month, we recognize that 32MB of SDRAM and a 3.2GB hard disk no longer represent a top-of-the-line configuration, so the GXa266 slipped in both of these important categories.

Still, this well-made midtower for networked environments proves the value of sensible design. The system is based on Intel's new NLX motherboard design, which lets users access the seven free slots by simply removing the case and lifting a lever—the entire circuit board holding the slots slides out.

Dell OptiPlex GXa266

Besides built-in ethernet, Dell's corporate desktops include DMI 2.0 client management software, allowing remote management of systems from a central office. The GXa266's PC WorldBench score of 259—average for a PII-266—shows that you don't have to sacrifice performance to enjoy rock-solid stability. ▶

USRobotics



The GXa266 features a good-looking 17-inch Dell Trinitron monitor and a comfortable keyboard. Altec Lansing ACS 290 speakers deliver strong (if somewhat muddy) bass. Software and modem, however, cost extra.

Dell provides a three-year parts and one-year labor warranty, 24-hour support, and free on-site service for the first year. The company has a history of superior support and reliability, according to reader polls.

5 QUANTEX QP6/300 SM-3X

PRO: Strong features, affordable, great support

CON: Generic documentation

For the second month in a row, the Quantex QP6/300 SM-3x gets a $200 price cut, bringing it to an affordable $2599. And for the second month in a row, the SM-3x is a Best Buy. This midtower sports all the power essentials, including a 6.4GB hard drive and a 56-kbps K56flex modem. The generous software bundle features Microsoft Office 97 Small Business Edition, making it attractive to small- and home-office buyers. The QP6/300 SM-3x is a terrific performer, too, with a PC WorldBench score of 269. It all adds up to an alluring system for the home office or small business. ▶

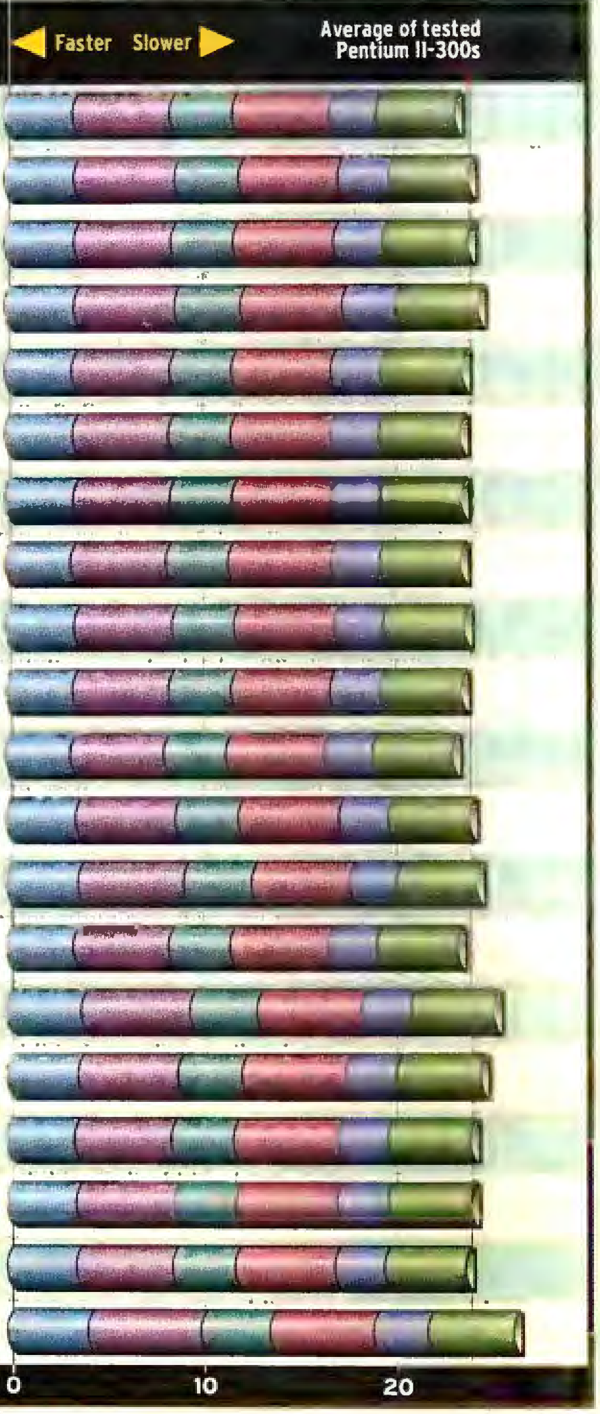
Quantex QP6/300 SM-3x

TOP 20 POWER DESKTOPS

TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (KB)	PC WorldBench score
1	Dell Dimension XPS D300*	Pentium II-300	64	512	272
2	Gateway 2000 G6-266*	Pentium II-266	64	512	263
3	Gateway 2000 E-3110 300*	Pentium II-300	64	512	268
4	Dell OptiPlex GXa266*	Pentium II-266	32	512	259
5	Quantex QP6/300 SM-3x*	Pentium II-300	64	512	269
6	Micron Millennia XKU 300	Pentium II-300	64	512	270
7	Unicent Avanta L300	Pentium II-300	64	512	270
8	DirectWave MVP VX2-300	Pentium II-300	64	512	272
9	Quantex QP6/300 SM-4X	Pentium II-300	64	512	268
10	CyberMax SuperMax PII 300	Pentium II-300	64	512	270
11	Sys Technology Sys Performance Pro 300LA	Pentium II-300	64	512	277
12	AST Bravo MS 6300	Pentium II-300	32	512	265
13	Sys Technology Sys Performance 233M2	Cx6x86MX-PR233	32	512	259
14	Kingdom Pentium ii-300	Pentium II-300	64	512	273
15	Sys Technology Sys Performance 233K6	AMD K6-233	32	512	251
16	Micron ClientPro 766Xi	Pentium II-266	64	512	259
17	Netis Starburst 300	Pentium II-300	64	512	266
18	Kingdom Pinnacle 266/S	Pentium II-266	64	512	264
19	Vektron Vision II Super PowerStation PII-300	Pentium II-300	64	512	268
20	HP Brio 8178	Pentium MMX-233	32	512	239

*Best Buy



Word 7.0 for Windows 95

Excel 7.0 for Windows 95

Picture Publisher 6.0 for Windows 95

Paradox 5.0 for Windows

WordPerfect 6.1 for Windows

1-2-3 release 5 for Windows

HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 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 score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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Circle 128 on reader service card

The SM-3x uses the Diamond Viper V330 graphics card, one of the better AGP boards. The 17-inch MAG InnoVision monitor produces sharp images and offers intuitive controls. We've seen a lot of Quantex PCs, and the interior of the QP6/300 SM-3x runs true to form: a bit disorderly but easy to upgrade. The three vacant PCI slots and one free ISA slot are accessible, while manuals offer basic illustrations and generic information.

Quantex earns points for its impressive support policies, including round-the-clock toll-free tech support and a three-year parts and one-year labor warranty.

New This Month

The following PCs made our power desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

9 QUANTEX QP6/300 SM-4X

PRO: Very fast, terrific software, large hard disk

CON: Blurry monitor

Fast PCs aren't a dime a dozen these days, it just seems that way. With a PC WorldBench score of 268, the Quantex QP6/300 SM-4X is merely competitive, and even the $2999 street price won't turn heads. But this loaded PC boasts lots of software and great multimedia features, making it an attractive buy.

Quantex QP6/300 SM-4X

The QP6/300 SM-4X does everything big, from the 8GB hard disk to the huge 19-inch monitor. We like the useful on-screen controls, operated with a simple dial, but output on the display was blurry. Software includes Microsoft Office 97 and a laundry list of applications that turn this PC into a home-office workhorse. The 56-kbps modem uses K56flex technology.

The 4MB Diamond Viper V330 AGP graphics card and Ensoniq AudioPCI sound board pair up for terrific multimedia, though sound won't work with DOS-only games. Support policies include a three-year parts warranty with one year free labor, plus 24-hour toll-free support.

This PC's name may be alphabet soup, but the message is clear: Bigger is better.

10 CYBERMAX SUPERMAX PII 300

PROS: Outstanding performance, great price, large 8GB hard disk

CONS: No modem or sound board, inadequate documentation

The CyberMax SuperMax PII 300 is like a Florida time-share: It sounds like a great value, but you can't help but wonder what the catch is. For $2599, you get a Pentium II-300 CPU that earned this midtower a PC WorldBench score of 270, among the best we've seen. The SuperMax comes equipped with a spacious 8GB hard disk, 64MB of SDRAM, and a fast Diamond Viper V330 AGP video card with 4MB of SGRAM. There's also a 12X–24X Toshiba CD-ROM drive. Skeptics won't scoff at the monitor, either: The 17-inch CTX display is crisp and bright, with a fine .26mm dot pitch, and the hardware controls make the display easy to adjust.

A peek under the SuperMax's hood reveals connector cables that are nicely bunched together and out of the way. The five open expansion slots and one available RAM socket are all easy to reach. Opening the case requires you to undo two thumbscrews on either side of the back panel and lift off the casing, while closing it demands that you slide the case precisely back into place.

So then, what's the catch? Well, the PC lacks a modem or sound card—though it arrived with a pair of Altec Lansing ACS-45W speakers and a subwoofer that sounded about average when we tested it on another PC. The documentation is, in essence, a rewrite of the Windows 95 manual, geared heavily toward beginners; the system also comes with a PII motherboard manual for hard-core techies. But there's not much information—such as instructions for removing the casing—for the average user.

CyberMax SuperMax PII 300

CyberMax may not be a household name, but we found its tech support friendly, responsive, and knowledgeable. Better still, support policies include toll-free 24-hour tech support.

The SuperMax PII 300 offers lots of features and performance at an attractive price. As for the time-share in Florida, we'll spend a couple of months there this winter and get back to you.

12 AST BRAVO MS 6300

PRO: Low price, 100-mbps network card, very fast

CON: No modem or speakers, no system reset button, slim software bundle

The AST Bravo MS 6300 will appeal to corporate buyers looking for a fast PC that isn't laden with the latest multimedia extras. Equipped with a 100-mbps ethernet card and selling for $2570, the MS 6300 impressed us by scoring 265 in our PC WorldBench application test suite.

AST Bravo MS 6300

This network-oriented midtower features a Intel EtherExpress PCI network card. There are two free DIMM sockets inside the easy-open, wide-body case, as well as two free PCI slots, four free ISA slots, and three vacant drive bays. The 4.3GB hard disk and 12X–24X CD-ROM drive are both typical for a power desktop—although many now sport 6GB and larger hard disks.

The MS 6300's integrated audio chip lacks wavetable MIDI and "3D" sound features, but the AGP-based ATI 3D Rage II+ graphics chip on the motherboard is the same as the one used on ATI's Xpert@Work graphics board—recommended in our December 1997 review of AGP graphics cards (see "AGP Graphics: A Bumpy Ride"). The 17-inch ASTVision 7U monitor could do with more than 2MB of SGRAM, however. Still, we liked the display, which produced sharp graphics and text. A convenient keypad on the front of the monitor makes it easy to adjust settings.

A "soft off" power button switches the MS 6300 between active operation and sleep mode, but users may confuse it with the true power button, which is on the back of the chassis. Most corporate buyers won't mind the lack of a modem and ▶

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Other critics agree. Imaging Magazine judged the new Hitachi "BEST" of the recent AIIM show – over other 19" monitors at the show. And CRN's Test Center recommends the Hitachi.

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Circle 114 on reader service card

the slim software bundle but will welcome the network software, including LANDesk Client Manager for remote management.

AST provides a generous three-year parts and labor warranty and 24-hour toll-free tech support seven days a week.

14 KINGDOM PENTIUM II-300

PRO: Second-fastest PC ever tested, multimedia configuration, ample space for expansion

CON: Spongy keyboard, technical support difficult to reach, skimpy documentation

With its sparse documentation and utilitarian design, the $2697 Kingdom Pentium II-300 will appeal to technically savvy buyers craving top performance. After all, this multimedia midtower served up a PC WorldBench score of 273, second only to the Sys Performance Pro 300LA. The Kingdom includes 64MB of SDRAM and a 6.4GB hard disk—both common for PCs on our power chart—and its ATI 3D Rage Pro graphics card stands out with superior 3D performance. The 17-inch monitor features user-friendly digital controls.

When it comes to software, Kingdom takes the road less traveled, bundling Lotus's SmartSuite 97 instead of the ubiquitous Microsoft Office. You also get an encyclopedia and atlas program from Compton's Multimedia—though we prefer their Microsoft Encarta counterparts—while beginners will welcome the Windows 95 training title.

We liked the Kingdom Pentium II-300's rugged, easy-to-open case and its ample space for expansion: There are two free PCI slots, one free ISA slot, and a shared ISA/PCI slot. Five open drive bays also invite upgrades. On the other hand, the keyboard felt spongy, and the PS/2 mouse lacks the scroll wheel that some users prefer for navigating spreadsheets and Web pages.

Kingdom Pentium II-300

Documentation is slim, but the variable parts warranty covers CPU and RAM for five years and other hardware for three years. Labor is covered for one year. Phone support is limited to 15.5 hours weekdays and 8 hours on Saturday. Unfortunately, our anonymous calls often failed to reach a representative, and we sometimes felt rushed off the phone.

Kingdom's troublesome support picture and meager documentation may ward off novice buyers, but for those comfortable with PCs, the Kingdom Pentium II-300 may provide the key to faster computing.

16 MICRON CLIENTPRO 766XI

PROS: Very good performance, attractive design, network-ready, strong support policies

CONS: Small hard drive, no modem, confusing monitor controls

With its built-in 3Com Fast Etherlink network adapter card, Micron's ClientPro line takes aim at corporate users. Powered by a Pentium II-266 CPU, the 766Xi earned a PC WorldBench rating of 259, about average for a PII-266. The $2899 price is a bit above average for a PII-266 system.

Micron ClientPro 766Xi

Design touches raise the 766Xi above the ranks of the ho-hum business boxes. The curved front bevel affords a sleek look, while a removable cover hides unsightly drive bay slots. The Hitachi 12X–24X, slot-loading CD-ROM drive is cool by any standard, but the floppy drive is problematic: You must stick disks fairly deep into the bezel to reach the drive. The 766Xi's interior is uncluttered and offers three free expansion slots and three open externally accessible drive bays.

The system ships with a Microsoft IntelliMouse and a comfortable keyboard, but the 3.2GB hard disk is the smallest on the power chart. A 17-inch Micron monitor delivers bright, crisp images, though the hardware controls and on-screen menus aren't very intuitive. We also found the Advent AV 009 speakers merely adequate and a poor match for the top-notch Creative Labs Sound Blaster AWE64 audio card—not a critical issue for this PC.

At least the documentation is above average, with helpful graphics and explanations. Micron also boasts strong support policies and a good service record.

17 NETIS STARBURST 300

PRO: Good performance, reasonable price

CON: Subpar support policies, no software, lacks AGP graphics

At $2700, the Netis Starburst 300 is an affordably priced, me-too Pentium II-300 system that just manages to break into the power desktops chart this month. While this midtower turned in a respectable PC WorldBench score of 266, the lack of bundled software and Netis's slim support policies may limit the Starburst's appeal to IS managers who want to equip employees with cutting-edge power. Similar to the Kingdom Pentium II-300 above it, the Starburst 300 features a generic configuration that includes 64MB of SDRAM, a 6.1GB hard disk, and a 17-inch Sampo Alpha Scan 760 monitor.

Home users and 3D graphics pros may be disappointed by the lack of an AGP graphics card—a Matrox Millennium II board occupies a PCI slot, leaving the AGP slot open for upgrading. The Sampo monitor provides adequate graphics display, but the small speakers produce tinny output. We found the keyboard comfortable to use—although some users may prefer more key travel—and the sturdy midtower case was easy to open. Closing it is another matter: You must perfectly align the latches along the base of the chassis to seal the case—a daunting task. The clutter-free interior offers plenty of open slots and drive bays for expansion.

Netis Starburst 300

Home users will balk at the lack of software and the less-than-friendly manuals. Netis's support policies are mixed, with a one-year parts, three-years labor warranty, and technical support available 10 hours per weekday and 6 hours on Saturday. Our calls to tech support went smoothly. ▶

Beyond the Top 20: Online

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Power Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- ◆ **NEC PowerMate Enterprise 300**
- ◆ **Premio Shadowhawk LX300**

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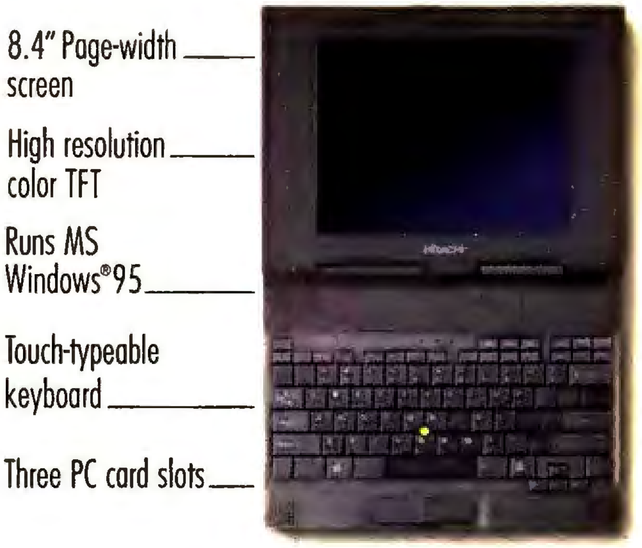

SIGNIFICANT FEATURES

Full-page width color screen-8.4" diagonal TFT.
Ultra portable (9.2" x 6.8" x 1.3") and ultra light (2.7 lbs).
Large, touch-typeable keyboard.
133MHz Intel Pentium® processor with MMX™ technology for superior video.
Runs Microsoft Windows® 95.
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24MB RAM, expandable to 40MB.
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Video out port with external resolution up to 1024 x 768.
SoundBlaster® Pro audio and integrated speakers.
Modem, memory, and other accessories available.

PWD0398

PC WORLD

TOP 20 BUDGET DESKTOPS

	SYSTEMS	Last month	Month tested	Street price (12/1/97)	CPU	Comments
1	★ **Dell Dimension XPS D266** 800/388-8542 www.dell.com	n/a	NEW	$2229	Pentium II-266	Very fast Pentium II with 14X-32X CD-ROM drive, 17-inch display, Office 97.
2	★ **Gateway 2000 G6-233** 800/846-2000 www.gateway.com	6	Feb 98	$1999	Pentium II-233	Affordable Pentium II, fast modem, great support; small hard disk, little software.
3	★ **Gateway 2000 GP5-233** 800/846-2000 www.gateway.com	1	Sept 97	$1973	Pentium MMX-233	Slight price dip for fast full multimedia system, 56-kbps modem; small hard disk.
4	★ **Gateway 2000 E-3110 233** 800/846-2000 www.gateway.com	7	Feb 98	$2049	Pentium II-233	Fast corporate PII, improved graphics, ethernet adapter, fine software bundle.
5	★ **Micro Express MicroFlex-P225J** 800/989-9900 www.microexpress.net	4	Jan 98	$1399	AMD K6-233	Bargain price on fast multimedia system, PC-to-TV graphics card, great warranty.
6	**Unicent Avanta T233** 800/308-3614 www.unicent.com	12	Jan 98	$2099	Pentium MMX-233	Another $100 off well-stocked SOHO PC with CD-ROM drive boosted to 14X-32X.
7	**CyberMax PowerMax** 800/437-4596 www.cybmax.com	5	Sept 97	$1249	AMD K6-166	Low-cost AMD K6 tower features around-the-clock support.
8	**Quantex QP5/200 SM-1** 800/896-4898 www.quantex.com	2	Oct 97	$1499	Pentium MMX-200	Affordable multimedia PC, 56-kbps modem, great support policies.
9	**DirectWave MVP VK6-233** 800/882-8108 www.directwave.com	n/a	NEW	$1899	AMD K6-233	Great configuration at low price, strong support; tinny speakers, slim manuals.
10	**Micron Millennia MME** 888/634-8799 www.micronpc.com	8	Jan 98	$1773	Pentium MMX-200	Budget SOHO system, excellent support; minimal RAM and hard disk space.
11	**Dell OptiPlex Gn+233** 800/388-8542 www.dell.com	9	Nov 97	$1867	Pentium MMX-233	Well-designed corporate PC with ethernet, fine support; no free drive bays.
12	**Micro Express MicroFlex-686/P200+LCE** 800/989-9900 www.microexpress.net	13	Aug 97	$1299	Cx6x86-PR200+	$100 off Cyrix-based multimedia PC, great warranty, improved CD-ROM drive.
13	**Micro Express MicroFlex P900D** 800/989-9900 www.microexpress.net	n/a	NEW	$1899	Pentium II-233	Least-expensive PII system, 64MB of RAM, excellent AGP graphics card.
14	**NEC Direction SPL 300** 888/863-2669 www.nec-now.com	n/a	NEW	$2199	Pentium II-300	Record-setting budget speedster, first PII-300 on chart, great buy for the price.
15	**Polywell Poly K6233Mx** 800/999-1278 www.polywell.com	17	Jan 98	$1850	AMD K6-233	Quick and well-configured system has large hard drive, gets $136 price drop.
16	**DTK Quin-57M/PM233** 800/289-2385 www.dtkcomputer.com	n/a	Oct 97	$1965	Pentium MMX-233	$396 price cut moves this PC from power to budget chart, updated CD-ROM drive.
17	**NMC Expert Pro II** 800/800-4662 www.natmicro.com	n/a	Sept 97	$2195	Pentium II-266	Large hard disk, ample RAM help boost this swift PII-266 onto the chart.
18	**Kingdom Pinnacle 233V MMX** 800/385-3436 www.kingdomcomputers.com	11	Jan 98	$1597	Pentium MMX-233	Well-rounded PC for small and home offices, expandable; poor keyboard.
19	**Unicent Avanta L233** 800/308-3614 www.unicent.com	n/a	NEW	$1999	Pentium II-233	Very fast PII-233 midtower, Microsoft Office 97 Professional; skimpy manuals.
20	**Innovative HV DT K6/200** 800/989-7253 www.innovative-hv.com	14	Feb 98	$1645	AMD K6-200	Quick system has PC-to-TV graphics card; short support hours, so-so monitor.

★ Best Buy   See features chart, page 240; test report, page 242.

n/a = not applicable

[1] For more information about all products in this chart, circle reader service no. 909.

[2] Insufficient data to give a rating.

NOW THOSE WITH NO MORE THAN $2000 to spend can buy a Pentium II system. While you can get the PII-233–based Micro Express MicroFlex P900D for $1899, Unicent's Avanta L233 costs just $100 more, provides top PII-233 performance, and comes with Microsoft Office 97 Professional. Dell's new Dimension XPS D266 emerges at the top of the chart; farther down, NEC's Direction SPL 300 is the first budget-priced PII-300. Not far off the chart, AST's Bravo MS 6266 features a network-savvy configuration for less than $1700. Also of note is the $1915 Hewlett-Packard Vectra VE, which boasts a terrific design but falters in our ratings due to a limited feature set and a somewhat high price.

SCORECARD

★ Overall rating	Price	Features and design	Vendor's system reliability	PC WorldBench score/performance	Vendor's support quality/policies	Reader service number [1]
85	expensive	very good	above average	261/outstanding	above average/best	708
81	average	good	average	247/very good	above average/best	709
81	average	good	average	240/very good	above average/best	710
81	average	good	average	250/very good	above average/best	711
80	inexpensive	good	[2]	249/very good	[2]/best	712
80	average	very good	[2]	239/very good	[2]/best	713
79	inexpensive	good	[2]	223/good	[2]/best	714
79	inexpensive	good	average	230/good	average/best	715
78	average	good	[2]	249/very good	[2]/best	716
78	average	satisfactory	above average	220/good	above average/best	717
77	average	satisfactory	above average	233/good	above average/best	718
77	inexpensive	good	[2]	217/good	[2]/best	719
77	average	good	[2]	252/outstanding	[2]/best	720
76	expensive	good	below average	269/outstanding	below average/good	721
75	average	good	[2]	240/very good	[2]/good	722
75	average	very good	[2]	241/very good	[2]/poor	723
75	expensive	good	[2]	260/outstanding	[2]/fair	724
74	average	good	[2]	237/very good	[2]/fair	725
74	average	satisfactory	[2]	255/outstanding	[2]/best	726
73	average	good	[2]	239/very good	[2]/poor	727
Scorecard weightings ▶	Price 25 percent	Features 25 percent	Reliability 15 percent	Performance 15 percent	Quality/policies 10 percent each	

This Month's Best Buys

1 DELL DIMENSION XPS D266

PRO: Outstanding multimedia performance

CON: Limited ISA expansion slots, somewhat pricey for the budget chart

Just last month, the Dell Dimension XPS D266 enjoyed a spot atop our power chart. But this newly tested D266, with its smaller hard disk and less RAM, costs a mere $2229—$420 cheaper than the $2649 machine it replaces. Its Pentium II-266 processor delivered an impressive PC WorldBench score of 261, enough to make this midtower our number one budget Best Buy.

Dell slimmed down its latest D266, but it still features the impressive 4MB STB Velocity 128 3D Accelerated Graphics Port graphics card and the 17-inch Dell 1000HS monitor that provides fine .26mm dot pitch display suitable for most business and multimedia use. Altec Lansing's ACS-290 speakers produce good sound, but hardcore gamers may want to spend the extra $50 for Creative Labs' Sound Blaster AWE64 sound board.

Dell Dimension XPS D266

A few hardware bugs and upgrade limitations persist. The XPS D266's modem doesn't work with DOS-only games, and although the 14X–32X CD-ROM drive is the fastest on our charts, experience suggests that only file transfers and installations benefit. Inside, there is only one free 16-bit ISA slot—none if you go with the AWE64 sound card—and three open PCI slots. A lone DIMM socket permits an addition to the included 32MB of SDRAM.

A three-year parts, one-year labor warranty protects the system. Despite the quirks, Dell has done well morphing its power champ into a budget standout.

2 GATEWAY 2000 G6-233

PRO: Very good performance and design

CON: Small hard drive, skimpy software bundle

For a buck under $2000, the Gateway 2000 G6-233 midtower system is a fast, well-supported PC that racks up a benchmark score of 247. The G6-233, which features a PII-233 processor, climbs to second place thanks to updated chart weightings that add extra value for AGP graphics. Even without the change, the G6-233 would be a good choice for small-business users who don't mind buying their own applications.

The configuration is pretty good for a low-cost Pentium II. You get Gateway's general-purpose EV700 17-inch monitor and the 4MB STB Velocity 128 3D AGP adapter.

Gateway 2000 G6-233

We liked the G6-233's user-friendliness. Gateway's strong tech support policies feature three years' coverage on parts and labor, as well as toll-free technical support 24 hours a day. ▶

PHOTOGRAPHS: KEN SMITH

TOP 20 BUDGET DESKTOPS

STANDARD FEATURES

	SYSTEMS	CPU	RAM (MB)	Secondary cache (KB)	Hard drive (GB)	Graphics adapter	Video RAM (MB/type)	Monitor tube/ viewable diagonal (inches)	Screen pitch (mm)	CD-ROM drive speed
1	Dell Dimension XPS D266*	Pentium II-266	32	512	4.3	STB Velocity 128 3D	4/SGRAM	17/15.8	.26	14X-32X
2	Gateway 2000 G6-233*	Pentium II-233	32	512	2.1	STB Velocity 128 3D	4/SGRAM	17/15.8	.28	12X-24X
3	Gateway 2000 GP5-233*	Pentium MMX-233	32	512	2	ST8 Virge 4MB 3D PCI	4/VRAM	17/16	.28	12X-24X
4	Gateway 2000 E-3110 233*	Pentium II-233	32	512	3.2	Permedia II AGP	8/SGRAM	17/15.9	.28	12X-24X
5	Micro Express MicroFlex-P225J*	AMD K6-233	32	512	3.1	ATI 3D Pro Turbo PC2TV	4/SGRAM	15/13.7	.28	12X-24X
6	Unicent Avanta T233	Pentium MMX-233	64	512	6.4	Matrox Millennium II	4/WRAM	17/15.8	.26	14X-32X
7	CyberMax PowerMax	AMD K6-166	32	512	3.2	Matrox Mystique	4/SGRAM	15/13.8	.28	12X-24X
8	Quantex QP5/200 SM-1	Pentium MMX-200	32	512	3.2	Matrox Mystique 22D	4/SGRAM	15/13.9	.28	12X-16X
9	DirectWave MVP VK6-233	AMD K6-233	64	512	7	Diamond Viper V330	4/SGRAM	17/16.1	.26	12X-24X
10	Micron Millennia MME	Pentium MMX-200	16	512	2.1	Diamond Stealth 3D 2000 Pro	4/EDO DRAM	15/13.6	.28	12X-24X
11	Dell OptiPlex Gn+233	Pentium MMX-233	32	256	3.2	integrated S3 Trio 64 V2	2/VRAM	15/13.8	.25	12X-24X
12	Micro Express MicroFlex-686/P200+LCE	Cx6xB6-PR200+	32	512	4	STB Velocity 3D	4/VRAM	17/15.8	.28	12X-24X
13	Micro Express MicroFlex P900D	Pentium II-233	64	512	3.2	ATI Xpert@Work	4/SGRAM	17/15.8	.28	12X-24X
14	NEC Direction SPL 300	Pentium II-300	32	512	4.3	Diamond Viper V330	4/SGRAM	15/13.9	.27	12X-24X
15	Polywell Poly K6233Mx	AMD K6-233	32	512	5.1	Diamond Stealth 3D 2000	4/EDO DRAM	17/15.6	.28	12X-24X
16	DTK Quin-57M/PM233	Pentium MMX-233	64	512	2.1	Diamond Stealth 3D 3000	4/VRAM	17/15.8	.28	12X-24X
17	NMC Expert Pro II	Pentium II-266	64	512	5.1	Matrox Millennium II	4/WRAM	17/15.9	.28	12X-24X
18	Kingdom Pinnacle 233V MMX	Pentium MMX-233	32	512	3.3	Hercules Dynamite 128	2/MDRAM	15/13.6	.28	12X-24X
19	Unicent Avanta L233	Pentium II-233	32	512	4.3	Matrox Mystique 220	4/SGRAM	17/15.8	.26	12X-24X
20	Innovative HV DT K6/200	AMD K6-200	32	512	3.2	ATI 3D Pro Turbo PC2TV	8/SGRAM	17/15.7	.28	12X-24X

* Best Buy [1] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology. [2] Downloads only, uploads at 33.6 kbps; uses Rockwell-Lucent's K56flex technology.

3 GATEWAY 2000 GP5-233

PRO: Affordable multimedia system

CON: Monitor is a bit fuzzy at high resolutions

At $1973, the Gateway 2000 GP5-233 midtower system is both stylish and affordable for a small or home office. The multimedia-laden PC includes a 12X–24X CD-ROM drive, an Ensoniq AudioPCI Wavetable sound card, and some fine Boston Acoustic speakers with subwoofer. Although this Pentium MMX-233 machine lacks some advanced multimedia features like AGP graphics, it posted a very good PC WorldBench score of 240.

On the whole, the GP5-233 is nicely constructed, although one careless detail surprised us: The wires between the modem and CD-ROM drive and the sound card weren't connected on our test unit. Gateway includes a comfortable keyboard and Microsoft's IntelliPoint mouse, which has a small wheel between its buttons to help you scroll through documents easily. The 17-inch Gateway EV700 display isn't the sharpest we've seen, though it's adequate for everyday business tasks. You also get Microsoft's Office 97 Small Business Edition software, which suits the needs of many small offices.

Gateway 2000 GP5-233

Gateway's support is top-flight. Besides the three-year warranty on parts and labor, you get round-the-clock phone support and a year of free on-site service.

4 GATEWAY 2000 E-3110 233

PRO: Fast system, easy-to-remove chassis

CON: Curved top of case makes it impossible to stack external components

The Gateway 2000 E-3110 233 is a high-performance budget system that competes well against corporate PCs from other major vendors. With its Pentium II-233 CPU, this business PC cranked out a PC WorldBench score of 250. It also features corporate perks such as an SMC Ether Power II 10/100 network interface card for easy high-speed network connections, plus DMI-2 client management software, all for $2049.

This month, Gateway upgraded the AGP graphics hardware on the E-3110 233 to an 8MB card based on the new Permedia II chip, which should enhance 3D

		EXPANDABILITY						CUSTOMER SUPPORT			
Modem speed (kbps)	Sound board	Case style	Max. RAM (MB)	Maximum secondary cache (KB)	Open RAM sockets	Open drive bays (ext./int.)	Open slots	Warranty for parts/labor (years)	Weekday toll-free support (hours)	Weekend support	Online support
56[1]	Yamaha OPL-4	midtower	384	512	1	3/1	4	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56[1]	Ensoniq AudioPCI	midtower	384	512	2	3/2	3	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56[1]	Ensoniq AudioPCI Wavetable	midtower	256	512	1	3/2	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56[1]	Ensoniq AudioPCI	midtower	384	512	2	3/2	2	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
56[2]	Sound Blaster AWE64	midtower	256	512	2	3/0	3	4/4	24	Sat., Sun.	WWW
56[1]	Ensoniq AudioPCI	midtower	256	512	5	3/1	4	5/3	24	Sat., Sun.	BBS, WWW
33.6	Ensoniq AudioPCI Wavetable	tower	384	512	5	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56[2]	Ensoniq AudioPCI	midtower	256	512	4	3/2	5	3/1	24	Sat., Sun.	BBS, WWW
56[2]	Sound Blaster AWE64	midtower	256	512	4	3/1	4	3/3	24	Sat., Sun.	BBS, WWW
56[1]	integrated	midtower	256	512	1	2/1	4	3/1	24	Sat., Sun.	BBS, CIS, WWW
not included	Vibra 16	desktop	256	256	1	0/0	3	3/1	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	Sound Blaster AWE64	midtower	512	512	2	2/3	3	4/4	24	Sat., Sun.	WWW
56[2]	Opti 32W-3D	midtower	512	512	2	3/0	4	4/4	24	Sat., Sun.	WWW
56[1]	integrated	midtower	384	512	2	3/0	4	3/3	24	Sat., Sun.	AOL, BBS, CIS, MSN, WWW
33.6	OEM CS37W-3DIS/C	midtower	256	512	5	3/0	4	3/5	24[3]	Sat., Sun.[3]	WWW
56[1]	Sound Blaster AWE64	midtower	256	512	4	3/2	4	2/2	9	none	BBS, WWW
33.6	Sound Blaster CT 3600	midtower	384	512	4	1/1	4	3/3	9	none	WWW
33.6	Ensoniq AudioPCI ES1370	midtower	256	512	4	2/3	4	varies[4]/1	15.5	Sat.	WWW
not included	Ensoniq AudioPCI	midtower	384	512	3	2/1	2	5/3	24	Sat., Sun.	BBS, WWW
56[1]	Crystal PnP Audio System	desktop	256	512	4	2/2	3	3/3	9	none	AOL, BBS, CIS, MSN, WWW

[3] First year only, drops to 10 hours weekdays and Saturday thereafter.

[4] Five years on CPU and main RAM, three years on other parts.

performance. The E-3110 even has equipment that many corporate PCs lack, such as a 56-kilobits-per-second x2 modem with bundled communications software.

Like many of the best budget systems, the E-3110 233 comes with a 17-inch monitor and 32MB of SDRAM. The EV700 display is acceptable for average use, but for high-end graphics tasks—or even work with small fonts in spreadsheets—spending the extra $75 for the better Vivitron 700 17-inch monitor may be worth it.

Gateway's PC documentation and support are both top-notch, and our readers praise the company's service.

Gateway E-3110 233

5 MICRO EXPRESS MICROFLEX-P225J

PRO: Terrific price, great performance

CON: Manual too technical, loud keyboard

The Micro Express MicroFlex-P225J may not be much to look at, but it packs serious performance with its AMD K6-233 processor. The P225J was once the fastest PC on the budget Top 20, and its strong 249 PC WorldBench score and low $1399 price still make this plain but well-supported midtower worthy of a Best Buy.

The MicroFlex-P225J comes with many of the usual components and a few cool ones, too. One of its best features is the ATI 3D Pro Turbo PC2TV video card, which you can also hook up to your television set, VCR, or camcorder. And its wavetable-equipped Sound Blaster AWE-64 audio card sounded great in our tests.

Otherwise, the P225J is a bare-bones box that will warm the hearts of nerds and corporate buyers. There is no software bundle at this price, and the manual is extremely complicated. No mollycoddling easy-open fasteners for the case, either: You have to remove four Phillips-head screws to get inside the one-piece metal box. Also, you'll want to seriously consider buying a keyboard other than the one provided with our test unit; it had unusually tall keys and made an annoyingly loud clacking sound when we typed on it. ▶

MicroFlex-P225J

Micro Express's support is a mixed bag. Its policies are among the best in the industry, including a four-year parts and labor warranty, free on-site service for the first year, a guaranteed two-day turnaround on factory repairs, and round-the-clock tech support. But getting through by phone requires patience—we had to leave messages three of the five times we called. Once we reached the reps, however, we found them courteous and helpful.

New This Month

The following PCs made our budget desktops chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

9 DIRECTWAVE MVP VK6-233

PRO: Affordable, big hard drive, 64MB of RAM

CON: Sparse documentation, poor speakers

Based on the K6-233 CPU from AMD, DirectWave's $1899 MVP VK6-233 system comes decked out with hardware you'll find on more expensive machines, including an excellent video card and monitor, a 7GB hard drive, a 56-kbps speakerphone modem with telephony software, and a Sound Blaster AWE64 audio card. What's ▶

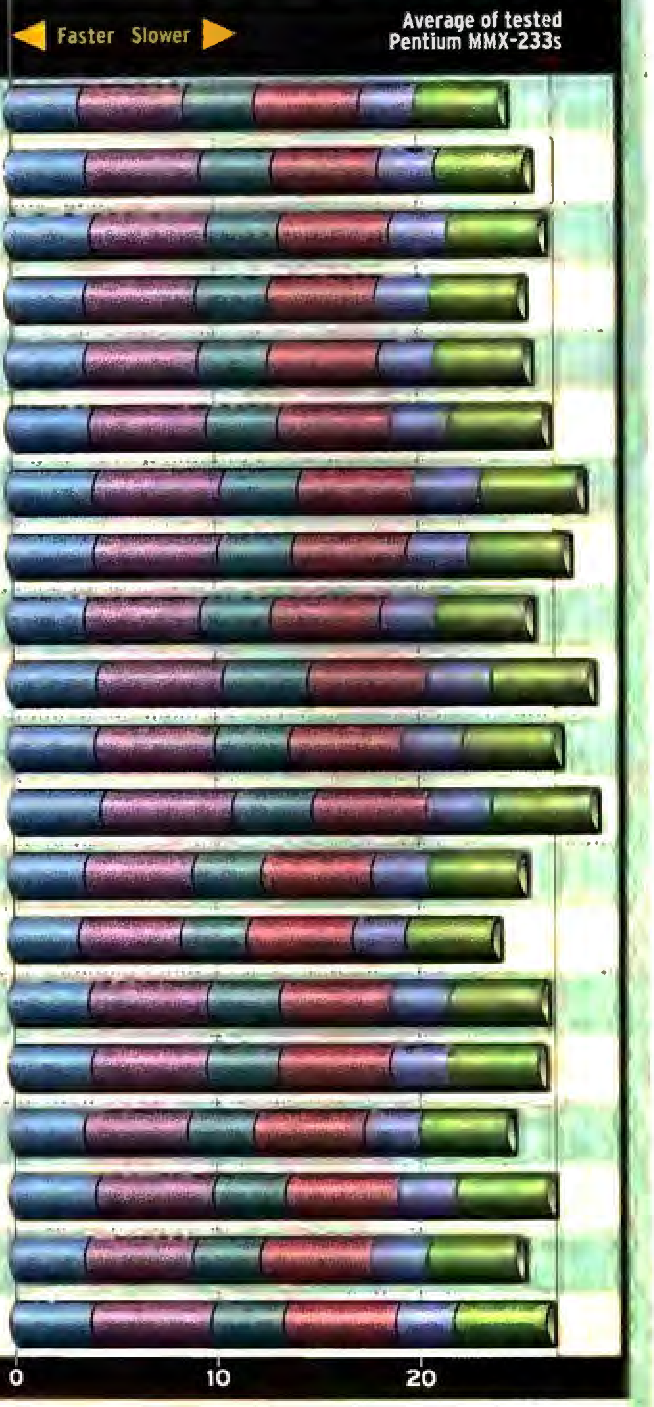
DirectWave MVP VK6-233

TOP 20 BUDGET DESKTOPS

TEST REPORT

	SYSTEMS	CPU	RAM (MB)	Secondary cache (KB)	PC WorldBench score
1	Dell Dimension XPS D266*	Pentium II-266	32	512	261
2	Gateway 2000 G6-233*	Pentium II-233	32	512	247
3	Gateway 2000 GP5-233*	Pentium MMX-233	32	512	240
4	Gateway 2000 E-3110 233*	Pentium II-233	32	512	250
5	Micro Express MicroFlex-P225J*	AMD K6-233	32	512	249
6	Unicent Avanta T233	Pentium MMX-233	64	512	239
7	CyberMax PowerMax	AMD K6-166	32	512	223
8	Quantex QP5/200 SM-1	Pentium MMX-200	32	512	230
9	DirectWave MVP VK6-233	AMD K6-233	64	512	249
10	Micron Millennia MME	Pentium MMX-200	16	512	220
11	Dell OptiPlex Gn+233	Pentium MMX-233	32	256	233
12	Micro Express MicroFlex-686/P200+LCE	Cx6xB6-PR200+	32	512	217
13	Micro Express MicroFlex P900D	Pentium II-233	64	512	252
14	NEC Direction SPL 300	Pentium II-300	32	512	269
15	Polywell Poly K6233Mx	AMD K6-233	32	512	240
16	DTK Quin-57M/PM233	Pentium MMX-233	64	512	241
17	NMC Expert Pro II	Pentium II-266	64	512	260
18	Kingdom Pinnacle 233V MMX	Pentium MMX-233	32	512	237
19	Unicent Avanta L233	Pentium II-233	32	512	255
20	Innovative HV DT K6/200	AMD K6-200	32	512	239

*Best Buy



HOW WE TEST All systems are tested with PC WorldBench, PC World's application-based benchmark. A higher PC WorldBench score is better. All PCs have Windows 95, and video resolution is set to 800 by 600 in 256 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 score is a sum of the weighted result of each script: Word (25 percent), Excel (20 percent), Picture Publisher (15 percent), Paradox (15 percent), WordPerfect (15 percent), and 1-2-3 (10 percent). For more details on our benchmark and how we run it, see PC World Online (www.pcworld.com/testing).

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i

more, it scored 249 on our PC WorldBench tests—within 5 percent of a typical 266-MHz PII system. The lone problem: The bundled Arkin NX-5100 speakers emitted fuzzy audio nearly devoid of bass.

This midtower will appeal to tech-savvy system administrators who want fast, affordable PCs. Bring your own network card and troubleshooting skills, though, since it doesn't come with much of either.

Thank heaven for the three-year parts and labor warranty. But we spent at least 20 minutes on hold during each anonymous call to tech support, and sometimes we were rushed off the phone with responses that were too brief to be useful.

13 MICRO EXPRESS MICROFLEX P900D

PRO: Outstanding budget performance, nice monitor and video card, excellent support policies
CON: Poor case design, outdated manuals

MicroFlex P900D

If somebody has told you that you can't afford to buy a Pentium II PC, don't believe it. At $1899, the Micro Express Micro-Flex-P900D is the least expensive PII machine on the budget chart. And with a PC WorldBench score of 252, the P900D offers performance on a par with that of its fellow PIIs.

The P900D includes some great components: The handsome Princeton EO70 17-inch monitor has excellent clarity, and the 4MB ATI Xpert@Work card was recommended in our December roundup of AGP graphics boards. The P900D also comes with 64MB of SDRAM—a remarkably hefty chunk of memory for a budget desktop. But most users won't recognize the makers of the 56-kbps K56flex modem or the sound card and speakers, which emit only adequate sound.

This generic, putty-colored midtower would benefit from better engineering. The power switch is inconveniently located on the back of the chassis, and some tricky latches and very small thumbscrews provide access to the interior—eventually. There are no free internal hard bays.

Micro Express's support policies are top-notch, with four years' coverage on both parts and labor, as well as 24-hour telephone support. The addition of a basic in-house manual and troubleshooting guide is an improvement, but the setup guide is a bit outdated with its diagrams of 5.25-inch floppy drives.

The P900D's flaws keep it out of Best Buy territory, but for top performance at a rock-bottom price, it's worth considering.

14 NEC DIRECTION SPL 300

PRO: Fastest budget PC, cheapest PII-300 ever
CON: Limited expandability

NEC sure knows how to make an entrance: The first midtower we've reviewed from its newly launched direct-mail line made our budget chart. The NEC Direction SPL 300 features a Pentium II-300 processor yet costs just $2199. That's not a typo, and the SPL 300 isn't some stripped-down box, either—it arrived fully loaded with a CD-ROM drive, a 56-kbps modem, a sound card, and speakers.

The SPL 300 delivered big in our PC WorldBench tests, posting a 269 score — the best ever for a budget system, and among the elite performers overall. We expected a lot of cut corners but found a well-rounded package instead. There's a 4.3GB hard disk, a 12X–24X CD-ROM drive, and a 15-inch NEC C550 monitor that provides a sharp picture, though it lacks the generous controls found on NEC's higher-end lines. The 4MB Diamond Viper V330 AGP video card delivers high-end 3D performance, but the built-in audio lacks a wavetable. NEC tops it off with the Microsoft Office 97 Small Business Edition software suite.

NEC Direction SPL 300

While the SPL 300's chunky styling won't win any design contests, we love the sturdy construction. The interior is cleanly laid out but has just one free ISA slot, a common situation with new PII PCs. Neophytes will appreciate the thorough manual. NEC's support consists of a three-year parts and labor warranty and 24-hour tech support, though readers have complained about NEC's service in the past.

By any measure, you can't ignore a machine this powerful at this price.

19 UNICENT AVANTA L233

PRO: Fast for a PII-233, excellent support policies
CON: Built-in AGP slot, but no AGP graphics card

Unicent Avanta L233

Feeling left out of the Pentium II revolution? Check out the $1999 Unicent Avanta L233, a Pentium II-233–based midtower that garnered a PC WorldBench score of 255—tops among PII-233 PCs. With 32MB of SDRAM and a 4.3GB hard drive, the Avanta L233 resembles a typical budget system, but this PC is tailored for those who need a machine for the office. The bundled Microsoft Office 97 Professional, for example, adds the Access database application to the standard suite.

The Avanta L233 also shows its professional roots by omitting an AGP graphics card: A 4MB Matrox Mystique 220 board sits in a PCI slot—while the included AGP slot sits empty. Presentations get a boost from the powerful Altec Lansing speakers and subwoofer, and the 17-inch display is welcome for large spreadsheets. Unfortunately, we found the monitor's controls difficult to decipher, especially since no manual was included. The system manuals were otherwise tersely adequate.

Unicent boasts excellent support policies, with a five-year warranty on parts and three years on labor, and 24-hour tech support every day. But when we called Unicent's tech support, we were put on hold repeatedly, only to be cut off after waiting as long as 20 minutes. Despite a price that may tempt bargain-hunters, the Avanta L233 is best suited to savvy users who need a fast PC for the job. ▶

Beyond the Top 20: Online

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 20 Budget Desktops chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

◆ **ALR Evolution 4000**
◆ **AST Bravo MS 6266**
◆ **Digital PC 3010**
◆ **HP Vectra VE**
◆ **Total Peripherals K6-200 Desktop**

National Software Testing Laboratory, Inc. (NSTL) found the EPSON Stylus Color 600 outperforms avg. speeds of the HP DeskJet 694C by 31% and the Canon BJC-4200 by 38%. Print speeds tested with Windows 95 and Microsoft Word, Microsoft Excel, Microsoft PowerPoint, Adobe PageMaker and Adobe Photoshop. Prices may vary. EPSON and EPSON Stylus are registered trademarks of Seiko Epson Corp. Micro Piezo and PerfectPicture are trademarks of Epson America, Inc. © 1997 Epson America, Inc.

AT 1440 DPI
YOU SEE SHE'S DANCING
SWAN LAKE. UNDER WATER.

lightshow
waterproof
fabrics.

TOP 10 NOTEBOOK PCs

	POWER NOTEBOOKS	Last month	Month tested	Street price (12/4/97)	CPU	Comments
1	Micron TransPort XKE 233 888/634-8799 www.micronpc.com	2	Feb 98	$4750	Pentium MMX-233	$688 price cut moves top multimedia machine into first place; heavy.
2	Gateway 2000 Solo 2300XL 800/315-2536 www.gateway.com	1	Dec 97	$3599	Pentium MMX-233	Ultrafast, marathon battery life, 56-kbps modem; slow 10X CD-ROM drive.
3	Dell Latitude CP M233ST 800/388-8542 www.dell.com	5	Jan 98	$3699	Pentium MMX-233	$700 price drop on fast notebook, lightest on chart; no modem.
4	Dell Inspiron 3000 M233XT 800/388-8542 www.dell.com	4	Jan 98	$3399	Pentium MMX-233	$600 price cut, 13.3-inch screen good for presentations; no modem.
5	Quantex H 1330 800/896-4898 www.quantex.com	n/a	NEW	$3599	Pentium MMX-233	Long-lasting battery, very fast; inadequate software bundle.
	BUDGET NOTEBOOKS					
1	Acer Extensa 391C 800/733-2237 www.acer.com/aac	n/a	NEW	$1799	Pentium MMX-133	Great value on very fast unit, long battery life; poor screen for graphics.
2	CTX EzBook 750MS 800/888-9052 www.ctxintl.com	3	Aug 97	$1619	Pentium MMX-150	Reasonably fast for low-cost notebook; slow CD-ROM drive.
3	Fujitsu LifeBook 435Dx 888/466-8434 www.fujitsu-pc.com	4	Oct 97	$1599	Pentium MMX-133	$200 drop in price, snappy PMMX-133; on the heavy side.
4	Toshiba Satellite 225CDS 800/334-3445 www.computers.toshiba.com	1	Nov 97	$1599	Pentium-133	Well-designed, low price; tech support free for only one year.
5	Transmonde Vibrant 133T 800/988-2882 www.transmonde.com	5	June 97	$2324	Pentium-133	Monster battery life, reasonably priced unit; limited support hours.

Best Buy See features chart, page 250.

n/a = not applicable [1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive. [2] For more information about all products in this table, circle reader service no. 902.

BY NOW YOU'VE NO DOUBT heard the buzz about "sub-$1000" desktop computers. Wondering whether notebook PC prices are about to fall off a cliff, too?

While fringe vendors now offer notebooks for under a grand, don't expect to see such bargains from major companies anytime soon. Notebook prices don't follow the lead of desktops because portables cost more to make and reach a smaller, more select market. But an analysis of two years of *PC World* data reveals a significant downward trend in pricing.

The cost of top-end notebooks with the latest processors hasn't changed much since March 1996. Vendors have kept the average price at about $3700 by pushing screen size to the maximum and stuffing these premium machines with multimedia features.

But more mainstream portables have fallen in price by at least $200 following the entrance of Acer, Fujitsu, Hitachi, and other competitors into the market. On this month's budget chart the average cost of a notebook, $1788, marks a two-year low. "Notebook prices are going down, but not as dramatically as desktops," says IDC analyst Randy Giusto.

This month's budget chart bristles with very inexpensive notebooks, but one stands out—the $1799 Acer Extensa 391C. This notebook—one of eight new portables tested this month—earns a Best Buy by delivering great performance at a terrific price. The Fujitsu LifeBook 435Dx, also priced to sell, moves up a notch into third place with a $200 price drop.

At press time, as Intel prepared to announce its new Pentium MMX-266 processor, the cost of high-end notebooks was also taking a dive. A huge $688 reduction shoots the Micron TransPort XKE 233, a good notebook for presentations, into first place on our power chart. Dell also reduced its prices, keeping the Latitude and Inspiron in the spotlight for the third month in a row. The Quantex H 1330—a fast notebook at a reasonable price—is the only newly tested notebook to make it onto the power chart.

POWER NOTEBOOKS

This Month's Best Buy

1 MICRON TRANSPORT XKE 233

PRO: Full range of multimedia features, fast

CON: Costly, heavy

If you need a notebook for presentations and want almost every state-of-the-art audio and visual gizmo that's available, then the Micron TransPort XKE 233 is your best bet. A $688 slash in price propels it into the

PHOTOGRAPHS: KEN SMITH

SCORECARD

★ Overall rating	PC WorldBench score/ performance	Price	Vendor's system reliability	Features and design	Vendor's support quality/policies	Battery life (hours:min)/ rating	Traveling weight [1]	Reader service number [2]
89	241/very good	very expensive	above average	outstanding	[3]/fair	8:11/outstanding	heavy	615
88	244/outstanding	average	average	outstanding	below average/fair	8:51/outstanding	average	616
84	241/very good	average	average	good	average/fair	4:38/good	light	617
84	238/very good	inexpensive	average	very good	average/fair	3:33/good	average	618
84	239/very good	average	[3]	very good	[3]/fair	5:53/very good	average	619
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	
90	204/outstanding	very inexpensive	[3]	very good	[3]/fair	5:50/very good	average	620
87	198/very good	very inexpensive	[3]	good	[3]/poor	4:21/good	average	621
85	192/very good	very inexpensive	[3]	satisfactory	[3]/fair	3:42/good	average	622
82	165/satisfactory	very inexpensive	average	good	below average/fair	3:19/good	average	623
80	190/very good	average	[3]	very good	[3]/poor	6:19/outstanding	heavy	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	

[3] Insufficient data to give a rating.

Best Buy slot on this month's power chart.

The TransPort XKE's Pentium MMX-233 processor, supported by an above-average 64MB of RAM, a 512KB secondary cache, and a 5GB hard drive, chalked up an impressive PC WorldBench score of 241, making this system among the fastest portables on the market today.

More speed means quicker screen transitions in graphics-dense applications. Presenting in front of a group? While the notebook's 13.3-inch screen delivers crisp, rich images, the TransPort XKE puts three audio and visual output ports at your disposal. In addition to the standard CRT port for connecting to a monitor, the TransPort XKE comes with an RCA composite port that allows hookup to an overhead display or television. Rarer yet, it has an S-Video port, which delivers even greater resolution when the system is connected to an external screen that supports this technology.

The TransPort XKE has better-than-average speaker sound for a notebook—but that doesn't mean you get high-fidelity audio. The headphones included in the bundle do improve the sound. Like a few other high-end portables we've seen, this one comes with autoplay, so you don't have to turn the notebook on to play your audio CDs. Plug in the headphones, and the CD-ROM drive turns on automatically; controls on the face of the drive make adjusting the sound a snap.

TransPort XKE 233

Micron positioned the two drive bays at the front of the notebook rather than on the side, a design decision that makes it easier for the user to swap discs. The bays can hold the CD-ROM and floppy drives simultaneously; or, if you prefer, they can accommodate two battery packs.

In keeping with the spirit of putting everything in this notebook but bucket seats, Micron also includes two pointing devices—a touchpad and an eraserhead—as part of the standard package. Gamers will appreciate the MIDI/joystick port, an uncommon feature on a notebook. Dedicated ports allow you to use both a PS/2 keyboard and a mouse at the same time, just like on a desktop PC. You may want to add an external keyboard because the wrist rests on the TransPort XKE are small, even for a portable computer.

The TransPort XKE has several things going for it as a traveling companion. You get outstanding battery life of more than 8 hours—almost twice that of most notebooks today. Another plus is the two modem ports: one for a phone cord, and the other for a cell phone (in case you have to transmit from remote locations). The notebook has some limitations, however. The company unfortunately did not see fit to include the fastest modem available. You get a 33.6-kilobits-per-second internal model, which seems stingy considering the system's high price. Moreover, frequent travelers will think twice before lugging this 9.2-pound machine everywhere they go.

Micron notebooks boast above- ▶

TOP 10 NOTEBOOK PCs

STANDARD FEATURES

	POWER NOTEBOOKS	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	Micron TransPort XKE 233*	Pentium MMX-233	9.2	64	5	active	13.3	1024 x 768	65,536	lithium ion	touchpad, eraserhead
2	Gateway 2000 Solo 2300XL	Pentium MMX-233	7.8	32	3	active	12.1	800 x 600	65,536	lithium ion	touchpad
3	Dell Latitude CP M233ST	Pentium MMX-233	6.8	32	2.1	active	12.1	800 x 600	16.8 million	lithium ion	touchpad
4	Dell Inspiron 3000 M233XT	Pentium MMX-233	7.6	32	2.1	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
5	Quantex H 1330	Pentium MMX-233	7.8	32	3	active	13.3	1024 x 768	16.8 million	lithium ion	touchpad
	BUDGET NOTEBOOKS										
1	Acer Extensa 391C*	Pentium MMX-133	7.2	32	1.6	dual-scan	12.1	800 x 600	65,536	NiMH	touchpad
2	CTX EzBook 750MS	Pentium MMX-150	7.8	16	1.4	dual-scan	12.1	800 x 600	65,536	NiMH	touchpad
3	Fujitsu LifeBook 435Dx	Pentium MMX-133	8.4	16	1.3	dual-scan	12.1	800 x 600	256	NiMH	touchpad
4	Toshiba Satellite 225CDS	Pentium-133	7.8	16	1.3	dual-scan	12.1	800 x 600	16.8 million	lithium ion	eraserhead
5	Transmonde Vibrant 133T	Pentium-133	9.6	32	1.4	active	12.1	800 x 600	65,536	lithium ion	touchpad

*Best Buy ● Yes ○ No n/a = not applicable

[1] Includes computer, adapter, power cord, and floppy drive or CD-ROM drive.

average reliability. The TransPort XKE comes with a one-year parts and labor warranty. Unlimited toll-free tech support is available around the clock.

New This Month

The following PC made our power notebooks chart for the first time this month. For original reviews of previously tested PCs on the chart, visit our Web page (www.pcworld.com/t20pcs).

5 QUANTEX H 1330

PRO: Very nice display, fast, good battery life

CON: Poor software bundle, no port covers

Quantex's latest entry into the power notebook market—the elegant H 1330—gives you hot-rod speed and a large screen for presentations. You don't get all the latest multimedia features of the Micron TransPort XKE 233, but neither do you have to cancel your next vacation to pay for it.

Sticker-priced at $3599, the Quantex H 1330 comes loaded with a Pentium MMX-233 engine, 32MB of SDRAM, and 512KB of secondary cache. This combination enabled the notebook to outclass all the other new contenders we saw this month, turning in a scorching PC WorldBench score of 239, the fifth-fastest notebook on record.

In addition to all its horsepower, the H 1330 delivers sparkling images on a crisp 13.3-inch active-matrix display at 1024 by 768 resolution. You get plenty of cargo room with a 3GB hard drive, but you can't install the 12X–20X CD-ROM and floppy drives at the same time.

The H 1330 won't disappoint you on the road. Most impressive is the system's single lithium ion battery, which fueled the notebook for nearly 6 hours. You can add a second battery if you're willing to relinquish both your CD-ROM and floppy drives.

This portable isn't exactly light on the shoulder at 7.8 pounds, but that's not unusual for a power notebook. A 33.6-kbps PC Card modem comes standard.

The keyboard is responsive and snappy, with conveniently large <Shift> and <Enter> keys—but the backspace key is small. Like many notebooks today, the H 1330 comes with a Universal Serial Bus port. And its ability to expand to 144MB of RAM exceeds the offerings from many vendors.

Quantex H 1330

We were disappointed to discover that Quantex had skimped in a few areas. Most expensive notebooks come with at least a few applications, such as Microsoft Works and games, but the H 1330 includes only communications software—Cheyenne's Bitware. Not even a lousy browser. The unit lacks a cover door for the ports on the back, too. Though these little doors do tend to break easily, exposed ports make us nervous. As with most notebooks today, the stereo system is barely adequate: Don't expect to rattle any windows when you pump up the volume.

Quantex offers a standard one-year parts and labor warranty and round-the-clock technical support.

BUDGET NOTEBOOKS

This Month's Best Buy

1 ACER EXTENSA 391C

PRO: Long battery life, fast, very affordable

CON: Lackluster dual-scan screen

Acer's Extensa 391C proves that a notebook can deliver very high performance—at the office and on the road—for well under $2000.

Not only did the gracefully curved, charcoal-gray Extensa 391C blow away every other budget portable on our chart this month in performance, but it's the fastest Pentium MMX-133 portable we've ever tested. Still, speed alone doesn't explain its Best Buy status; it's also cheap. Acer gives

		EXPANDABILITY					CUSTOMER SUPPORT			
CD-ROM drive speed	Modem speed (kbps)	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-20X	33.6	192	2	●	●	●	1/1	24	Sat., Sun.	BBS, CIS, WWW
10X	56[2]	192	1	○	●	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-20X	n/a	128	1	●	○	●	1/3	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-20X	n/a	144	1	●	○	●	1/1	24	Sat., Sun.	AOL, BBS, CIS, WWW
12X-20X	33.6	144	1	●	○	●	1/1	24	Sat., Sun.	BBS, WWW
12X-20X	33.6	128	0	○	●	●	1/1	24	Sat., Sun.	BBS, CIS, WWW
6X	n/a	72	2	●	●	●	1/1	12	none	WWW
10X	n/a	80	1	●	●	●	1/1	24	Sat., Sun.	WWW
10X	n/a	144	1	●	●	●	1/1	24	Sat., Sun.	BBS, CIS, MSN, WWW
12X-16X	33.6	64	1	○	●	●	1/1	11	none	WWW

[2] Downloads only, uploads at 33.6 kbps; uses 3Com/U.S. Robotics' x2 technology.

Acer Extensa 391C

you the fastest CD-ROM drive on the budget chart and a long-lasting battery—all for an eminently reasonable price of $1799.

Nothing is flawless, though. If you do a lot of word processing, the Extensa's 12.1-inch screen is fine. But for graphics work, it's no prizewinner. In particular, dark colors have the washed-out appearance typical of early dual-scan technology.

Having crabbed about that, we like everything else about this notebook. The keyboard is easy to use and has a snappy, firm feel. Moreover, commonly used keys, such as backspace, are large—an important feature many notebook makers ignore. The responsive touchpad tracked better than many others we've tested (touchpads tend to be less accurate than other types of pointing devices).

Away from the office, the Extensa 391C should hold up nicely. So will your arms: The notebook travels at a sprightly 7.2 pounds. It has no port covers, but the ports themselves are recessed deeply enough to stay out of harm's way.

An internal modem, like the Extensa's 33.6-kbps model, gives you one less thing to forget during last-minute packing. Unfortunately, the floppy drive is external.

Acer says its notebooks have *heuristic* power-management: They learn how you work, and use that knowledge to save power. Heuristic logic seems to be effective, judging from the nearly 6 hours of battery life the Extensa 391C's nickel–metal hydride battery delivered.

You also get a standard 1.6GB hard drive, an internal 12X–20X CD-ROM drive, and sound capabilities for your musical moments. In our tests, the internal speakers were loud enough but had the usual tinny notebook fidelity. Break out the headphones, though, and the sound achieves Walkman quality.

Acer provides the standard one-year warranty on parts and labor, in addition to round-the-clock telephone support. Unfortunately, we don't have enough data to rate the quality of Acer's support or the reliability of its systems.

FUTURE NOTEBOOKS

DVD: "Yeah, Baby!"

AIR TRAVELERS ALERT! You're no longer stuck with bad in-flight movies. Our tests of two new second-generation DVD notebooks (see *New Products*) indicate that they will play an entire movie on just one battery charge (we used the 90-minute *Austin Powers: International Man of Mystery*). In each test, the battery kept on ticking past the 2-hour mark.

The $4999 Panasonic CF-63, a shipping unit, delivered outstanding video with only an occasional flicker. Austin Power's sixties-style suit couldn't have been a more shocking blue. As Austin would say, "It was groovy, man."

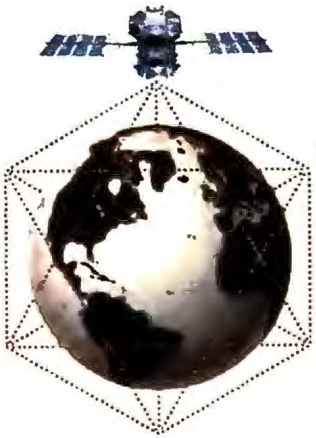
In contrast, the $5799 Toshiba Tecra 750DVD we tested—a preproduction unit—wasn't ready for show time. It produced very jagged images, particularly during Austin's wild dance routines. We suspect the problems were limited to that particular unit and aren't typical of the Tecra 750DVD line. Look for a review of the Panasonic CF-63 in our May issue. ■

Beyond the Top 10: Online

We evaluated these systems along with the others, but they didn't score high enough to reach the Top 10 Notebook PCs chart. For write-ups, see PC World Online (www.pcworld.com/t20pcs).

- **Akia Tornado TX233**
- **AST Ascentia M5160**
- **Fujitsu LifeBook 765 Tx**
- **Gateway 2000 Solo 5100XL**
- **IBM ThinkPad 380ED**
- **WinBook XL PMMX-233**

INTRODUCING SKYMAP™ PRO.
GETTING LOST AN



A network of 24 U.S. Global Positioning System (GPS) satellites constantly download positioning data to SkyMap™ Pro's GPS antenna attached to your notebook PC. So you'll always know where you are and where you're going. In real time.

SkyMap transforms your notebook PC into a GPS-guided navigation and map system. It includes detailed maps of the entire 50 states, a compact 12-channel GPS antenna that plugs into your notebook's PC card slot, a hand-held Remote Commander and 2 CD-ROM disks loaded with maps, 500,000 searchable business listings, major airport layouts, plus an integrated contact management and landmark Address Book.

(Notebook PC not included.)

The powerful 12-channel antenna weighs but a few ounces

And the Remote Commander lets you operate SkyMap functions without touching your mouse or keyboard.

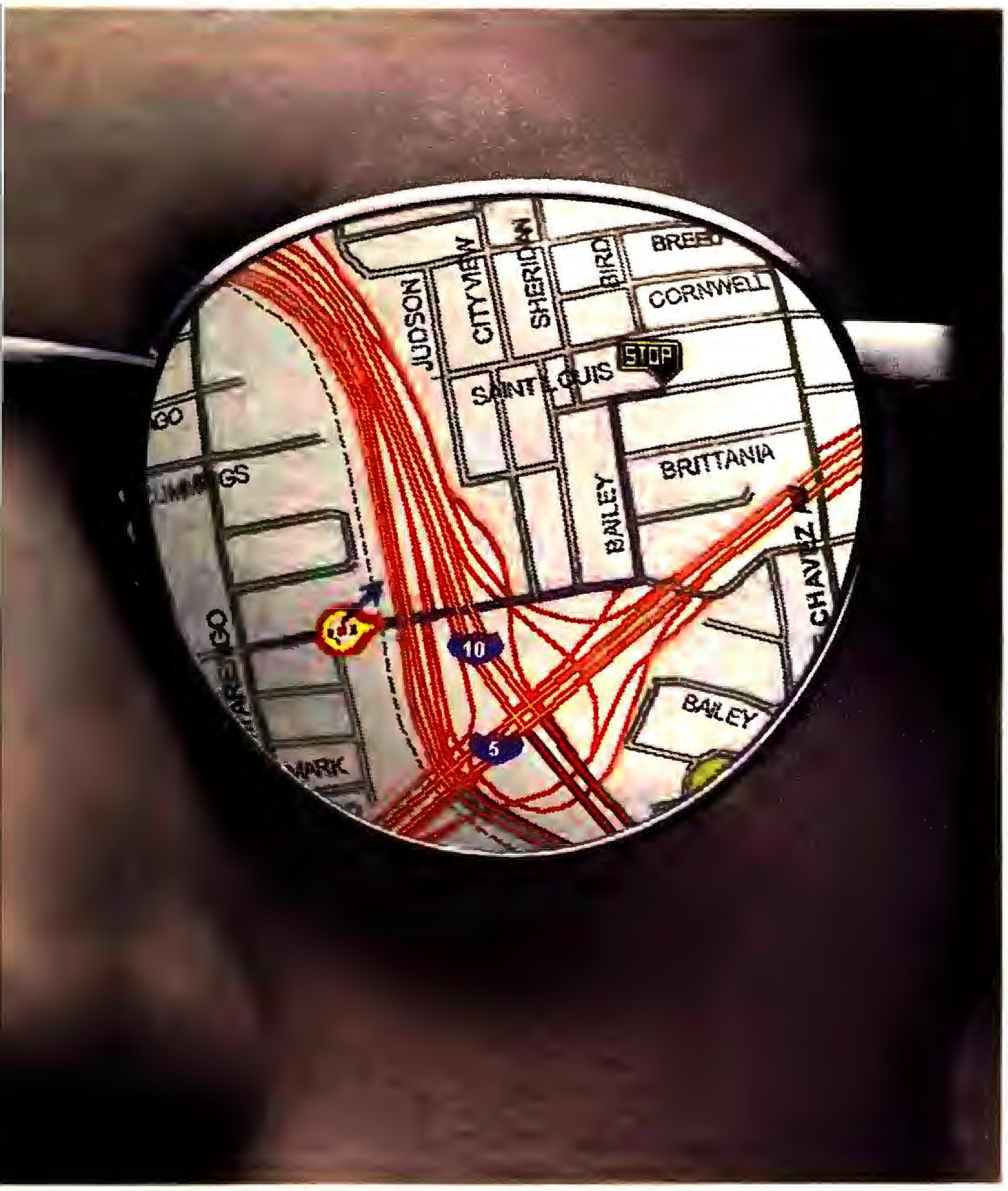
SKYMAP PRO. THE ULTIMATE GPS AND MAP SYSTEM FOR THE MOBILE PROFESSIONAL.

When you're traveling on business, time is your most precious asset. And SkyMap Pro from Etak helps you make the most of it. It helps you get where you're going. Without getting lost. And it helps you be more productive along the way.

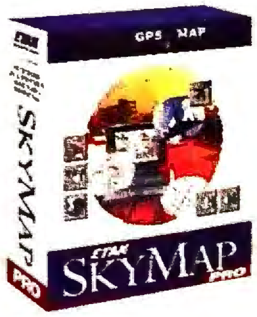
SkyMap Pro is the world's most complete mobile GPS and map system for your Windows® 95 notebook PC. It lets you pre-plan your travel routes. And as you travel, GPS satellites and detailed maps show you where you are, where you're going and let you map out how you're going to get there. In real time.

The GPS tracking system is generally accurate within 100 meters, however, various factors may affect the tracking system and further impede its ability to accurately track location. Map data contained in this product may contain errors and omissions

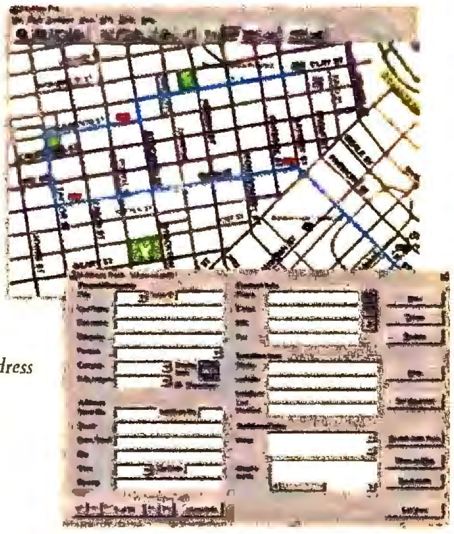
T’S THE DIFFERENCE BETWEEN O GETTING THERE.



SkyMap Pro, the ultimate GPS and map system for the mobile professional, and SkyMap Traveler, the complete GPS and map system for the recreational traveler, are available through resellers. (Call 1-888-2-SKYMAP for the one nearest you.) Both products are backed by a 30-day money back guarantee and a one-year limited warranty.



SkyMap pinpoints your position on the map display and tracks your progress toward your destination. Voice Alerts and multiple waypoints help keep you on track. SkyMap Pro integrates a contact management and landmark Address Book that enables you to import data from applications like Access, Act! and Excel. And from the Address Book, you can attach and open files including spreadsheets, memos, pre-recorded trips, or a picture of your client.*



Do not use this product in any way that interferes with safe vehicle operation.

Always secure system components.

Moreover, SkyMap Pro integrates a powerful contact management and landmark Address Book that includes import and file attachment capabilities that simplify communication and help you manage your life on the road. SkyMap Pro. It not only gets you there. It gets you organized. And you get it all for a suggested retail price of just $299.95. For the name of your nearest Etak SkyMap reseller, call **1-888-2-SKYMAP** (1-888-275-9627). Or visit us on the Web at **www.etak.com/startGPS.2**

ETAK®
The Digital Map Company

Circle 92 on reader service card

A Unit of the Sony Group

TOP 10 HOME PCs

	POWER SYSTEMS	Last month	Month tested	Street price (12/4/97)	Comments
1	★ Gateway 2000 G6-233 800/846-2000 www.gateway.com	2	Jan 98	$2119	**PRO:** Reasonably priced for a Pentium II, very fast, decent selection of software titles, cheapest power PC. **CON:** Average reliability rating.
2	Dell Dimension XPS D300 800/388-8542 www.dell.com	n/a	NEW	$2750	**PRO:** Ties with fastest power home system to date in speed, top-notch reliability and service ratings. **CON:** Expensive, limited software bundle, so-so setup.
3	Micron Millennia Mme with Fusion 3D 888/634-8799 www.micronpc.com	3	Oct 97	$2278	**PRO:** Meaty hardware features, very reasonably priced, first-rate reliability and service ratings. **CON:** Slowest machine on power chart.
4	Gateway 2000 G6-300XL 800/846-2000 www.gateway.com	4	Jan 98	$3387	**PRO:** Superfast machine matches performance of new number two power PC, perfect for serious gamers and home entertainment fanatics. **CON:** Very expensive, average reliability rating.
5	Quantex QP6/300 M-4x 800/869-4898 www.quantex.com	n/a	NEW	$2199	**PRO:** Very speedy machine for a very good price, substantial hardware package. **CON:** Lesser-known vendor, average reliability and service ratings.
	BUDGET SYSTEMS				
1	★ Dell Dimension XPS D233c 800/388-8542 www.dell.com	n/a	NEW	$1899	**PRO:** Fast Pentium II speed with AGP graphics card, top-flight reliability and service ratings. **CON:** High price for a budget PC, limited software bundle, middling out-of-box experience.
2	Gateway 2000 G5-200 800/846-2000 www.gateway.com	n/a	NEW	$1499	**PRO:** Very low price includes color printer, a great bargain. **CON:** Lacks power for high-end multimedia titles and demanding home office applications, average reliability rating.
3	Quantex QP5/233 M-2 800/869-4898 www.quantex.com	4	Jan 98	$1499	**PRO:** Good setup instructions, reasonably priced, fast for a budget computer. **CON:** Average reliability and service ratings.
4	HP Pavilion 3100 800/724-6631 www.hp.com/info/pchome1	3	Sept 97	$1298	**PRO:** Very low price, supereasy setup. **CON:** Small monitor, rather limited software package, average reliability and support ratings, slowest machine on chart.
5	Packard Bell Multimedia M415 800/733-5858 www.packardbell.com	5	Feb 98	$1248	**PRO:** Least expensive PC on chart, friendly interface, easy setup. **CON:** Slow performance for a PMMX-166 system, average reliability and service ratings.

★ Best Buy

n/a = not applicable

WHEN IT COMES TO CHOOSING a home PC, first impressions can be misleading. And even somewhat comical. Just look at how home systems differ from their boxier, office-bound cousins. Some Hewlett-Packard Pavilions, for instance, look swollen, with a power switch that resembles a belly button. And the latest Acer Aspire has a bulge and a splatter of holes on the side of the case that make it look like a chunk of Swiss cheese.

But hey, beauty *is* in the eye of the beholder. Even so, there's one cosmetic feature you may want to avoid—even if that machine's swanky style fits perfectly in your new retro rumpus room: Beware the midtower with a lumpy top. Many home PC designs incorporate curves to soften the machine's appearance. But that makes it impossible to put things like an external modem or a backup drive on top of your computer if you're short on space. Yeah, I know that placing things on your PC case is not a recommended practice. Buy a flattop model, though, and you won't regret it.

POWER SYSTEMS

NEW AT THE TOP this month is the $2119 G6-233 from Gateway 2000. Its superb price, great speed, and excellent setup were enough to beat Dell's new Dimension XPS D300 by a hair. This Pentium II-233 PC is great for heavy workloads. You can store any amount of data on its 4GB hard disk and built-in Iomega Zip drive. It has a DVD-ROM drive, a 17-inch monitor, and an Accelerated Graphics Port video card.

Dell Dimension XPS D300

Brand-new at number two is the latest speed monster from Dell, the Dimension XPS D300. Its 300-MHz Pentium II processor and AGP video card led this muscle machine to post a 270 on our PC WorldBench tests, matching Gateway 2000's G6-300XL as the fastest home PC we've seen to date. But all that speed isn't cheap—the XPS D300 costs $2750. Dell also offers a 24-month leasing program (see *Consumer Watch*).

Returning to the number three spot is Micron's Millennia Mme with Fusion 3D. The $2278 Mme has a Pentium MMX-233 processor, and it's anything but slow: Its PC WorldBench score of 241 is within shouting distance of Pentium II territory. The Mme has all the trappings of a good home office machine, including an Iomega Zip drive and a 17-inch monitor.

But if you're completely obsessed with fun and games, check out number four, Gateway 2000's G6-300XL. Like the number two Dell Dimension XPS D300, this Pentium II sizzler runs at 300 MHz, has

PHOTOGRAPHS: KEN SMITH

SCORECARD

★ Overall rating	PC WorldBench score/rating	Price	Reliability/ support	Setup	Features	Reader service number
90	255/outstanding	average	average/ above average	outstanding	Pentium II-233, 32MB of RAM, 4GB hard disk, DVD-ROM drive, 56-kbps fax-modem, built-in Iomega Zip drive, 17-inch monitor, AGP video card with 4MB of RAM.	666
90	270/outstanding	above average	above average/ above average	fair	Pentium II-300, 32MB of SDRAM, 6.4GB hard disk, DVD-ROM drive, 56-kbps fax-modem, 17-inch monitor, AGP graphics card.	667
89	241/very good	average	above average/ above average	good	Pentium MMX-233, 32MB of RAM, 3.1GB hard disk, 12X-24X CD-ROM drive, 56-kbps fax-modem, Iomega Zip drive, 17-inch monitor.	668
87	270/outstanding	expensive	average/ above average	outstanding	Pentium II-300, 64MB of SDRAM, 6.4GB hard disk, DVD-ROM drive, 56-kbps fax-modem, 19-inch monitor, AGP graphics card, TV tuner.	669
85	268/outstanding	average	average/ average	outstanding	Pentium II-300, 64MB of RAM, 5GB hard disk, 12X-24X CD-ROM drive, 56-kbps fax-modem, 17-inch monitor.	670
Power scorecard weightings ▶	Performance 30 percent	Price 15 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	
89	255/outstanding	above average	above average/ above average	fair	Pentium II-233, 32MB of RAM, 4.3GB hard disk, 12X-32X CD-ROM drive, 56-kbps fax-modem, 15-inch monitor, AGP graphics card.	671
88	213/fair	inexpensive	average/ above average	outstanding	Pentium MMX-200, 16MB of SDRAM, 2GB hard disk, 12X-24X CD-ROM drive, 56-kbps modem, 15-inch monitor, Canon BJC 250 color bubble jet printer.	672
86	237/good	average	average/ average	outstanding	Pentium MMX-233, 32MB of RAM, 3.2GB hard disk, 12X-24X CD-ROM drive, 56-kbps fax-modem, 15-inch monitor.	673
85	172/fair	very inexpensive	average/ average	best	Pentium MMX-166, 16MB of SDRAM, 2GB hard disk, 8X-16X CD-ROM drive, 33.6-kbps fax-modem, 14-inch monitor.	674
84	175/fair	very inexpensive	average/ average	good	Pentium MMX-166, 24MB of RAM, 3.2GB hard disk, 8X-16X CD-ROM drive, 33.6-kbps fax-modem, 15-inch monitor.	675
Budget scorecard weightings ▶	Performance 15 percent	Price 30 percent	R/S 40 percent	Setup 5 percent	Features 10 percent	All products: 906

an AGP graphics card, and matched the Dell's top PC WorldBench score of 270.

Unlike the XPS D300, though, the G6-300XL is loaded with extras: 64MB of RAM, a 19-inch monitor, and a TV tuner. But prepare to pay—this Gateway costs a steep $3387.

Almost matching Dell's XPS D300 and Gateway's G6-300XL in speed—with just a 2-point difference—is Quantex's new QP6/300 M-4X. And at $2199, it costs substantially less than the Dell. It's great for the experienced but budget-minded user of high-performance games, graphics, or large databases.

BUDGET SYSTEMS

STEALING THE NUMBER ONE slot on our budget chart this month is the first Pentium II system to make the list, Dell's $1899 Dimension XPS D233c. Priced here with a 15-inch monitor, this Pentium II-233 offers great speed and an AGP video card. If you need a good, low-cost PC for your expanding home office, the XPS D233c could be the machine for you.

Gateway G5-200

Slipping a notch to number two is Gateway's new G5-200, which has been revamped to take the place of last month's number one budget system, Gateway's phased-out G5-166. The G5-200 offers terrific value, easy setup, *and* Canon's BJC 250 color bubble jet printer. At $1499, it's a great deal for the small business with humble computing needs or the family on a budget.

If you hunger for speed but can't swallow the Dimension XPS D233c's $1899 price, the $1499 QP5/233 M-2 from Quantex is the next best thing. It's the fastest budget Pentium MMX PC we've seen. Its 32MB of RAM and 3.2GB hard drive give it the speed and storage needed for both home office tasks and home entertainment.

In fourth place is the Pentium MMX-166–based Pavilion 3100 from HP. Best suited to the first-time buyer, this $1298 PC with a small 14-inch monitor is still fine for surfing the Net, word processing, and keeping track of home finances.

Also returning from last month is Packard Bell's Multimedia M415. The M415 is straightforward in its setup, and its friendly interface makes Windows 95 easier to master. You can't argue with the $1248 price, either. But be forewarned: Packard Bell has had a poor reputation for reliability and service in the past. Recent surveys and our calls to the company's technical support suggest that the situation has improved. Still, be prepared to troubleshoot the M415 on your own.

—*Kirk Steers*

Kirk Steers is a contributing editor for PC World. *Testing performed by Ulrike Diehlmann of the PC World Test Center.* ■

Beyond the Top 10: Online

We evaluated the following system along with the others, but it didn't score high enough to reach the Top 10 Home PCs power list. For a write-up, see PC World Online (www.pcworld.com/t10homepcs).

- ◆ **CyberMax PowerMax A2**

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Astound	Multimedia presentations
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TOP 10 PRINTERS

	MONOCHROME WORKGROUP PRINTERS	Month tested	Street price (12/4/97)	Overall rating	Speed for plain text (ppm)	Speed for full-page graphics (ppm)	Comments	Reader service number
1	★ **HP LaserJet 4000 TN** 800/527-3753 www.hp.com	Jan 98	$1599	96	12.8	3	⚡ **FEATURES:** 17-ppm laser. Standard 8MB of RAM, 1200-by-600-dpi resolution, 600 sheets input, 300 output. **PRO:** Fastest, great text quality, large paper capacity. **CON:** Clearing paper jams could be easier, mediocre graphics at default settings, most expensive on monochrome chart.	638
2	Lexmark Optra S 1620 800/539-6275 www.lexmark.com	NEW	$999	93	11.5	2.2	**FEATURES:** 16-ppm laser. Standard 4MB of RAM, 1200-by-1200-dpi resolution, 350 sheets input, 250 output. **PRO:** Good print quality (especially with gray-scale), ties for lowest price on monochrome chart. **CON:** Text can print too dark, slowest monochrome graphics printing.	639
3	Lexmark Optra S 1650 800/539-6275 www.lexmark.com	July 97	$1129	92	11.6	2.4	**FEATURES:** 16-ppm laser. Standard 4MB of RAM, 600-by-600-dpi resolution (and true 1200 by 1200), 250 sheets input and output. **PRO:** Extremely fast, $146 price drop, easy to use, sharp print quality, includes serial port. **CON:** Gray-scales are subtle but a little coarse, documentation can be confusing.	640
4	IBM Network Printer 12 800/358-6661 www.ibm.com	Mar 97	$999	87	8.9	2.4	**FEATURES:** 12-ppm laser. Standard 4MB of RAM; 600-by-600-dpi resolution, 250 sheets input, 270 output. **PRO:** Crisp text and gray-scale printing, ties for lowest price on monochrome chart, round-the-clock support. **CON:** Numerous manuals can be confusing, slowest text speed among these monochromes.	-
5	Brother HL-1660 800/827-6843 www.brother.com	NEW	$1299	84	11.4	2.4	**FEATURES:** 17-ppm laser. Standard 4MB of RAM, 600-by-600-dpi resolution, 650 sheets input, 250 output. **PRO:** Fast, good text quality and paper-handling options, fewer jams with heavy paper stock. **CON:** Graphics lose detail, most of manual comes only on CD-ROM, control panel can be confusing.	641
	COLOR WORKGROUP PRINTERS							
1	★ **Epson Stylus Color 1520** 800/463-7766 www.epson.com	Sept 97	$799	88	3.2	0.9	⚡ **FEATURES:** 6-ppm monochrome/5-ppm color ink jet. Standard 64KB of RAM, 1440-by-720-dpi monochrome/color resolutions, 100 sheets input, 35 output. **PRO:** Extremely inexpensive, gorgeous color quality. **CON:** Very slow text speed, meager paper capacity, needs special paper for best print quality.	-
2	Xerox DocuPrint C55mp Color Laser Printer 800/349-3769 www.xerox.com	Sept 97	$4500	85	8.1	0.5	⚡ **FEATURES:** 12-ppm monochrome/3-ppm color laser. Standard 30MB of RAM, 600-by-600-dpi monochrome/color resolutions, 250 sheets input, 150 output. **PRO:** Great output, fastest color laser text speed we've seen, includes $500 ethernet card. **CON:** Expensive, power switch is inconveniently located.	642
3	Minolta Color PageWorks 888/264-6658 www.minoltaprinters.com	Nov 97	$2999	85	7.1	0.3	⚡ **FEATURES:** 12-ppm monochrome/3-ppm color laser. Standard 4MB of RAM, 600-by-600-dpi monochrome/color resolutions, 400 sheets input, 250 output. **PRO:** Inexpensive, good paper-handling features, clean text printing. **CON:** Print quality on images is a little grainy, slowest graphics speed on chart.	643
4	Lexmark Optra SC 1275 800/539-6275 www.lexmark.com	Jan 98	$3999	82	7.4	1	⚡ **FEATURES:** 12-ppm monochrome/3-ppm color laser. Standard 16MB of RAM, 600-by-600-dpi monochrome/color resolutions, 400 sheets input, 250 output. **PRO:** Fastest graphics, good text quality, many expansion options. **CON:** Blocky graphics and garish colors, complicated drivers.	644
5	Tektronix Phaser 560 800/835-6100 www.tek.com	Jan 98	$3995	82	6.5	0.5	⚡ **FEATURES:** 14-ppm monochrome/4-ppm color laser. Standard 8MB of RAM, 600-by-600-dpi monochrome/color resolutions, 250 sheets input, 500 output. **PRO:** Great print quality, can print labels and envelopes in color. **CON:** Replacing fuser and drum is awkward.	645
	★ Best Buy						⚡ Windows 95-certified Plug and Play	All products: 904

HOW WE TEST The overall rating for both monochrome and color workgroup printers is based on print quality (27 percent), price (20 percent), features and ease of use (20 percent), speed (15 percent), service and support (13 percent), and consumables (5 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

MONOCHROME WORKGROUP lasers have not gotten any cheaper in the last six months, but they have gotten faster. On our monochrome chart the average print speed has increased by 7 percent for text and 14 percent for graphics since September 1997. The average price for a workgroup printer remains about $1200. This month two new, fast, and reasonably priced models jump onto the monochrome chart: Lexmark's $999 Optra S ▶

1620 takes second place, and Brother's $1299 HL-1660 takes fifth. Both print good-looking documents swiftly, but the Brother's steeper price kept it from placing higher. At $1599, Hewlett-Packard's LaserJet 4000 TN is costly, but it remains a Best Buy because it prints superb text at 12.8 pages per minute, a chart record.

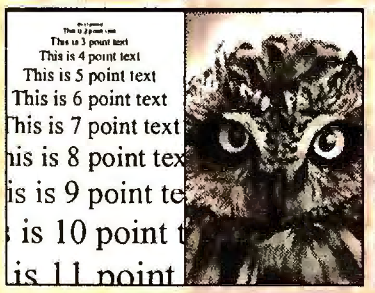
COOL, CALM COLOR

AFTER MAJOR PRICE cuts and advances in print quality last summer, the market for color workgroup printers seems to have stabilized. In 1997 prices dropped an average of $3000 while print quality increased, but this month we picked the same top five color printers as we did in January. Neither of the two new printers we tested—the $3695 Tektronix Phaser 360 nor the $2995 Panasonic KX-P8410E—made the cut. The $799 Epson Stylus Color 1520, a dirt-cheap ink jet offering great color, remains our Best Buy.

In an early look, Tektronix's Phaser 360, a new solid-ink printer, appears impressive. Its 800-dots-per-inch resolution improves on the 300 dpi of its older sibling, the Phaser 350 (see the January 1997 issue). Their designs are similar—neither takes legal-size paper or envelopes—but the 360 includes an ethernet card and holds 125 more pages. Unfortunately, Tektronix sent us only beta software, so we were unable to rank the printer. We'll retest it when final software is available.

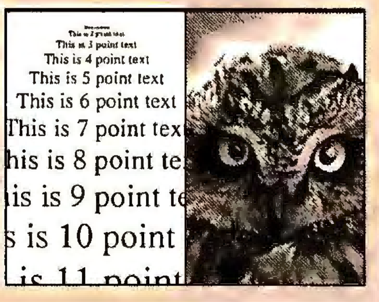
PRINT QUALITY SAMPLES

Tip-Top Text From Lexmark, Brother, Epson



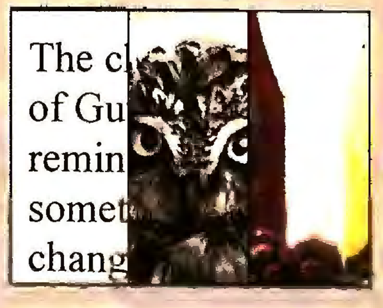
LEXMARK OPTRA S 1620

Text is very black with the new Optra S 1620, our number two. Its gray-scale graphics have crisp edges and many shades of gray, making the picture look more realistic.



BROTHER HL-1660

Debuting at number five on our monochrome chart, the new HL-1660 prints light but clean text. Graphic images look mostly good but a bit lacking in detail.



EPSON STYLUS COLOR 1520

The Epson Stylus Color 1520 remains a Best Buy, offering realistic color on the cheap. We also like its clean text and smooth gray-scale and color graphics.

We also tested the Panasonic KX-P8410E, the only color laser we know of that's capable of 1200-by-1200-dpi output. Panasonic says it's a shipping product, and Tektronix has been using the same engine as the Panasonic's for six months in its Phaser 560. But the KX-P8410E ran as slow as an old dog on a hot day. With the skimpy 8MB of RAM that it ships with, it printed text at less than 1 ppm—awful compared to our chart average of 6.5 ppm. Adding 64MB of RAM at the company's request didn't help.

LEXMARK VERSUS LEXMARK

SIMILAR MODELS in printer companies' product lines can confuse consumers. For example, Lexmark now offers three nearly identical printers—two of them on our monochrome chart. The new $999 Optra S 1620, in second place, is a lot like the older, $1129 Optra S 1650 in third. About their only difference (besides price) is in paper handling: The 1650 takes more options, such as an output stacker and three (not two) extra 500-sheet paper drawers. The older Optra S 1250, number three in January, *seems* identical to the new 1620, even in its $999 price. But this 12-ppm laser is almost 2 pages a minute slower. It's no longer on our chart, but Lexmark still sells it. The lesson? Look closely at specifications before you buy.

Unless you need more paper capacity, go with the new Optra S 1620 over the 1650. Like the older Optra S models, the 1620 has a simple control panel menu and sturdy input trays. Also like the other Optras, the 1620 prints rich blacks. Text is almost too dark but still clean, and gray-scale objects are clearly defined.

MAKING ITS DEBUT on our chart, the new Lexmark Optra S 1620 offers good output quality and fast printing for just $999.

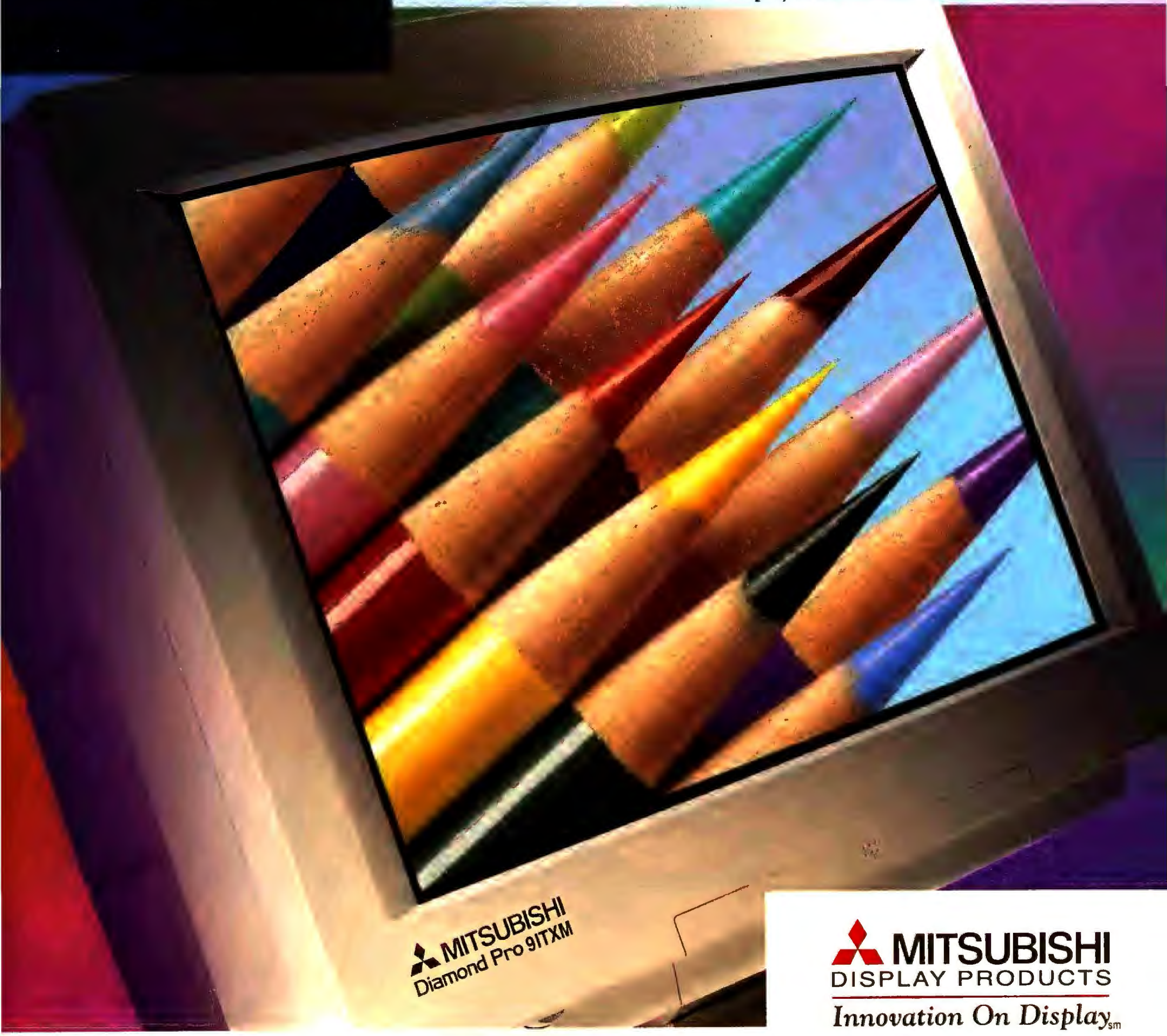
BRINGING UP BROTHER

BROTHER HAS HAD monochrome models on our personal printers chart but has fared poorly with workgroup printers until now. We like most everything about Brother's new HL-1660: its big 500-sheet main paper tray (an extra 500-sheet tray costs $299, and a duplexer $499); its rear-exit slot for printing special stock with fewer jams; the fact that it uses the same toner cartridges as HP's series 4 and 5 LaserJets, which are widely available at discounted prices; even the way its control panel design helps mouse-tired fingers.

We also like the HL-1660's speed and print quality. At 11.4 ppm on text, it's close to Lexmark's Optra S 1620. On graphics, it beats the new Lexmark. The HL-1660 prints light—good for heavy fonts, but italics have a wan look. Graphics are strong, though less detailed than we'd prefer.

What's not to like? At $1299, the HL-1660 is a tad costly. A year ago that price would have been fine, but today similar workgroup printers cost below $1000. And despite the control panel's handy design, its confusing buttons require checking the manual. Most frustrating, the documentation is mostly on CD-ROM, and you can't even look at it on screen—you must choose chapters to print automatically when you insert the disc.

—Dan Littman ■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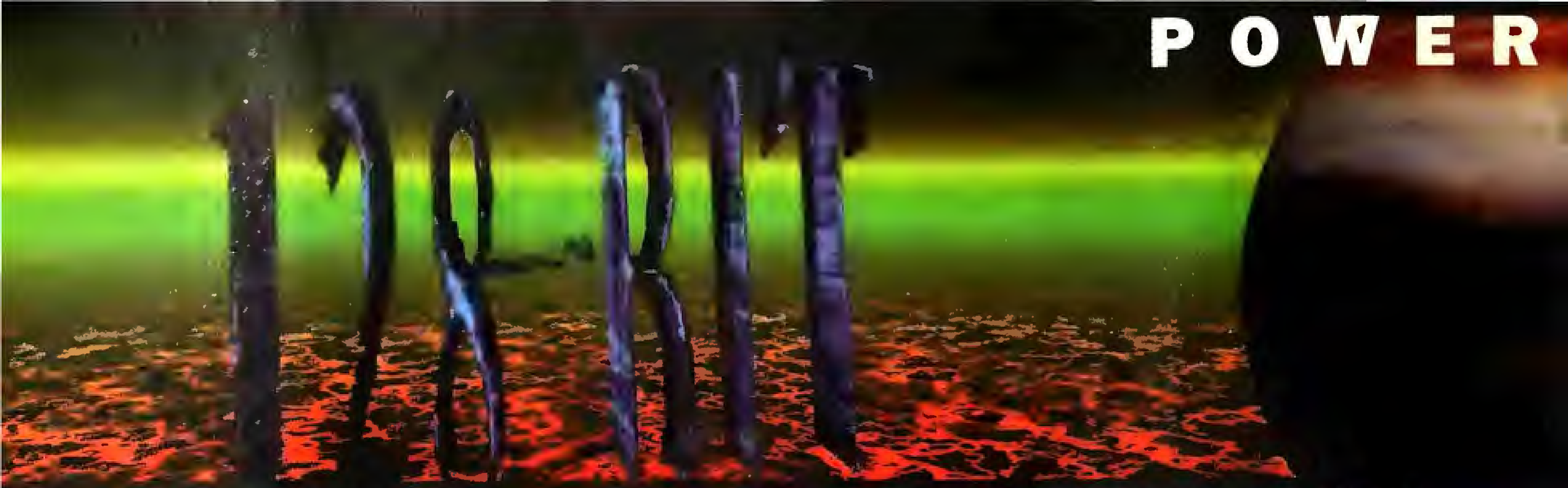

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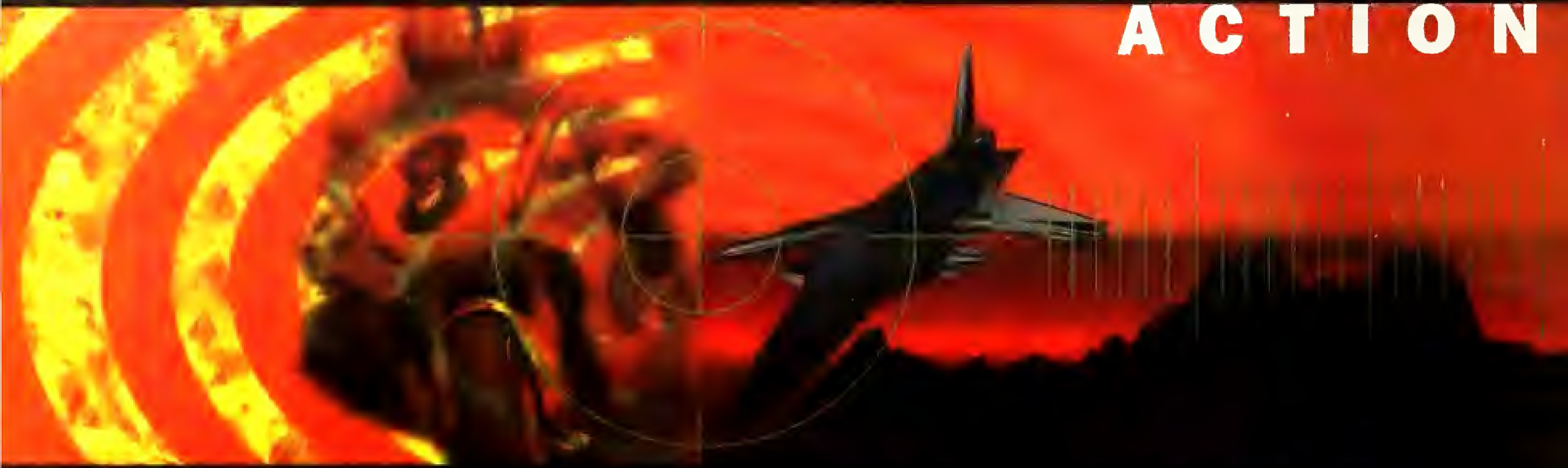

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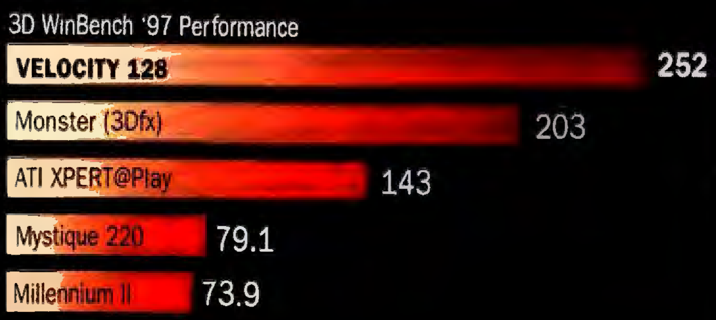

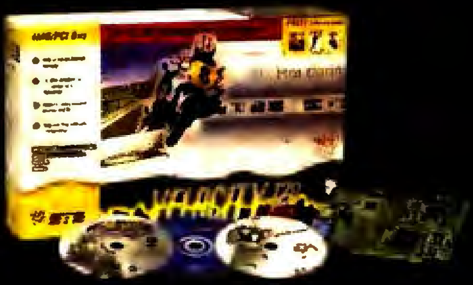

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†3D WinBench 97 1.0 tests conducted on a PII-300, PCI 2.0 Bus, 512K cache, 64MB SDRAM, 640x480x16bit, at 75Hz [illegible] GDI bypass as required for Microsoft certification. Memory and driver versions. STB VELOCITY 128™ (4 MB) (PCI version) 4.10.01.0116 9/23/97, Diamond Monster 3Dfx (4MB) 4.03.00.2108 4/16/97, ATI XPERT@Play (4MB) 4.10.01.2227 8/16/97, Matrox Millennium II (4MB) [illegible] /97, Matrox Mystique 220 Business (4MB) 4.03.00.3700 8/4/97. Specifications subject to change without notice.

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TOP 10 MONITORS

	17-INCH MONITORS	Month tested	Street price (12/15/97)	Overall rating	Quality of text/graphics	Comments	Reader service number
1	★ **Mitsubishi Diamond Pro 87TXM** 800/843-2515 www.mitsubishi-display.com	Sept 97	$575	88	very good/ very good	**FEATURES:** 15.7-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 107-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **PRO:** $144 cut, sharp picture, great controls, color- and image-correction utility. **CON:** Two faint lines visible across screen.	628
2	★ **Iiyama VisionMaster Pro 17** 800/394-4335 www.iiyama.com	Sept 97	$639	88	very good/ excellent	**FEATURES:** 15.9-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 12-hour weekday toll-free support. **PRO:** Great graphics, superb text, easy-to-adjust on-screen menus, large viewable area. **CON:** Two faint lines visible across screen.	629
3	**ViewSonic PT775** 800/888-8583 www.viewsonic.com	Sept 97	$729	87	very good/ excellent	**FEATURES:** 15.9-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 119-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 11-hour weekday toll-free support. **PRO:** Stunning graphics, crisp text, large viewable area, easy to adjust, color-correction utility. **CON:** Two faint lines across screen.	630
4	**Samsung SyncMaster 700p** 800/933-4110 www.sosimple.com	Jan 98	$609	85	very good/ very good	**FEATURES:** 15.3-inch viewable area, .26mm dot pitch tube, up to 105-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 24-hour toll-free support. **PRO:** $180 price drop, sharp styling, well-focused picture, easily adjustable. **CON:** Cryptic menu icons, relatively small viewable area.	631
5	**Samsung SyncMaster 700b** 800/933-4110 www.sosimple.com	Sept 97	$509	85	very good/ very good	**FEATURES:** 15.7-inch viewable area, .28mm dot pitch tube, up to 100-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 24-hour toll-free support. **PRO:** Attractively styled case, equally fine display of text and graphics, basic controls easy to adjust. **CON:** Cryptic menu icons.	632
6	**AcerView 79g** 800/733-2237 www.acer.com	NEW	$699	83	very good/ excellent	**FEATURES:** 15.5-inch viewable area, .25mm stripe pitch Diamondtron tube, up to 110-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 24-hour toll-free support. **PRO:** Colorful and realistic graphics, sharp text, easy-to-use menus. **CON:** Toll support after first year, two faint lines across screen.	633
7	**ViewSonic P775** 800/888-8583 www.viewsonic.com	Jan 98	$599	83	good/ good	**FEATURES:** 15.7-inch viewable area, .28mm dot pitch tube, up to 117-Hz refresh rate,[1] Plug and Play ready,[2] TCO'95 compliant, three-year warranty, 11-hour weekday toll-free support. **PRO:** $100 price drop, well-designed controls. **CON:** Graphics look flat on this model, with fairly dull colors.	634
8	**KDS Visual Sensations VS-9** 800/237-9988 www.kdsusa.com	Jan 98	$550	82	very good/ good	**FEATURES:** 15.7-inch viewable area, .26mm dot pitch tube, up to 120-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 11-hour weekday toll-free support. **PRO:** $49 price drop, above-average text, intuitive controls, high refresh rate. **CON:** No numerical calibrations for adjustments, menus available only in English.	635
9	**Panasonic PanaFlat PF70** 800/742-8086 www.panasonic.com	Jan 98	$849	82	very good/ excellent	**FEATURES:** 15.6-inch viewable area, .24mm slot pitch tube, up to 106-Hz refresh rate,[1] Plug and Play ready,[2] TCO'92 compliant, three-year warranty, 24-hour toll-free support. **PRO:** Impeccable focus, flat screen reduces reflection of ambient light. **CON:** Initial impression of bowed lines (goes away in a few days), expensive.	636
10	**Sylvania Acoustic S730A** 800/850-4939 www.sylvania.com	Sept 97	$399	81	good/ good	**FEATURES:** 15.6-inch viewable area, .28mm dot pitch tube, up to 85-Hz refresh rate,[1] Plug and Play ready,[2] three-year warranty, 8-hour toll-free weekday support. **PRO:** $231 price cut puts basic multimedia monitor on chart, has microphone and speakers. **CON:** Short support hours, easy to confuse degauss and reset buttons.	637

★ Best Buy — For reviews of products that didn't make the chart, visit www.pcworld.com/t10monitors. — All products: 903

HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), features and ease of use (25 percent), price (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

[1] Highest refresh rate at 1024 by 768 resolution.

[2] Plug and Play monitors and graphics cards can communicate bidirectionally. However, Windows 95 does not fully utilize monitor Plug and Play.

A $144 DROP makes Mitsubishi's Diamond Pro 87TXM our new number one, though only a hair higher than the number two Iiyama. A $180 cut pushes up Samsung's SyncMaster 700p, and ViewSonic's P775 is $100 less. Sylvania's basic Acoustic S730A multimedia monitor dropped the most ($231): Just $399, it's a first-timer at number ten. The AcerView 79g—with great graphics—is the only new monitor to make the chart this month. ■

Avitron

PC WORLD TOP 10 GRAPHICS BOARDS

	GRAPHICS BOARDS	Month tested	Street price (12/5/97)	Overall rating	PC WorldBench graphics score/ rating	3D rating	Multimedia rating	Comments	Reader service number
1	**ATI 3D Pro Turbo PC2TV** 905/882-2600 www.atitech.com	Oct 97	$219	97	189/ very good	good	outstanding	**FEATURES:** 8MB of SGRAM, 200-MHz RAMDAC, ATI Rage II chip, software for 3D modeling, image editing, and VRML. **PRO:** Terrific multimedia performance, nice 3D, connects to TV. **CON:** Expensive, mediocre video playback, no toll-free support.	646
2	**Hercules Thriller 3D** 800/532-0600 www.hercules.com	NEW	$129	96	188/ very good	very good	poor	**FEATURES:** 4MB of SGRAM, 220-MHz RAMDAC, Rendition Verite V2200 chip, no software. **PRO:** Cheap, above-average 3D performance, decent 2D performance, toll-free support. **CON:** Slow in full-screen AVI video playback, no weekend support.	647
3	**ATI Xpert@Work** 905/882-2600 www.atitech.com	Dec 97	$169	95	191/ outstanding	good	good	**FEATURES:** 4MB of SGRAM (upgradable to 8MB), 230-MHz RAMDAC, ATI Rage Pro chip, bundled photo editing and 3D modeling software. **PRO:** Fast all around, great utilities, connects to a TV, good price. **CON:** So-so 3D, no toll-free support.	648
4	**STB Nitro 3D** 800/234-4334 www.stb.com	Dec 97	$99	95	190/ outstanding	adequate	adequate	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/VX chip, bundled 3D games. **PRO:** Least expensive board on chart, speedy 2D, toll-free support, lifetime warranty. **CON:** 3D images are below average quality.	649
5	**ATI 3D Xpression+ PC2TV** 905/882-2600 www.atitech.com	Oct 97	$115	94	190/ outstanding	adequate	adequate	**FEATURES:** 4MB of SGRAM, 170-MHz RAMDAC, ATI Rage II chip, bundled 3D games plus 3D modeling, image editing, and VRML software. **PRO:** Good 2D, speedy 3D, nice bargain, connects to a TV. **CON:** Mediocre video playback, no toll-free support.	650
6	**STB Velocity 128** 800/234-4334 www.stb.com	Nov 97	$179	94	189/ very good	very good	adequate	**FEATURES:** 4MB of SGRAM, 230-MHz RAMDAC, NVidia Riva 128 chip, bundled games and 3D image editing software. **PRO:** $20 price drop; excellent 3D quality, strong 2D performance, good game software. **CON:** Poor AVI video playback.	651
7	**Diamond Stealth 3D 2000 Pro** 800/468-5846 www.diamondmm.com	Jan 98	$135	93	191/ outstanding	good	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D game, photo editing software, and multimedia encyclopedia. **PRO:** Great 2D, fast 3D, inexpensive, connects to a TV. **CON:** No toll-free support.	652
8	**Hercules Terminator 3D/DX** 800/532-0600 www.hercules.com	Oct 97	$109	93	189/ very good	adequate	very good	**FEATURES:** 4MB of EDO DRAM, 170-MHz RAMDAC, S3 Virge/DX chip, bundled 3D games. **PRO:** Inexpensive, quick in multimedia programs, excellent AVI video playback, toll-free support. **CON:** Subpar 3D quality overall, driver bug in Terracide game.	653
9	**Hercules Stingray 128/3D** 800/532-0600 www.hercules.com	Oct 97	$209	91	184/ very good	very good	poor	**FEATURES:** 4MB of EDO DRAM, 180-MHz RAMDAC, Alliance ProMotion-AT3D chip, 3Dfx Voodoo Rush 3D chip set, bundled games. **PRO:** $20 price drop, terrific 3D quality, toll-free tech support. **CON:** Pricey, slowest 2D on chart.	654
10	**Hercules Dynamite 3D/GL** 800/532-0600 www.hercules.com	Feb 98	$249	91	191/ outstanding	very good	good	**FEATURES:** 8MB of SGRAM, 230-MHz RAMDAC, 3DLabs Permedia 2 chip, bundled games and image editing software. **PRO:** $30 price drop, excellent overall 3D, toll-free support. **CON:** Priciest on chart, disorganized utilities, AVI images look blocky.	655

Best Buy — For reviews of products that didn't make the chart, visit www.pcworld.com/t10graphics. All products: 905

HOW WE TEST We tested PCI boards under Windows 95 with PC WorldBench 1.0 at 800 by 600 and 16.8 million colors, at 1024 by 768 and 65,536 colors (reported here), and at 1280 by 1024 and 65,536 colors. The 3D rating is based on frame rates in our VRML and 3D game tests and on subjective ratings in three games. The multimedia rating is based on frame rates in our Macromedia Director and AVI playback tests and on timed scores in our PowerPoint multimedia presentation tests. Boards were tested in a Dell Dimension XPS P133c with 32MB of EDO DRAM and 256KB of pipeline-burst secondary cache. The overall rating is based on performance (40 percent), features (30 percent), price (20 percent), and support policies (10 percent). For all scores, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

TWO HERCULES boards muscle their way onto the chart for the first time. The Hercules Thriller 3D is new: With quality 3D, competitive 2D, and a cheap $129 price, it earns a second-place Best Buy. The Hercules Dynamite 3D/GL was an unsuccessful contender last month; now a price drop boosts it into last place. We tested three additional boards this month, from Canopus, Diamond, and Leadtek, but none were strong enough to make the chart. ■

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	Model	(mm) SM/AG	Refresh Rate (Hz) @1600x1200	H-Scan (KHZ)	MSRP ($)
19"*	**TeleVideo SVP300**	**0.26**	**75**	**30-95**	**925**
	Princeton EO90	0.26	75	30-95	999
	Hitachi Elite 751	0.26	75	31-94	1149
	OptiQuest V95	0.26	75	30-95	1095
21"*	**TeleVideo SVP350**	**0.28**	**85**	**30-107**	**1539**
	Mitsubishi 91TXM	0.28	75	30-95	1649
	NEC P1150	0.28	75	31-94	1599
	IIYAMA Pro 21	0.30	75	30-94	1699

***Diagonal viewable area may vary.**

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TOP 10 MODEMS

	33.6-KBPS INTERNAL MODEMS	Month tested	Street price (12/19/97)	Overall rating	Average transfer time per MB (min:sec)	Comments	Reader service number
1	**Hayes Optima 33.6 Internal Business Modem** 800/377-4377 www.hayes.com	July 97	$189	81	2:31	**FEATURES:** 16-bit ISA card, flash ROM, 230.4-kbps PC-to-modem speed, distinctive ring, voice mail, callback, password protection, Caller ID, SmartCom Message Center LE fax/data software. **PRO:** Fast performer, cross-ship replacement. **CON:** No weekend support, long 8.5-inch card may block other PC components.	676
2	**Zoom FaxModem V.34I Plus** 800/631-3116 www.zoomtel.com	July 97	$69	80	2:38	**FEATURES:** 8-bit ISA card, MNP-10EC error control, 115.2-kbps PC-to-modem speed, distinctive ring, COMit and WinFax Lite fax/data software. **PRO:** Flawless installation, good performer, very affordable. **CON:** Lacks security features such as Caller ID and password access to modem.	677
3	**3Com Courier V.Everything 33.6K Internal** 800/877-2677 www.3com.com	July 97	$215	80	2:44	**FEATURES:** 8-bit ISA card, flash ROM, 230.4-kbps PC-to-modem speed, distinctive ring, Caller ID, QuickLink II fax/data software. **PRO:** Thorough and accessible documentation, toll-free support, cross-ship replacement, great software includes remote access program. **CON:** Most expensive 33.6-kbps modem on chart.	678
4	**ActionTec DeskTalk 33.6** 800/797-7001 www.actiontec.com	retested this month	$50	79	2:48	**FEATURES:** 16-bit ISA card, 115.2-kbps PC-to-modem speed, voice mail, speakerphone, microphone, audio cable, Cheyenne BitWare voice/fax/data software. **PRO:** Cheapest modem on chart, $20 price drop. **CON:** Lackluster performer, no support on weekends, no security features such as Caller ID.	679
5	**Viking 33.6 ISA Modem** 800/338-2361 www.vikingcomponents.com	Jan 98	$78	79	2:58	**FEATURES:** 8-bit ISA card, MNP-10 error control, 115.2-kbps PC-to-modem speed, distinctive ring, voice mail, speakerphone, VoiceView, DSVD, callback, Caller ID, QuickLink Message Center fax/data software. **PRO:** Low price, nice features, 24-hour toll-free tech support. **CON:** Slowest 33.6-kbps modem on chart.	680
	56-KBPS INTERNAL MODEMS						
1	**IBM 56K Modem Internet Kit** 800/772-2227 www.pc.ibm.com	Nov 97	$135	80	2:39/3:17 [1]	**FEATURES:** x2 protocol, 8-bit ISA card, 115.2-kbps PC-to-modem speed, V.80, distinctive ring, voice mail, speakerphone, DSVD, Caller ID, QuickLink Message Center software. **PRO:** Rich features, 24-hour support, good software, $14 price cut. **CON:** Slowest 56-kbps download, free upgrade to 56-kbps standard only if it's software.	–
2	**3Com Courier V.Everything 56K Internal** 800/877-2677 www.3com.com	Nov 97	$260	79	2:33/2:57 [1]	**FEATURES:** x2 protocol, 8-bit ISA card, 230.4-kbps PC-to-modem speed, distinctive ring, callback, Caller ID, RapidComm fax/data software. **PRO:** Fast performer, toll-free support, free upgrade to upcoming 56-kbps standard even if modem swap is required. **CON:** Most expensive on chart, support available weekdays only.	681
3	**Diamond Multimedia SupraExpress 56i Sp** 800/727-8772 www.diamondmm.com	Jan 98	$139	78	2:48/3:04 [1]	**FEATURES:** K56flex protocol, 16-bit ISA card, 230.4-kbps PC-to-modem speed, V.80, distinctive ring, voice mail, speakerphone, Caller ID, microphone, audio cable, COMit and FaxTalk software. **PRO:** Feature-laden, smooth installation. **CON:** Slow 33.6-kbps transfer rate, free upgrade to 56-kbps standard only if it's software.	682
4	**Shark Multimedia Leopard 56K** 800/800-3321 www.sharkmm.com	Jan 98	$90	77	2:38/3:04 [1]	**FEATURES:** K56flex protocol, 16-bit ISA card, MNP-10 error control, 115.2-kbps PC-to-modem speed, V.80, distinctive ring, voice mail, speakerphone, VoiceView, ASVD, microphone, Caller ID, Dial-Tone software. **PRO:** Good features, $19 price drop. **CON:** No weekend support, free upgrade to 56-kbps standard only if it's software.	683
5	**Zoom FaxModem 56K** 800/631-3116 www.zoomtel.com	Nov 97	$119	77	2:35/3:08 [1]	**FEATURES:** K56flex protocol, 16-bit ISA card, MNP-10EC error control, 230.4-kbps PC-to-modem speed, V.80, WinFax Lite and COMit software. **PRO:** Good support hours including Saturday, free upgrade to 56-kbps standard even if modem swap is required. **CON:** Support call is on your dime, installation is a little rough.	684

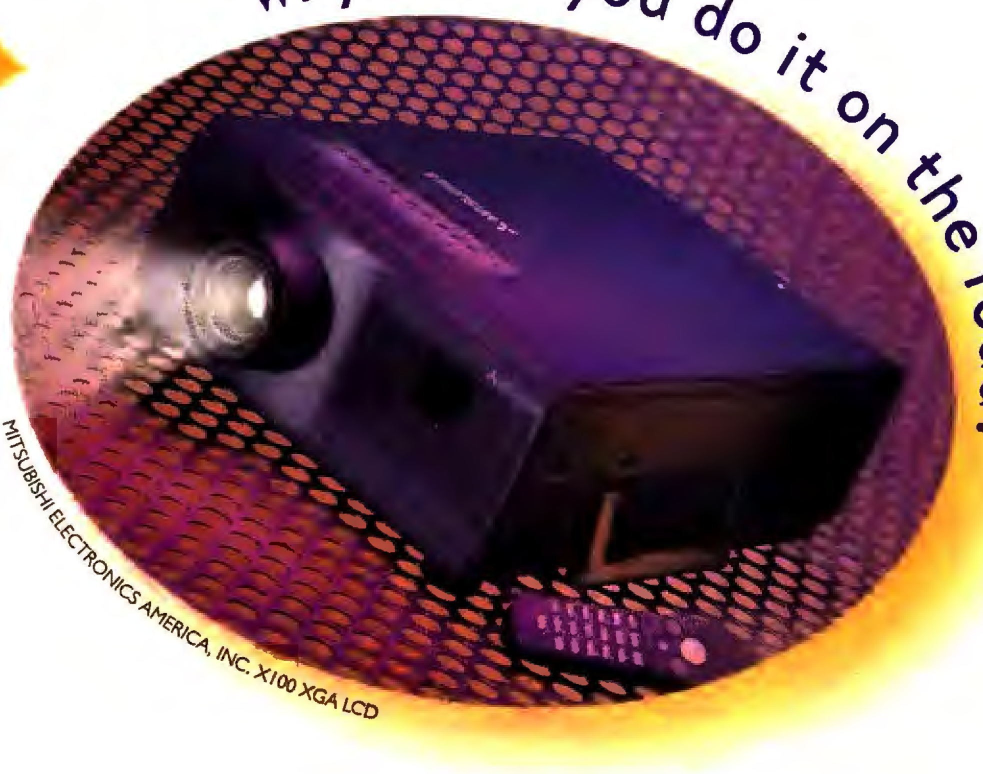
Best Buy For reviews of products that didn't make the chart, visit www.pcworld.com/t10modems. **All products:** 907

HOW WE TEST We test 33.6-kbps modem-to-modem performance using a pair of identical modems on a Telecomm Analysis Systems simulated phone network. It sends a text file over 55 line conditions, and a mix of five files—graphics, text, program, and compressed files—over one line condition. For our 56-kbps tests, we call a local Internet service provider access number and transfer .jpg, .doc, and .zip files continuously over an 18-hour period. The times to transfer a megabyte of data are higher in the ISP test than in the TAS test because the files used in the former are less compressible. Results for the two tests are not comparable. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

[1] V.34 TAS transfers/56-kbps ISP downloads.

IT'S NOW EASIER TO find a full-featured 56-kilobits-per-second modem that costs no more than a 33.6-kbps unit: Shark's $90 Leopard 56K meets or beats nearly every other price here. No new modems we tested this month—from Global Village, Jaton, Logicode, and NewCom—made the chart, due to mediocre performance and basic features. We also retested ActionTec's DeskTalk 33.6 with an updated driver; performance did not improve. ■

Why don't you do it on the road?



MITSUBISHI ELECTRONICS AMERICA, INC. X100 XGA LCD

Presentations that sizzle and sell:

How to hit the road running with today's LCD projectors.

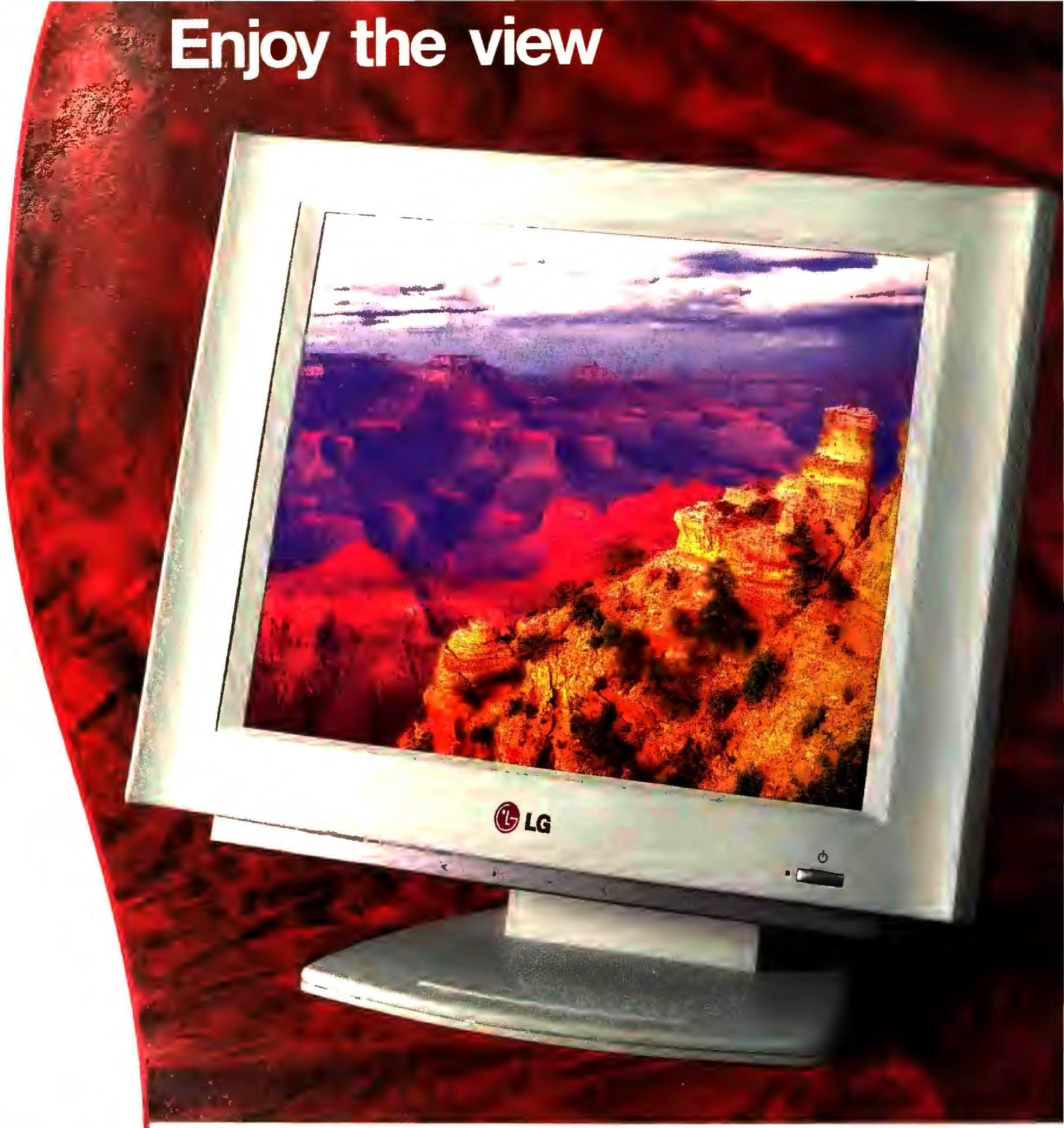
Part Two in an ongoing series on presentation technology

In our last installment, we covered everything you need to know about selecting an LCD projector that's right for you and your company. But once you find the perfect projector, how do you use it to your best advantage? To help in that regard, we've done plenty of research and talked with several industry experts to put together this comprehensive guide on preparing for great presentations.

So get ready to hit the road with your new equipment in tow. And get ready to dazzle!

Do your ADVANCE work

Like many things in life, a good presentation is ten percent inspiration and 90 percent perspiration. And a good portion of the latter is



LG

Monitors

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Auto-screen sizing
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preparation. So even before you start developing content and begin rehearsing, there's plenty of prep work to do. "The most important thing you can do is to get comfortable with your projector," says Jim Hall, Epson's group product manager for multimedia projectors. "Take time to discover everything it can do," he adds. Even though today's projectors are quite easy to use, there is a bit of a learning curve to ascend—don't try to learn how to use your new projector on the fly.

Then you need to know the lay of the land. "I always call the presentation site well in advance to conduct a survey of the environment," says James Chan, LCD and presentation systems product manager for Viewsonic. "It's essential to know your audience, the support equipment available, and the layout of the room prior to creating content and determining the proper equipment to bring." As someone who not only sells LCD projectors, but spends a good deal of his time on the road giving presentations with them and about them, Chan should know.

As part of your site survey, ask about the following:

- How many people will be attending?
- What kind of audience? A presentation that's appropriate for marketing people might put technical types to sleep—and vice versa. The key to an effective presentation is credibility. So know who you're talking to.
- What is the size of the room? What kind of lighting is used? Knowing in advance will help you develop your staging strategy (more on this below). If possible, get in the room well in advance and "do at least one rehearsal on site," says Clint Hoffman, marketing manager for display products at Sony Electronics.
- How bright is the room? If it's a dark room, you can bring your light-weight portable projector. If the room is bright, you might want to use a heavier machine with a higher lumen output.
- What kind of screen is available? If there isn't a screen, is there a light-colored wall free for projection? If there is only a white board available, make arrangements to have a good screen on site (white boards throw glare that can make it impossible—even painful—for your audience to see).
- Are there other supplemental resources available on site? Make sure you're 100 percent clear on everything you'll need to bring. Don't forget the cables!

EPSON AMERICA, INC. ELP-3500

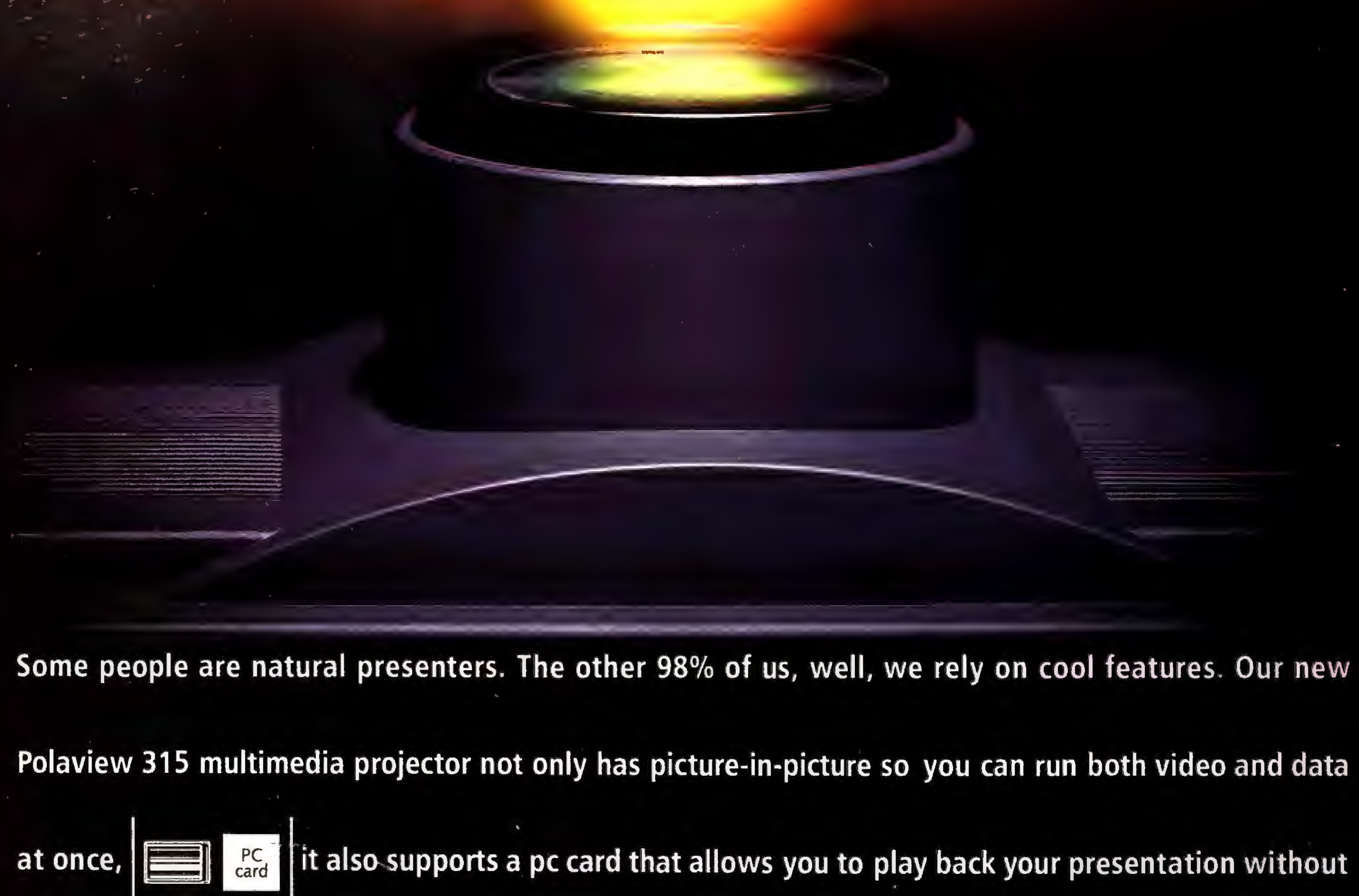
Setting the STAGE

Once you've done your advance work and have your presentation ready to go (we'll cover that in our next issue), it's time to set up the room. Here are a few pointers:

First, be sure to allow yourself enough time to do the job right. "Most presenters are familiar and comfortable with the content of their presentation," says Epson's Hall. "The anxiety arises when they don't leave enough time for set up. So show up early."

"You want the audience to focus on your message—not the methodology," says Hall. "Try to position the projector so they're not looking at it instead of you," he adds. Sony's Hoffman recommends rearranging the seating scheme if you can't get the projector out of the way.

If possible, use a ceiling-mount kit to suspend your projector from the meeting room ceiling. This is the best, least intrusive method—it reduces view obstruction and minimizes the effects of the projector's noise. However, not all projectors provide the ceiling option—nor is it always feasible to do the preparation required to install the projector this way. If that's the case, consider putting the projector on a low table or



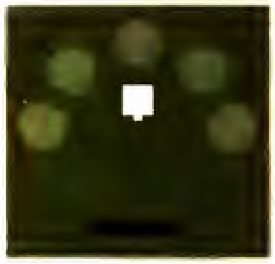
Projected Sales Figures
*Based on adjusted 1997 sales

MITSUBISHI ELECTRONICS AMERICA, INC. X100 XGA LCD

A ceiling mount lets the audience focus on you, not the machine.

platform in front of the meeting table, out of the audience's line of sight to the screen. Or if the tables are placed in a U-shaped arrangement, put the projector low to the ground—or even on the floor—towards the closed end of the U.

These arrangements may seem a bit intricate. But there's good reason: What you want to avoid is placing the projector directly on the meeting table where vibrations from people tapping on laptops or taking notes can really shake up your image. Additionally, the steady drone of the fan in close proximity to your audience can have a hypnotic effect. This hardly makes for a memorable performance. Because just like the hypnotists say in their act: "When you awaken you will not remember a thing."



Keep the projector below the audience's line of sight.

As for the laptop you're using to run the presentation, the same rule applies for the same vibratory reasons: don't put it on the same table as the projector. Since most projector cables are no longer than nine feet, you'll have to have your laptop fairly close to the projector (using longer cables tends to harm image quality). Ideally, position it so you can see the notebook screen without having to turn your back on the group and without having to rely on the projected image to follow the presentation. Also, be sure it's within remote control range. And speaking of remote controls, you definitely should use one—or at least a wireless mouse. The most natural way to present is moving around the podium, using a remote device to advance the images of your presentation. "Take care not to box yourself in so that your only escape route is directly through the projector's light beam," cautions Hall.

One last word about setting the stage: Power. It's not worth the risk to try running a complete presentation on a battery (also, the external monitor port on some laptops won't function under battery power). So plug it in! And as much as possible, tape down your power cords to prevent any unforeseen acrobatics. Take care not to plug too many appliances into a single circuit or surge strip. There's no bigger show stopper than a room gone black.

Let there be LIGHT
(but not too much)

The experts agree: The three most important things people look for in a projector are brightness, portability, and resolution. Of those elements, the only one you can control and enhance is brightness. So even if your projector is on the lower end of the lumen scale, there are measures you can take to make sure you are projecting a bright, high-impact image. And take heart: with today's powerful, bright projectors, "lighting is not nearly as big a factor as it used to be," observes Sony's Hoffman.

When setting up the room, you want to leave enough light so your audience can take notes; but not too much so it washes out the projected image and reduces contrast. Eliminate as much sunlight and fluorescent lighting as you

Leave enough light for note taking.

EIKI INTERNATIONAL, INC. LC-XGA 970

can in the room. If available, use blinds or curtains to diminish sunlight and simply turn off the fluorescents. If that's not possible, use only the bank of lights furthest from the screen. Your best bet is incandescent lighting—and even then, use only the back row or those lights which are directed away from the screen. If dimmers are available, use them.

Above all, avoid having sunlight—or any light for that matter—directly hitting the screen. If there are a lot of windows, try to position the screen in front of them so direct sunlight does not reach the screen.

Time for a SCREEN TEST

The positioning and quality of the screen has a big effect on the readability and impact of your presentation. Most pros recommend a one-to-six screen height-to-distance ratio for optimum viewing. So, for instance, if your screen measures five feet in height, no one in the audience should be more than 30 feet away from it.

Here are some other tips for better screening:

- High-gain screens (those which make the image appear brighter when viewed perpendicularly) are best for use in environments with a lot of ambient light.
- Test the distance positioning of the screen by projecting an image with the smallest text found in your presentation. If it's readable from the back row, you're in good shape. But take note: bigger is not always better. "Don't overwhelm your audience," advises Epson's Hall. "An eight-foot diagonal image in a small meeting can be overpowering."
- Place or open the screen high enough so that the bottom of the projected image is unobstructed for all viewers.
- Try to match the screen area to the aspect ratio of the projected image. LCD projectors provide a ratio of three high to four wide. So in order to fill the entire screen area, you should open the screen so the height is 3/4 of the width. Since many people are more comfortable with the familiar 35 mm slide aspect ratio of 3:2, you might want to change your presentation to this format. It's easy to do with

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Not all the presentations you make are on the road. But if you still want high-impact color and sharp resolution for presentations you make in the office—without the expense of an LCD projector—here's an affordable alternative you should consider: Today's advanced LCD flat panel displays. LCD panels provide finer image quality than CRT-based monitors and are considerably lighter and more portable. And at prices ranging from about 20 to 50 percent of what you'd pay for an LCD projector, they have become very popular in corporate conference rooms across the country.

Using an LCD panel as an external monitor with your laptop can be an ideal solution for presentations to small, informal groups. Many models have comparable resolution to LCD projectors as well as features such as screen rotation and wall mounting capabilities that make them versatile players in any office presentation arsenal.

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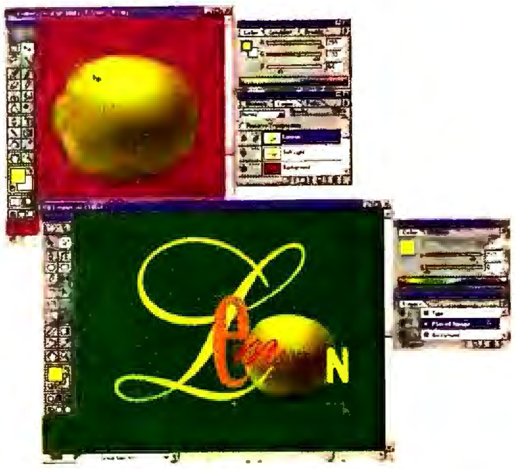

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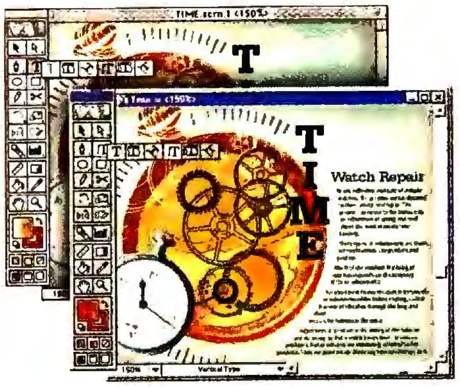

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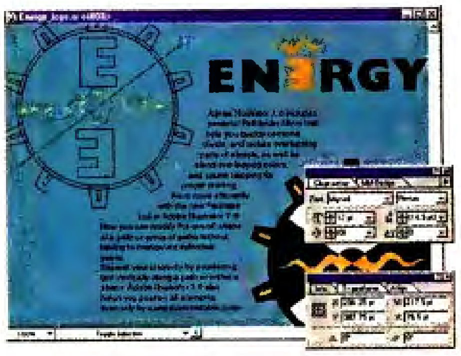

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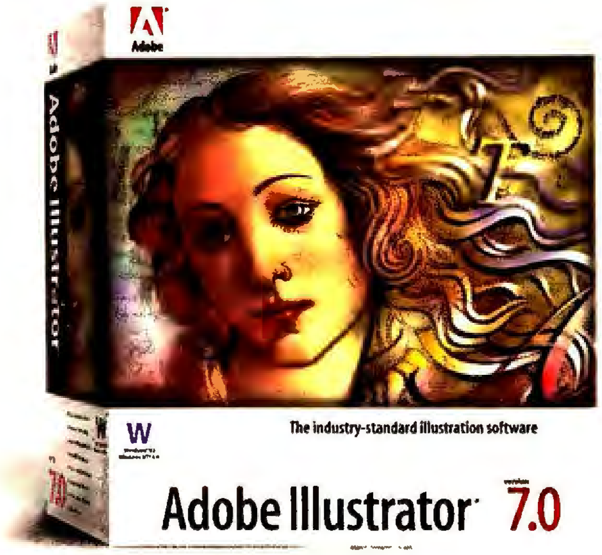

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common presentation software such as PowerPoint and Corel Presentations under Page Setup. If you convert to a 3:2 format, you should open the screen so that its height is 2/3 of its width.

As noted earlier, it's best to place the projector so that it doesn't obstruct anyone's view. However, the best image is produced when the projector is level with the center of the screen—often directly in the line-of-sight of your audience. If the projector is not dead on center, the image can be distorted because its top is further from the screen than its bottom is. This will create an image that is slightly larger on top, and also out of focus on the edges. To compensate for this difference in distance, angle the screen forward at the top until the image is corrected. (Many tripod screens have an angle adjustment feature at the top for this reason. If yours doesn't, try raising the front of the projector itself.)

Coming up NEXT

Now you know how to get ready to give that killer presentation. "The bottom line is this," concludes Epson's Hall: "If you take the time to get comfortable with the hardware and the room set up, it's much easier to focus on the presentation." So now it's time to get to the main event: In our next installment we'll deal with content development issues and technical troubleshooting tips. Please stay tuned!

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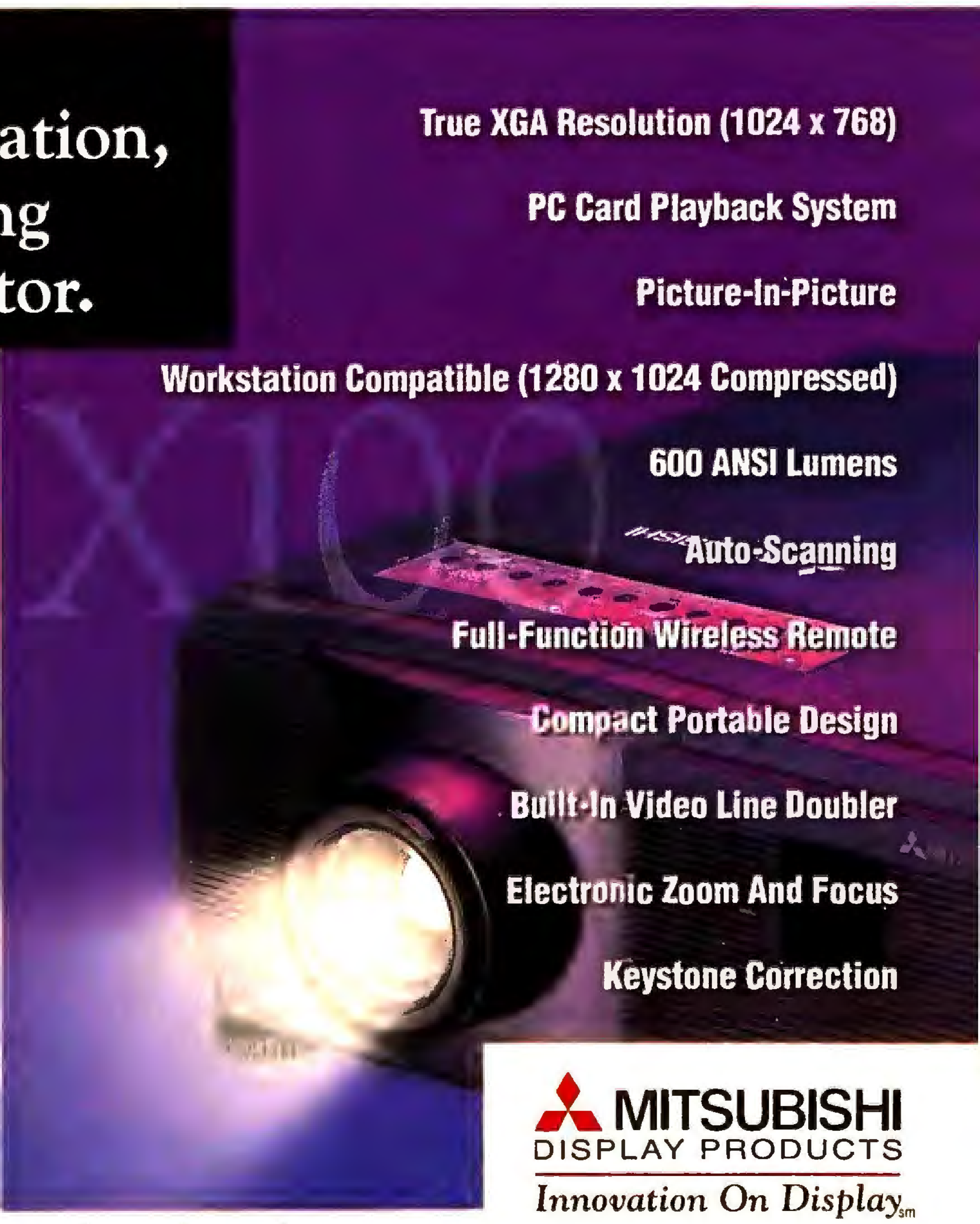
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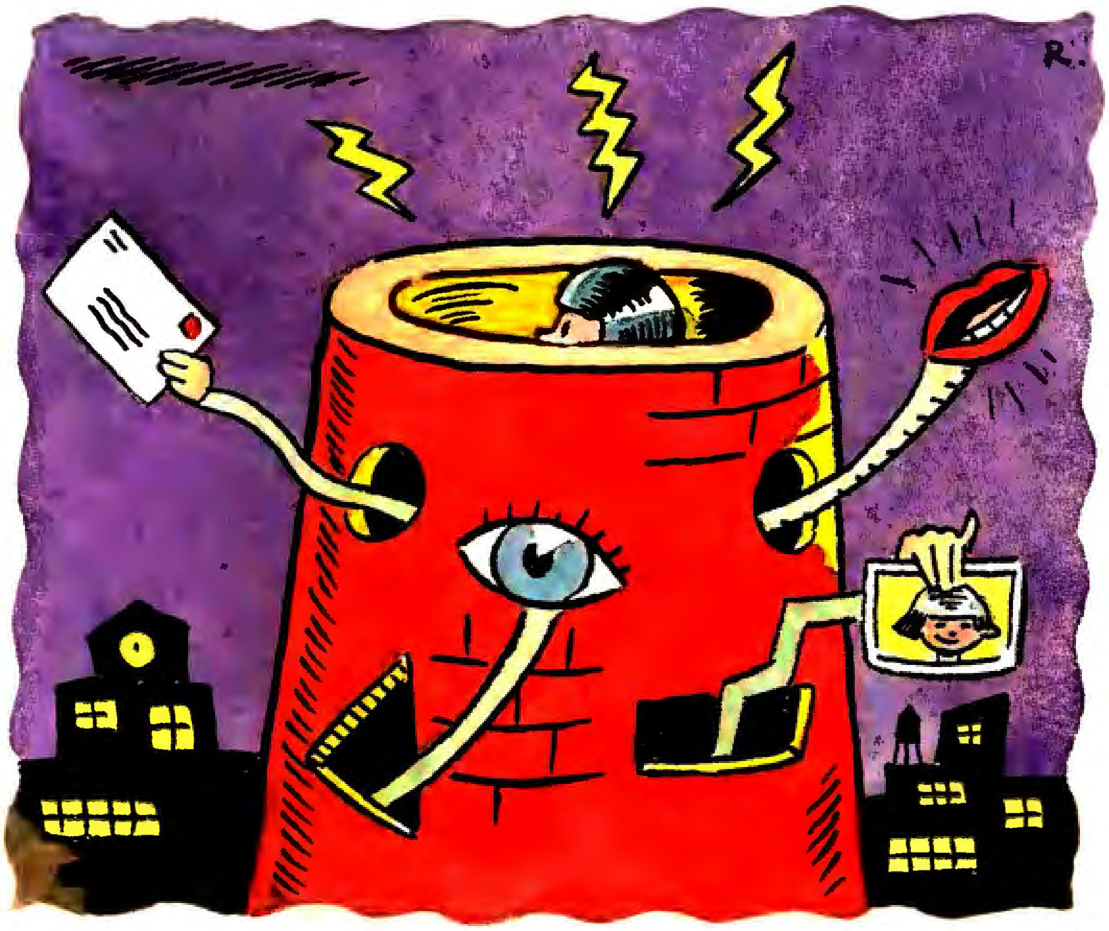


ILLUSTRATION: MARC ROSENTHAL

TECHNOLOGY HAS TURNED ME into a hermit. Even in those few moments when I'm not working (or sleeping), I'm using my PC to get news, watch my stocks, manage my bank account, and buy groceries online. But when my friends stopped calling and my mother threatened to have my picture put on a milk carton, I knew I had to do something. So I decided to use the same technology that makes me so darned self-sufficient to stay in touch with those who matter to me.

Luckily, I found several free chat and e-mail programs to help me regain my social-butterfly status—and do a little personal networking on the side. I also checked out some videoconferencing and video capture hardware, so I can prove to my family that it really *is* me chatting with them. And I tried a freeware program that lets me make phone calls over the Net.

EDITED BY

Angela Freeman, Anne Kandra, and Scott Spanbauer

E-MAIL WANTS TO BE FREE

E-MAIL IS PERHAPS the most convenient way to stay in touch these days. But I did not want to use my account at work to gab with friends, because it's under the ever-watchful eye of my evil boss. And I didn't want to pay for a whole new account. So I signed up for a free one with USA.Net's **NetAddress**. Like Juno, Hotmail, and other gratis e-mail services, NetAddress has one catch: A banner ad pops up on the Web site when I check my e-mail. But as far as I'm concerned, it's a small price to pay.

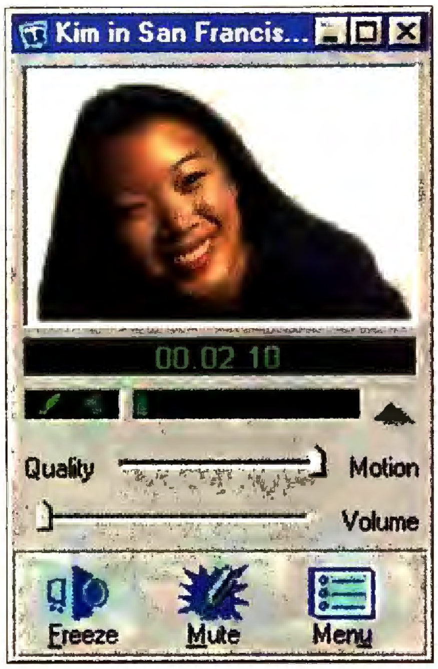
Registering took all of 5 minutes, and accessing my mail from the Web is even easier—I just type my user name and password. NetAddress lets me send and receive attachments, store up to 5MB of messages, organize my in-box into folders, and automatically forward messages to my other accounts. I can also configure it to work with a POP3 mail reader such as Eudora or Microsoft Exchange. The best thing about NetAddress (besides the price) is that I can use it to send out confidential e-mail without having to worry about the boss peeking.

PICTURE THIS

NO MATTER WHO you're talking to, sending e-mail back and forth has its limitations. So I decided to get visual. I hooked up ArcSoft's $149 **Zipshot**—a small video capture device about the size of a TV remote control—so I could grab still images (or short video clips) from my videotapes of my trip to Mexico and send them over the Net.

First I connected the Zipshot to my video camera, then plugged it into my PC's parallel port. (The device also hooks up to digital cameras, TVs, VCRs, or any other video source.) The bundled Zipshot software then walked me through grabbing the perfect shot of myself lounging on the beach with a margarita. I enhanced the picture a little (okay, a lot), added a background and an audio file of splashing waves, then zipped my electronic postcard off to my snowbound friend in Colorado. Hey, I can be evil, too. ▶

The Zipshot also includes rudimentary videoconferencing software, but keeping my video camera hooked up to the PC was awkward. Still, I figured if I could actually get the feature up and running, I could use it to work from home—maybe even attend meetings in my bunny slippers.



HELLO OPERATOR: Videoconferencing using VDOPhone Professional is easy over phone lines, but the quality isn't great over the Internet.

With visions of comfy loungewear dancing in my head, I picked up the $249 **VideoLogic Captivator PCI/VC,** which bundles a PCI video capture card with a cute little Philips color desktop video camera that sits on top of the monitor. It also comes with trial versions of several popular videoconferencing packages, plus the full (but now outdated) version 2.02 of VDOnet's **VDOPhone Professional.** Even though the installation wasn't quick—I had to open the computer case to install the PCI card, then plug the camera into it—it was pretty straightforward, which is a good thing considering the Captivator's bare-bones installation guide. After I downloaded a trial version of VDOPhone Professional 3.0, I was ready to go.

Alas, my fantasy was not meant to be. Once I was all set, it dawned on me that no one I know has videoconferencing equipment. So I logged on to the Net and connected to VDOnet's Online Directory (www.vdo.net), then scanned the site's user rosters for someone with a friendly-sounding name. I clicked the "dial" icon next to the name Smiley (bypassing both Captain Hook and Sexyguy) and crossed my fingers. The telephone rang, and lo and behold, I was face to face with a woman in Albuquerque.

F Y I

LOOKS LIKE the Internet has more window shoppers than impulse buyers. A new study says that more than half of U.S. adults with Net access have gone cybershopping—but only 16 percent have completed a purchase on the Web. The most popular products to buy online? Books, computer hardware, and software.

SOURCE: INTELLIQUEST

At least, I'm pretty sure it was a woman; it was hard to tell. When I could see the video clearly, the audio sounded garbled and choppy. At other times the audio was fine, but then the video looked as if it were coming from the dark side of the moon—it was pixelated and transmitting at only a few frames per second. Of course, I was using a 28.8-kilobits-per-second modem; you'd probably do better with a faster one.

Then I tried dialing directly in to Smiley's computer to test a point-to-point connection; the quality of both video and sound improved dramatically. Hey, maybe this working-in-my-fuzzy-slippers thing might fly after all!

Much of the success of your own foray into videoconferencing will depend on your fellow conferee's equipment. Ideally, both parties should use at least a 33.6-kbps modem and the same videoconferencing software. Despite claims, many of these packages won't really work together. You could campaign for your friends and relatives to buy the same hardware and software (and risk sounding like an MCI "Friends and Family" commercial), or you could always search the Internet for new friends.

THE BUDDY SYSTEM

OR YOU COULD do like I did, and hold off on videoconferencing for now. It's actual real-time interaction that I seek, so why not skip the video and go straight to conferencing? There are several "buddy list" programs that let you chat in real time with others over the Net.

Most of my (nontechie) family subscribes to America Online, and they've all raved to me about AOL's internal buddy list feature, which lets them know when family members are online and allows them to send text messages back and forth instantly. Well, now I can get a piece of the chat action, too. America Online recently released **AOL Instant Messenger,** which is designed to let any Internet user chat with anyone else logged on to AOL or the Net.

SMILE PRETTY: This tiny camera comes with VideoLogic's Captivator PCI/VC.

ILLUSTRATION: MARC ROSENTHAL; PHOTOGRAPH: MARC SIMON

I downloaded the free software, registered at AOL's Web site, and typed my family's screen names into my list. ▶

Scorecard

AOL Instant Messenger
Grade: **B+**; Price: free; America Online Networks; 703/265-2120; www.aol.com

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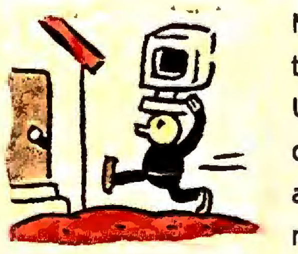
The next time my dad logged on to AOL while I was online, I was notified. You can add non-AOL Net surfers to your buddy list too, but only after they download the program and register. The very basic interface lets you arrange your buddies into groups; for example, I grouped my sister and parents under Family and my business contacts under Colleagues.

Just for kicks, I tracked down my boss while I was traveling (always good to keep tabs if you can) and realized that I had a file he needed. Now wouldn't it be cool, I thought, if I could just send him the file right now? Well, actually...I could, using **ICQ**, a free chat/buddy list program from Mirabilis. Just like Instant Messenger, it notifies you when your buddies are online and lets you chat across the Internet. But it also allows you to exchange files on the fly, so I was able to zip that report off to my boss the second he asked for it, rather than having to compose a separate e-mail message. Every second counts, right?

F Y I



MORE THAN half the homes in the United States still don't have a PC, according to a new survey. But that may change soon: 43 percent of households own one, up from 35 percent in fall 1996, and 10.2 percent plan to buy a PC sometime during the next six months.

SOURCE: DATAQUEST

With lots more features and uses, ICQ is definitely a better program than AOL Instant Messenger. The interface is a bit more complicated, and you can't organize your buddies into groups as you can with AOL's program, but you can have multiparty chats. And ICQ offers some solid security measures—others must get your authorization to add you to their lists, and it's easy to remove yourself from someone's list if you choose.

QUICK AND EASY: The Zipshot video capture device makes grabbing stills from video a snap.

DON'T FORGET YOUR MA BELL

AND, OF COURSE, there's nothing wrong with just picking up the phone and actually *talking* to someone. IDT's free **Net2Phone** lets you make phone calls from your PC to a regular telephone; the call is routed through the company's central switching mechanism over the Internet.

So I downloaded the software, registered, and dialed my mom's number using Net2Phone's on-screen telephone keypad. Unfortunately, it wasn't all I'd hoped. Since I didn't have a full-duplex sound card (which can handle data going both ways simultaneously), only one of us could speak at a time. There was a noticeable delay, but when it finally came through, the sound quality was a lot better than I'd expected—kind of like turning my PC into a $2000 walkie-talkie.

Why would you want to do this, you ask? Good question. The idea is to save on long-distance phone charges. People calling the United States from other countries will see the most benefit from Net2Phone, since the Internet phone call actually originates from the United States. The rate is 10 cents a minute at peak times, and 15 cents off-peak. If you just want to call your mom in the next state, like I did, you'll probably get a better rate from AT&T. But the cool factor alone warrants giving Net2Phone a try.

So after all this, I've found that I can use technology to stay in touch. I've regained friends, learned new jokes, picked up some new technical skills, and got back in the good graces of my mother. I won't have to die alone and friendless (if technologically adept). Of course, now I can't use work as an excuse for not calling my old friends anymore—they know how to find me.

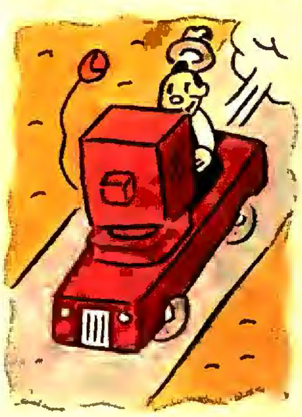
—Angela Freeman

Angela Freeman is a PC World *staff editor.* ■

KEEPING UP

Where Do You Want to Go Today?

WHAT'S A COMPANY to do once it's sewn up the market for desktop operating systems? If you're Microsoft, you try to convince people to run Windows in their cars. That's the idea behind the Auto PC. Based on the Windows CE operating system, the device—part car radio, part computer—provides an AM/FM tuner and a CD player. In addition, it offers features such as driving directions and an electronic phone book that can be used with a cell phone. Everything is controlled through voice commands, so you can keep your eyes on the road and your hands on the wheel. Several car-audio companies plan to introduce Auto PCs later this year for about $1000, and they will be available as an option on some Ford, Mercedes, and Nissan models.



Keeping Up With the Dow Joneses

FROM YAHOO TO SCHWAB.COM, free stock market quote services on the Web are a dime a dozen. But these quotes don't keep up with the often torrid pace of the market—there's typically a delay of 20 minutes or more. For quotes that are both fast and free, try the new Thomson Real Time Quotes site (www.thomsonrtq.com). You'll first need to fill out an online form, print it, and return it by fax or snail mail. But once you take care of that, you can return to the site at any time for free real-time quotes.

Put Your Mug on a Mug

OKAY, SO YOU used that new digital camera or scanner to get scads of family photos into your PC. Now what? PictureMall (www.picturemall.com) lets you order T-shirts, teddy bears, tool belts, playing cards, and dozens of other items customized with your favorite snapshots. Using your Web browser, just upload a digitized photo to the PictureMall site and place your order. Prices, though not cheap, are reasonable: $14.95 for a coffee mug, $24.95 for a sweatshirt, or $16.95 for a snazzy pair of boxer shorts. There are also weekly specials. —Harry McCracken

ILLUSTRATIONS: MARC ROSENTHAL; PHOTOGRAPH: MARC SIMON

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Survival Tips for E-Mail Junkies

ILLUSTRATION: MARC ROSENTHAL

YOU WERE BOUND to find out sooner or later, so I may as well admit it: I'm an electronic-mail junkie. I'm hooked because e-mail has become a dramatically powerful tool, giving me almost instant access to friends, colleagues, and business contacts.

The e-mail downside? If you're not careful, you can find yourself drowning in file attachments and eating lots of spam sandwiches (hold the mustard, thanks). There is some good news, though. I have a number of tools and techniques to help you keep your head above the never-ending e-mail flood. And although I favor one particular e-mail package, the tricks I describe here will work with most mail applications.

WHEN SPAM WAS YOUNG

THE OLD DAYS of e-mail were pretty horrifying. Using MCI's software to send mail to another MCI subscriber was an arduous exercise; trying to e-mail someone on, say, CompuServe was virtually impossible. Those were the dark ages, before the advent of low-cost, local Internet service providers.

Nowadays, you can choose from an abundance of ISPs, as well as plenty of programs to manage e-mail. The one I recommend—and love to use—is Qualcomm's Eudora Pro Mail 4.0. It's fast and lean, isn't overwhelming to use or learn, and has features I really need. If you're curious, you can try it without cost for 30 days or opt for the free Light version.

Eudora is so slick that it can make incoming e-mail stand on its head, spin in a circle, and whistle Dixie. How? One word: *filters*. I couldn't imagine the value of filtering—until I had 300 messages clogging my in-box. Then I learned how to use Eudora's filters to restore order.

Make **incoming e-mail** stand on its head, **spin** in a circle, and **whistle** Dixie. How? One word: **filters.**

If spam afflicts you only moderately, Eudora can cut it back even more. Create a filter against the name of a sender, subject, or domain name, and Eudora dumps the e-mail into the trash. For instance, try sending me a message with "big money" or "get rich" in the subject line, and it'll disappear without a trace.

Unfortunately, you may be a major spam magnet. In that case, you may need a specialized program, such as Unisyn's terrific Spam Exterminator 3.0. The program has the goods on more than 5000 spam artists, and when it checks for new mail, it deletes the spam instantly. Also check out Doug's SPAM filtering page at www.erols.com/dtoombs/spam.htm for some cool spam-defeating tricks.

Eudora's filters also work magic on my most critical incoming messages. When Eudora recognizes a message from my editor, it plays a .wav file—"Hail to the Chief"—and I salute the monitor. Wait, it gets better. The message is then transferred into my Home Office folder and pops open on screen. Nifty, no?

Here's another cool filtering trick: I sometimes get 60 messages a day from readers and people asking about my user group. Eudora searches each message for a few key words and phrases (say, *Pasadena*, or *Home Office*) and then replies with an appropriate message. Eudora can also respond automatically to all messages when you're on vacation, telling senders when you'll be back in the office. Even better, it can redirect the entire message—kind of like call forwarding—to someone else (no, not me, thanks).

ADORING EUDORA

EUDORA ALSO HAS the smarts to let me check both my EarthLink and MindSpring accounts. Unfortunately, it won't yet work with America Online's, Prodigy's, or CompuServe's proprietary mail systems. Keep your fingers crossed, though: Eudora may be able to check mail on these services by the time you read this.

To learn more about Eudora, head for the loyalist Web sites at www.ka.net/eudora and www.cs.nwu.edu/%7Ebeim/eudora. Then subscribe to the excellent Eudora mail list: Send a message to majordomo@wso.williams.edu and include *subscribe eudora-win* in the body of the message.

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Altec Lansing ACS48 Speakers & Subwoofer
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104+ Keyboard & Mouse
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Ensoniq 3D 32-Voice PCI Wavetable Sound Card
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HERE'S HOW

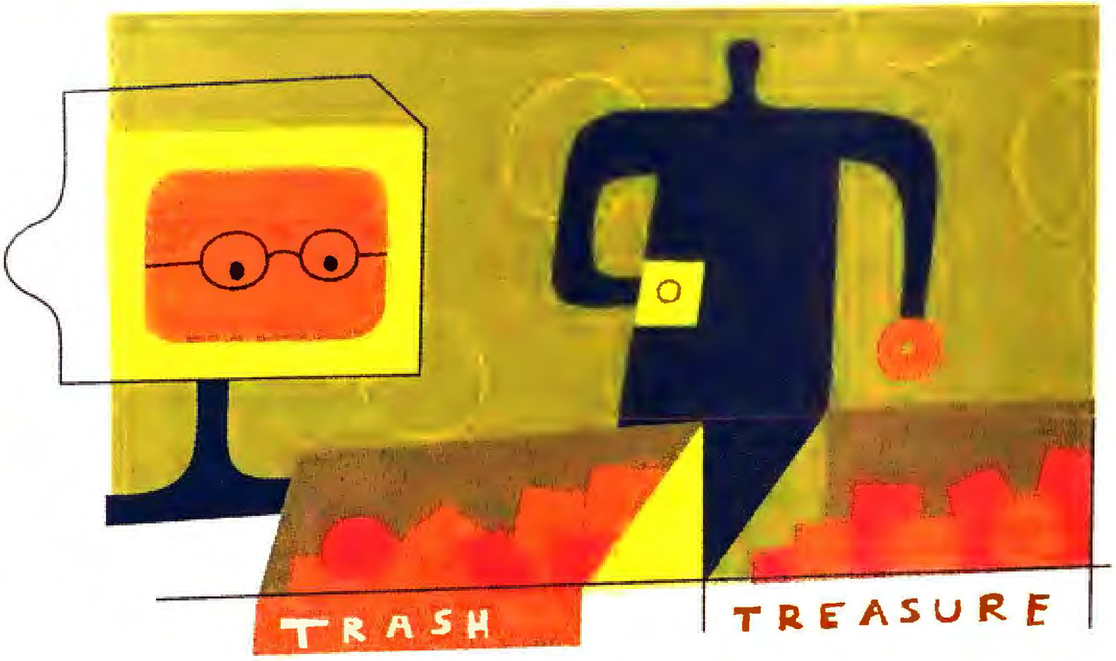


ILLUSTRATION: DOUG ROSS

ANSWER LINE

Is It Really Safe to Delete All These Files?

FOR SOME REASON, I HAVE A NUMBER OF autoexec files–13 of them, to be exact–on my Windows 95 machine. I don't know why I have so many of these files on my system. I didn't put them there. Can I safely delete all of the autoexec files whose extensions end with a number?

John Hanna, Parkersburg, Iowa

I RECEIVE LOTS OF LETTERS from readers who want to know whether they can delete strange files from their hard drives. I'll answer all of those questions at once.

If you're not sure whether you should delete a file, move it temporarily to another drive or folder. If you have a file compression utility such as PKZip or WinZip, you can also compress the mystery file. Then go about your business. If problems develop in the next few months, decompress the file or return it to its original location. Otherwise, delete it.

Several readers ask about files beginning with '_ofidx' or 'ffastun'. These are indexes for Microsoft Office's FastFind feature (the former are from Office 7.0; the latter, from Office 97). If you delete these files, Office will just re-create them. To prevent Office from creating them, remove FastFind from the Windows\Start Menu\Programs\Startup folder. You'll pay a price, however, in slower text searches.

GIVE CD-ROM DRIVE THE BOOT

IN THE FEATURE ARTICLE "How to Keep Your PC Trouble-Free" [October 1997], you recommend putting 16-bit CD-ROM drivers on a boot floppy. As you suggested, I turned to my old, pre-Windows 95 autoexec.bat and config.sys files, but I haven't been able to find the right information on them. How do I create a boot floppy?

Robert Butler, Villas, New Jersey

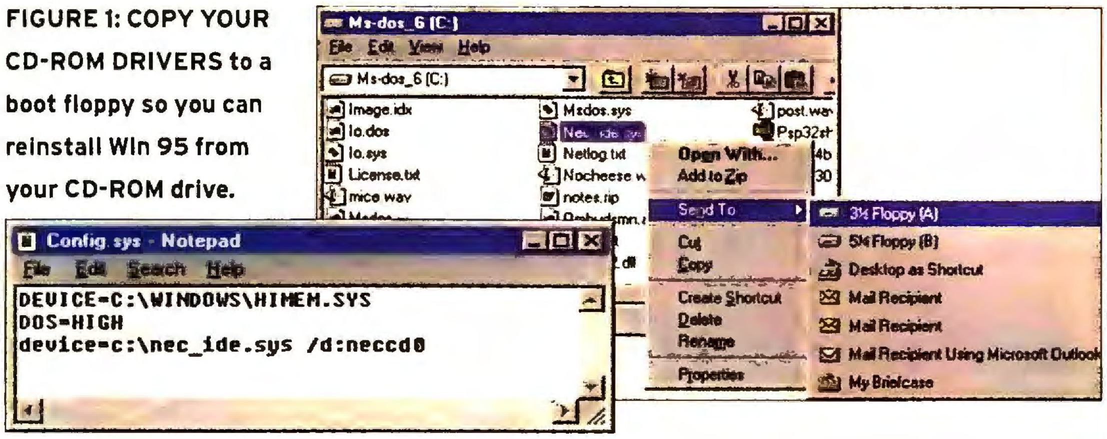
PERHAPS I DID GO LIGHT on the details; sorry about that. If you lose everything on your hard drive, you'll probably need to boot from a floppy disk, then reinstall Windows 95 from the CD-ROM. And this means that your floppy drive must load the 16-bit CD-ROM drivers when it boots. Unfortunately, Microsoft doesn't give us a simple way to do that.

Here's a step-by-step procedure for creating a CD-ROM–reading boot floppy that should work on most Win 95 systems.

1. Put a floppy in the drive. Open *My Computer,* right-click the *A:* icon, and select *Format.* Click the *Copy system files* check box, then click *Start.* When the formatting is done, click *Close* twice.
2. In Notepad, open the file Windows\Dosstart.bat, then save it as **a:autoexec.bat** (that 'a:' is very important). Look for a line in the file containing 'mscdex.exe', and delete everything up to it—the first word in the line should be 'mscdex.exe'. (You can remove all subsequent lines from the file, too.) Save the file.
3. Copy the file Windows\Command\Mscdex.exe onto your boot floppy in A:.
4. Now comes the hard part: Back in Notepad, open config.sys on the C: drive and look for a device= command that *might* be for your CD-ROM drive. The letters 'cd' anywhere in the command are a good sign, as is the name of your CD-ROM drive's manufacturer. If you can't find a likely suspect, see if there's another file on drive C: that begins with 'config'—for instance, config.dos. When you've found a file with what you hope is the right line, save it as **a:config.sys**. If the line

By Lincoln Spector

FIGURE 1: COPY YOUR CD-ROM DRIVERS to a boot floppy so you can reinstall Win 95 from your CD-ROM drive.



```
DEVICE=C:\WINDOWS\HIMEM.SYS
DOS=HIGH
device=c:\nec_ide.sys /d:neccd0
```

begins with 'rem', delete that word; the line should begin with 'device='.

5. The device= line refers to a file by its path and name—c:\nec_ide.sys, for example. Copy that file to drive A: (see **FIGURE 1**). Then remove the path from the line in a:config.sys. For instance, if the line reads 'device=c:\nec_ide.sys /d:neccdo', trim it to **device=nec_ide.sys d:/neccd0**.

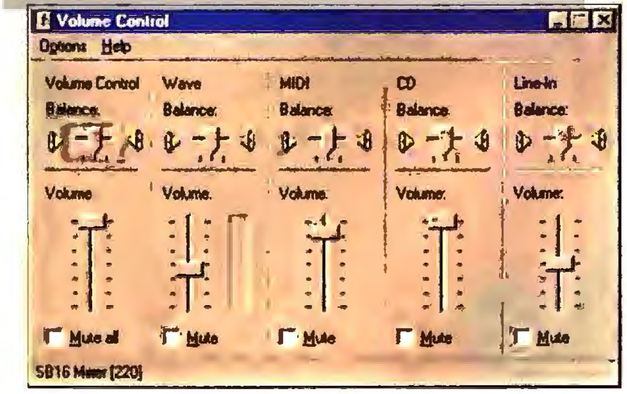
Now it's time to test what you've done. Stick a CD-ROM in your drive, and with the floppy in drive A:, reboot. When you get an A> prompt, type **dir d:** (or whatever letter your CD-ROM drive uses).

If you get a file list, rejoice! Then remove the floppy disk, reboot, write-protect the floppy, and store it in a safe place. But if the dir command brings the error message 'Invalid drive specification', go back to the drawing board and try again. One thing you might try: Compare the commands in the floppy's config.sys and autoexec.bat files. Each should have a parameter that starts with '/D:', followed by other letters. If that parameter isn't identical in both files, try changing one to match the other.

Balancing Sound in Windows 95

THE STEREO in your living room lets you adjust the balance between the left and right speakers. Why not the stereo in your PC? Windows 95 has a balance control; it's just not easy to find. Select *Start•Programs•Accessories•Multimedia•Volume Control.* You'll get a dialog box that lets you adjust the volume and balance of your sound system, as well as specific .wav files and audio CDs.

If you don't have Volume Control, you can install it from the Windows 95 CD-ROM.



PUT INTERNET EXPLORER ON AN E-MAIL DIET

I WAS SHOCKED to discover that every e-mail message I've ever sent or received through Microsoft Internet Explorer's Internet Mail was taking up precious hard drive space. One file I found, Deleted Items.mbx, contained every file I'd ever deleted. Silly me, I thought that when I "permanently deleted" an e-mail message, it was, well, permanently deleted.

I did some research and found a way to regularly empty the Deleted Items file: Select *Mail•Options,* click the *Read* tab, then check *Empty messages from the 'Deleted Items' folder on exit.* Now Internet Mail empties at least part of the garbage when I exit it.

But that takes care of only half the problem. The other subfolders in the Mail folder—Inbox, Outbox, Saved Stuff, and the notorious Sent Items—just keep getting bigger. I can delete all the messages in these folders, but the files stay the same size. How do I reclaim this space?

Jackson Hawk, Rogue River, Oregon

JUDGING FROM THE WAY Microsoft's Internet e-mail programs store messages, I'd say the company truly cares about space on your hard drive: It thinks you have too much. (According to Microsoft, its space-wasting way of storing messages improves performance.)

But there is a way to recapture that space from Microsoft's Internet e-mail programs. If you're using Internet Explorer 3.*x*'s Internet Mail, select *File•Folder•Compact•All Folders.*

If you're using Internet Explorer 4.0's Outlook Express, select *File•Folder•Compact All Folders.* And to regularly clear Outlook Express's Deleted Items folder, select *Tools•Options,* click the *General* tab, and check *Empty messages from the 'Deleted Items' folder on exit.*

OVERDRIVE OVERVIEW

CAN I UPGRADE my Dell Dimension XPS P100 with Intel's Pentium MMX-200 OverDrive chip?

Mark Strickland
Montrose, Pennsylvania

IT'S NOT ALWAYS EASY to determine whether a computer can handle this upgrade. Intel has tested a few systems for OverDrive compatibility and posted the results at www.intel.com/overdrive/ ▶

CONTENTS

INTERNET

online DON'T MISS ADDITIONAL HERE'S HOW information at **www.pcworld.com/hereshow.**

business/upgrade/upgrade.htm. But if you're looking for a general discussion of what your system needs for each OverDrive chip, check out www.intel.com/overdrive/unbrand/.

If you're considering the 200-MHz MMX OverDrive, ask yourself whether your motherboard's CPU socket can handle it. Many Pentium processors require a socket designed for a specification called Socket 5, but the MMX chips—including the OverDrive chip—need a newer variation called Socket 7. Pentium systems built since 1995 may use Socket 7, but it's not a sure thing.

Open up your PC and take a look. It's easy to read the socket labels, even when the chip is plugged in (see **FIGURE 2**).

Finding out whether a system's BIOS can support the MMX OverDrive is considerably easier. Just check out Intel's BIOS test utility at PC World Online.

But in the end, it's probably best to ask your PC vendor. My contact at Dell warns that attempting this upgrade "might be opening up a can of worms."

For more hints and information about CPU upgrades in general, check out this month's *Hardware Tips*.

HOW MUCH IS THAT FOLDER OF THE WINDOWS?

IN "HOW DO I REINSTALL Windows 95?" [September 1997], you suggested copying the Windows 95 directory from the Windows 95 CD-ROM onto the hard drive for easier reinstallation. You mentioned that this directory takes up about 30MB of hard drive space. Mine seems to consume 79MB. Are we talking about the same thing?

Mike Davies
Stoke on Trent, Staffordshire, England

SORRY ABOUT THE CONFUSION, Mike. The Win 95 folder is 32MB on the upgrade CD-ROM, 34MB on the original OEM version, and 79MB on the OEM Service Release 2 version.

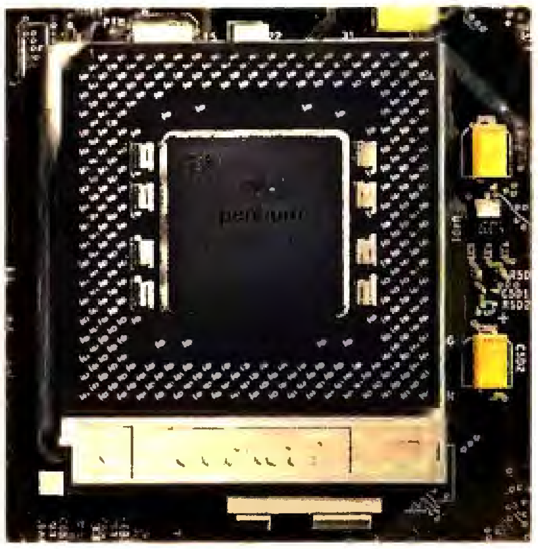


FIGURE 2: TO DETERMINE THE SOCKET your CPU is plugged into, read the label.

Find files from this article at www.fileworld.com. Answer Line welcomes your questions and pays $50 for published items. PC World *contributing editor Lincoln Spector writes a computer humor column,* Gigglebytes, *that appears in 13 publications in four countries. See page 14 for contact information.* ■

SPIRE
INTERACTIVE TRAINING

WINDOWS TIPS

SCOTT DUNN

Simplify disk maintenance ◆ Keep documents handy ◆ Keys to foreign exchange

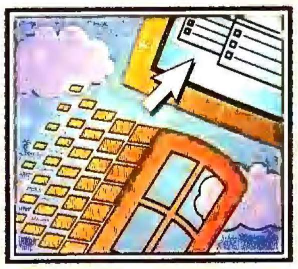
Get DOS or Win 95 Prompt Each Time Your PC Starts

IN THE NOVEMBER 1997 *Windows Tips,* I explained how to make an automatic prompt for choosing between DOS and Windows 3.*x* each time you start your PC. This piqued the curiosity of many readers, who wanted a similar function for Windows 95.

Good news: Not only does Win 95 know this trick, but it also gives you a large number of different start-up choices. All it takes is a little editing of the msdos.sys file in your root directory (see **FIGURE 1**).

Here's what to do. In Explorer, choose *View•Options* and make sure that *Show all files* is selected. Click *OK.* Next, locate msdos.sys in the root directory of your start-up drive. Right-click the file and choose *Properties.* In the resulting dialog box, uncheck the *Read-only* attribute and click *OK.* Now choose *Start•Run,* type **notepad c:\msdos.sys**, and press **<Enter>**. (If you're using a diskwide compression program such as DriveSpace, replace 'c' with the appropriate host drive letter.)

When the file opens in Notepad, look for the [Options] heading. If you see a line that begins BootMenu=, edit it to read **BootMenu=1** (or add the line if it's not there). This forces Windows to display a menu of options each time you start your computer. Just press the number of your choice, and away you go.

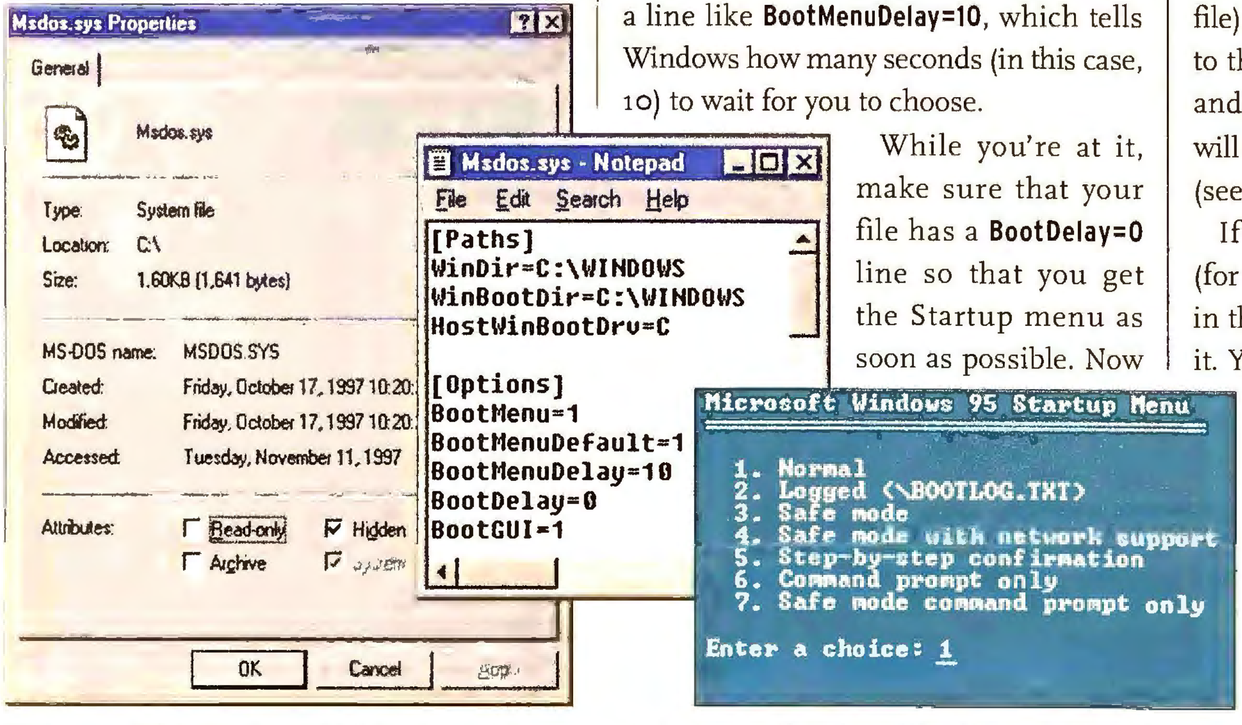


If you don't make a choice, Windows will use whichever option is set as the boot menu default. To set that default yourself, you need a line like **BootMenuDefault=1**. The number corresponds to the numbers in the Startup menu. For example, you'd use the number **1** to make Windows the default, **3** to make Windows' Safe mode the default (yecch), **6** to make MS-DOS mode the default, and so on.

If you want to be able to boot to your previous version of DOS—and you have not removed it from your system—make sure the file has the line BootMulti=1. (Use **BootMenuDefault=8** to make this the default.)

To determine how long Windows waits for you to make a choice from the menu before using its default of 30 seconds, type a line like **BootMenuDelay=10**, which tells Windows how many seconds (in this case, 10) to wait for you to choose.

While you're at it, make sure that your file has a **BootDelay=0** line so that you get the Startup menu as soon as possible. Now save the file and then exit.



Type: System file
Location: C:\
Size: 1.60KB (1,641 bytes)
MS-DOS name: MSDOS.SYS
Created: Friday, October 17, 1997 10:20:
Modified: Friday, October 17, 1997 10:20:
Accessed: Tuesday, November 11, 1997
Attributes: ☐ Read-only ☑ Hidden ☐ Archive ☑ System

```
[Paths]
WinDir=C:\WINDOWS
WinBootDir=C:\WINDOWS
HostWinBootDrv=C

[Options]
BootMenu=1
BootMenuDefault=1
BootMenuDelay=10
BootDelay=0
BootGUI=1
```

```
Microsoft Windows 95 Startup Menu

   1. Normal
   2. Logged (\BOOTLOG.TXT)
   3. Safe mode
   4. Safe mode with network support
   5. Step-by-step confirmation
   6. Command prompt only
   7. Safe mode command prompt only

Enter a choice: 1
```

FIGURE 1: FORCE WINDOWS 95 TO DISPLAY a menu of start-up options by editing the msdos.sys file.

Add Special Effects to .Wav Files

WHO SAYS Sound Recorder can't do special audio effects? Launch Sound Recorder (select *Start•Programs•Accessories•Multimedia•Sound Recorder*), open the .wav file you want to enhance, and choose *Edit•Copy*. Then move the slider a little to the right of the beginning. For a mild reverberation effect, set the slider at about 0.04 second (watch the Position box). For a more dramatic echo, move the slider further. When you're ready, choose *Edit•Paste Mix*. Click the play button to test.

That's all there is to it. The next time you reboot your PC, you'll have a lot more control over how things start up.

AVOID TYPING LONG PATHS

IF YOU PERFORM a lot of file management chores in DOS, or if you simply have an application that makes you enter file path names in dialog boxes, you know that all the typing can be a pain. Fortunately, you can make Windows do some of it for you. The trick is to first locate the file or folder in File Manager or Explorer; a little dragging or pasting does the rest.

If you have a file icon handy in an Explorer window in Windows 95 or NT 4.0 but need to use it in a command line (for example, with a DOS command or a batch file), you can simply drag the file or folder to the DOS window or choose *Start•Run* and drop it into the Run box. Windows will then type the path where you drop it (see **FIGURE 2**).

If you need to use the path elsewhere (for example, in a dialog box), highlight it in the Run box and press **<Ctrl>-C** to copy it. You can then paste the path wherever you need it.

In Windows 3.*x*'s File Manager, select the file or folder whose path you need and press **<Alt>-<Enter>** to display its Properties dialog box. Highlight the path and press **<Ctrl>-C** to copy it. Unfortunately, in the case of files this copies only the path and not the file name. You can either ▶

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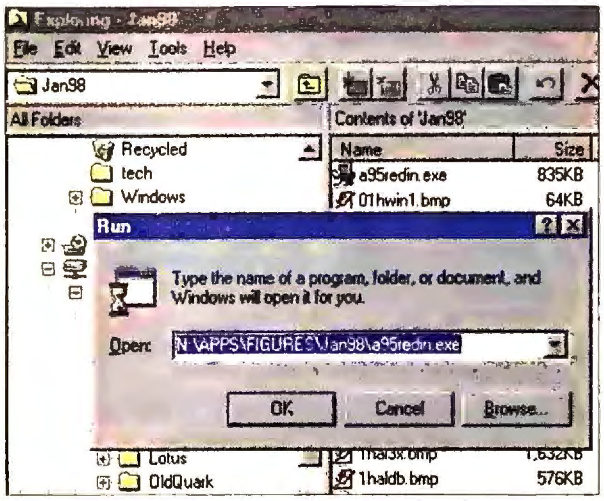
Circle 91 on reader service card



Type the name of a program, folder, or document, and Windows will open it for you.

Open: N:\APPS\FIGURES\Jan98\a95redin.exe

FIGURE 2: SAVE YOURSELF SOME TYPING by dragging files with long path names to their target.

paste the path and then return to this dialog box to copy the file name, or just type in the file name after pasting the path.

SIMPLIFY DISK MAINTENANCE

IF YOU USE Microsoft's ScanDisk and Disk Defragmenter utilities regularly, you can save yourself the trouble of having to click through dialog box options each time you run them by adding a few command-line switches to the appropriate Shortcut. Then the next time you want to check a disk or defragment a drive, you simply choose the tool—the rest is automatic.

To do so, right-click the *Start* button and choose *Open* or *Explore*. Locate and select the *ScanDisk* or *Disk Defragmenter* Shortcut, which by default resides in the Windows\Start Menu\Programs\Accessories\System Tools directory. (If you want to make a desktop copy of the Shortcut, right-click to drag the icon to the desktop and choose either *Copy Here* or *Create Shortcut(s) Here*.) Press **<Alt>-<Enter>** to open its Properties sheet. Click the *Shortcut* tab, then click at the end of the command line in the Target box. Finally, add command-line switches (separated by spaces) as explained below.

ScanDisk. Type the letter of any drive you want scanned, followed by a colon (as in **c:**). To scan all local (nonnetworked) hard drives, skip the drive letters and type **/a**.

To have ScanDisk start and stop without interacting with you, type **/n**. Even with this switch, ScanDisk may stop to report errors. If you don't want this information, start the program and check *Automatically fix errors*. You must click *Start* and run ScanDisk at least once without the /n switch to make this setting stick.

If you want ScanDisk to run in Preview mode—so it will find errors but not fix them—use the **/p** switch. Be aware, however, that Preview mode can be misleading: It gives the illusion that errors are being corrected when in fact they are not.

You might end up with a command line that looks like this:

c:\windows\scandskw.exe c: d: /n

This would check drives C: and D: and then automatically exit when finished.

Disk Defragmenter. As with ScanDisk, you can type individual drive letters followed by a colon. To defragment all nonnetworked hard drives, type **/all**.

If you want only to defragment files—so that each file is stored contiguously on the disk—and not to consolidate free space, type **/u**. If you want free space consolidated without defragmenting files, type **/q**. If you want both the defragmenting and consolidation, type **/f**. (Note that /u, /q, and /f are mutually exclusive, so you can use only one of these switches at a time.)

To make Disk Defragmenter start and end without asking you for settings or displaying any messages, type **/noprompt**.

Finally, if you want to see the disk map that symbolizes the defragging process, type **/detailed**. Otherwise, you'll get the small Defragmenter window by default.

Your final command line might read c:\windows\defrag.exe /all /f /noprompt to defragment and consolidate free space on all local hard drives, without user interaction, in the default view.

KEEP CURRENT FILES HANDY

THE DOCUMENTS MENU is a handy way of opening recently used files (select *Start•Documents*). Unfortunately, if you work with many applications or browse through a lot of folders, the file you want probably won't be there, because the menu has a limit of 15 documents. And although the Documents menu represents Shortcuts found in Windows\Recent, simply copying Shortcuts to this folder won't make them appear in the Documents menu.

Here are a couple of tricks for keeping your current work handy.

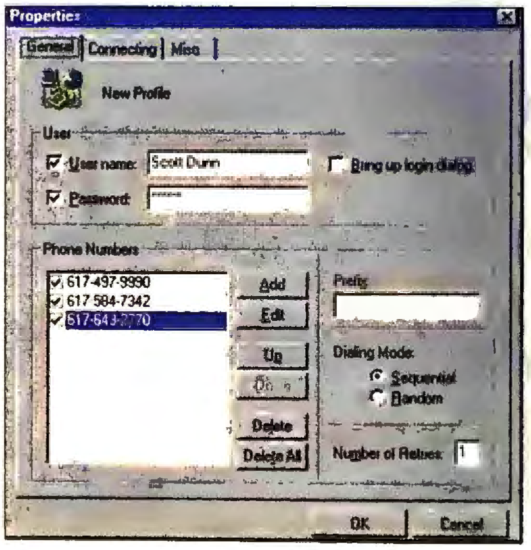
First, if you really want a file to appear in the Documents menu, choose *Start•Run* and then click *Browse*. For Files of Type, choose *All Files (*.*)*. Navigate to the file that you want to see in the Documents menu, select it, and then click *Open*. This puts the file's name in the Run dialog box and adds it to the Documents menu. To continue adding more files to the menu, click *Browse* again and repeat the process as many times as you would like. When you're finished click *Cancel*, or click *OK* to open the file that's currently displayed in the Run box. This trick can be useful if you expect to work with a series of documents whose applications don't list recently used files.

If all of this seems like too much work, you may find it handier just to keep a window or two open on your desktop with the Shortcuts you need. One way of doing this is to select the Recent folder in your Windows folder using Explorer, right-click and drag it to the desktop, and then choose

▶

WINDOWS TOOLBOX

Doing Dial-Up? Let FreeDum Ring



User name: Scott Dunn

617-497-9990
617 584-7342
617-643-2770

IF YOU CONNECT TO multiple systems using Windows' Dial-Up Networking, remembering multiple passwords and launching several e-mail programs or browsers can be a pain. Check out FreeDum, a freeware program that dials in to different accounts, launches the programs that you want, and shuts down automatically when you exit a specified application. You can download FreeDum from PC World Online.

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Every once in a few years an innovation comes along that rocks the scanning industry. Microtek's engineers and color scientists have been responsible for so many of them. And now, they've done it again.

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Instead of a conventional transparent media adapter, your film is placed into one of five holders (*SnapTrans™ Templates*). A template snaps into a tray and which is then inserted into the scanner (like the new high-resolution *ScanMaker® 5* color flatbed scanner shown above).

The benefit to you? No refracted light diminishing the values of your original. No "Newton-rings" either – those annoying concentric circles that appear in scanned images when film is sandwiched between two panes of glass.

Of course, these are just two of the benefits you'll experience with the new ScanMaker 5. We haven't even talked about the superb reflective scans you get, or the single-pass speed, or the great bundled software, or Microtek's award-winning ScanWizard software...

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- 5 SnapTrans™ templates for film stocks from 35mm to 8" x 10"
- Solid stainless steel chassis
- 3 long-life cold cathode lamps
- Precision-machined aluminum optical carriage
- High grade optically flat first surface mirrors yielding 95% reflective light for lower image noise
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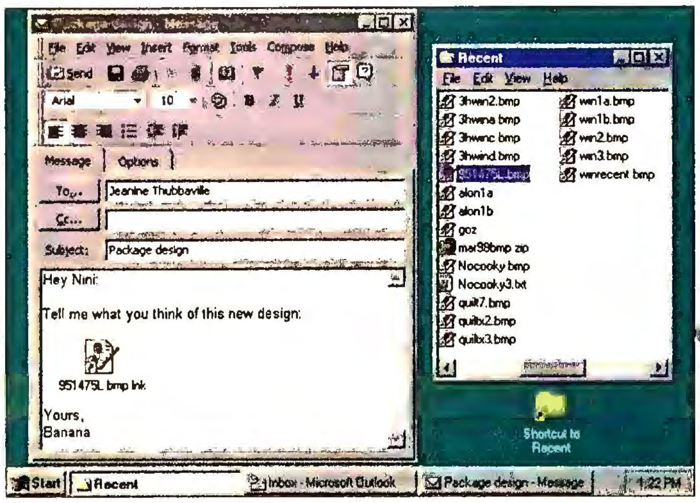


To: Jeanine Thubbaville

Subject: Package design

Hey Nini:

Tell me what you think of this new design:

951475L bmp lnk

Yours,
Banana

FIGURE 3: ACCESS RECENT DOCUMENTS by keeping their Shortcuts in a Recent folder Shortcut on your desktop.

Create Shortcut(s) Here from the pop-up menu. Drag and drop your Shortcuts to other files onto the Recent Shortcut. Now when you need a file, just double-click the *Recent* Shortcut and find the Shortcut to the file you want (see **FIGURE 3**). Using the Recent folder is handy because some of the Shortcuts there will be inserted automatically by Windows.

WEB PAGES ON THE DESKTOP

JAMES HEY OF Arden, North Carolina, suggests a similar strategy for keeping handy the Internet sites you've visited most recently with Microsoft Internet Explorer 3.*x*: Right-click and drag the History folder from the Windows folder, drop it on your desktop, and choose *Create Shortcut(s) Here.*

Double-click this icon anytime you want to go to a recently visited Web site. Skim through the list until you find the address you want, and double-click it. If your monitor resolution is high enough, you can save some clicking by keeping both the Recent and History windows open while you work.

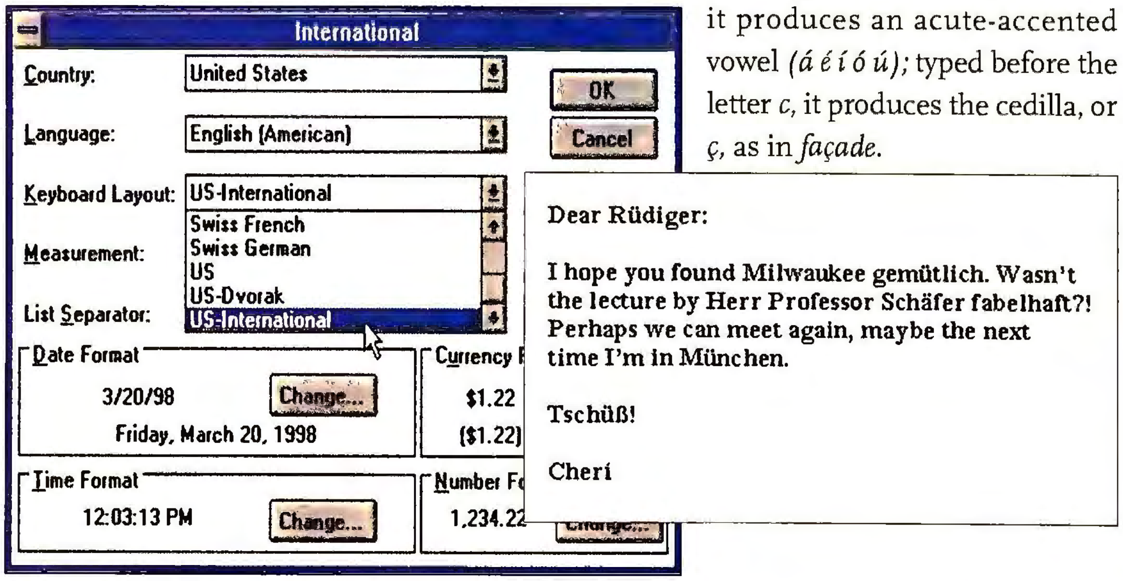
KEYS TO FOREIGN EXCHANGE

IF YOUR DOCUMENTS are peppered with foreign words requiring umlauts, cedillas, or accents acute and grave, you can generate such characters almost automatically.

The secret lies in Windows 3.*x*'s US-International keyboard layout. To turn this on, start Control Panel and double-click the *International* icon. From the Keyboard Layout drop-down list, choose *US-International* and click *OK* (see **FIGURE 4**). If the US-International layout is not installed, you'll be prompted to insert one of your original Windows disks. Do so and click *OK*.

From now on, several characters on your keyboard—specifically the grave accent (`), tilde (˜), apostrophe ('), quotation marks ("), and caret or circumflex (ˆ)—will behave differently. When you type one of these characters, nothing happens at first. But wait: If the next character you type is one normally associated with a particular diacritical mark, the two will appear as a single character. For example, if you type **^** followed by **o**, you get ô, as in the French *hôpital*.

This gimmick works only for characters normally associated with these marks: If you type an apostrophe followed by **s**, you get *'s* (as in *Sally's*) rather than a foreign character. But typed before *a, e, i, o,* or *u*, it produces an acute-accented vowel *(á é í ó ú)*; typed before the letter *c*, it produces the cedilla, or *ç*, as in *façade*.



Country: United States

Language: English (American)

Keyboard Layout: US-International

Measurement:

List Separator:

Date Format: 3/20/98 Friday, March 20, 1998

Currency: $1.22 ($1.22)

Time Format: 12:03:13 PM

Number F: 1,234.22

Dear Rüdiger:

I hope you found Milwaukee gemütlich. Wasn't the lecture by Herr Professor Schäfer fabelhaft?! Perhaps we can meet again, maybe the next time I'm in München.

Tschüß!

Cheri

FIGURE 4: BROADEN YOUR KEYBOARD'S HORIZONS with the US-International layout.

Windows for Workgroups Is Not Just for Workgroups

I TRIED YOUR TIP "Track Down Unused Files" (*Windows Tips,* October 1997) and was surprised that the Properties dialog box shown in the column did not match the one on my Windows 3.11 system. If you are using Windows for Workgroups, that should be specified in your article, since it's a fairly specialized release.

Ron Lowry, Internet

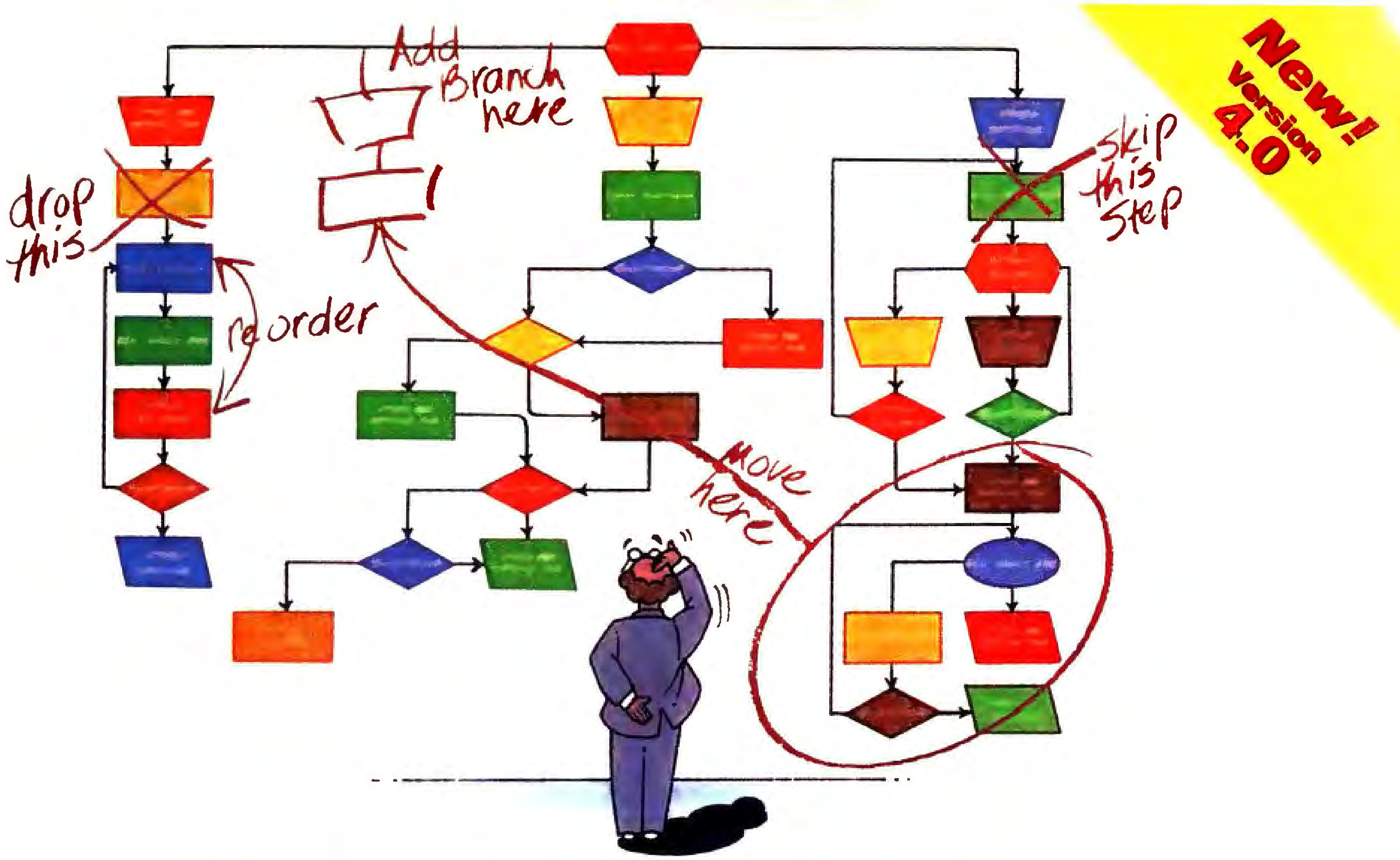
YOU'RE RIGHT, RON. I should have indicated that you need Windows for Workgroups 3.11 to get the detailed Properties dialog box, which can help you deduce the program that installed various system files. If you're using Windows 3.1 or 3.11, you need a file viewer or Windows Write, as explained in "Unmasking Orphaned System Files" (*Windows Tips,* April 1997).

However, I disagree that Windows for Workgroups is a specialized release. It is an important upgrade from Windows 3.*x*, with many improvements that go beyond networking. These include 32-bit file access—which lets you dispense with SmartDrive—and a superior File Manager. You can still find Windows for Workgroups by scrounging around computer stores.

What if you want just an apostrophe or quotation mark without generating a special character? Just type a space after one of these keys to get the original character.

Using the US-International layout transforms your keyboard's right <Alt> key. Holding this key while typing a character produces a wide range of foreign characters, plus some very useful U.S. symbols. Pressing the right-hand **<Alt>** along with **C** gives you the copyright symbol (©); **<Alt>-R**, the registered-trademark symbol (®); **<Alt>-;** (semicolon), the paragraph symbol (¶); and so on. To get the <Alt> functions you're used to, press the left **<Alt>** key.

Find files from this article on PC World Online at www.fileworld.com. Windows Tips *welcomes your questions and tips and pays $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, 800/283-9444). See page 14 for contact information.* ■



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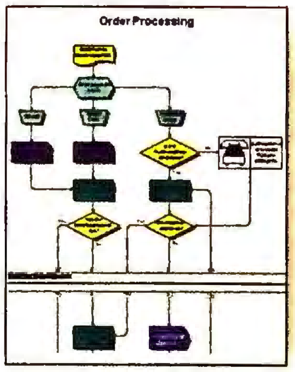

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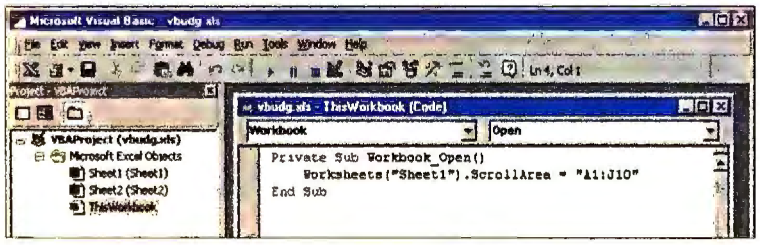
A5837C-ALLAD4PM-0997

Protect Formulas and Data by Hiding Them

SUPPOSE YOU'VE CREATED a worksheet with an area in which users enter data, and you want to protect the data and formulas in the rest of the worksheet from being corrupted by those users.

One solution, which works in all spreadsheets, is to hide all of the sensitive rows and columns. In Excel, select the rows you want to hide, and choose *Format•Row•Hide.* Then select the columns you want to hide, and choose *Format•Column•Hide.*

You might also want to protect the worksheet with a password to prevent others from unhiding rows or columns. Before you do that, though, you have to unlock the cells in which users will enter data. Highlight those cells, select *Format•Cells,* click the *Protection* tab, make sure *Locked* and *Hidden* are not checked, and click *OK.*



```
Private Sub Workbook_Open()
    Worksheets("Sheet1").ScrollArea = "A1:J10"
End Sub
```

FIGURE 1: LOCK USERS OUT of sensitive worksheet areas in Excel 97 with a subroutine that uses the ScrollArea feature.

To hide cells in 1-2-3 release 97, right-click the row or column borders and select *Hide.* To prevent others from unhiding those cells, choose *File•Workbook Properties,* click the *Security* tab, and check *Lock Workbook.* Enter a password if you like.

To hide a row or column in Quattro Pro 8, select it, click the right-mouse button, and select *Hide* from the menu. Unfortunately, you cannot prevent users from unhiding these cells.

If you're using Excel 97, you can take advantage of the ScrollArea feature—but this requires a Visual Basic macro. When you set the scroll area via a VBA macro, the user cannot move the cursor outside that range.

To activate the scroll area whenever the worksheet is opened, press **<Alt>-<F11>** to open the Visual Basic Editor. Select your workbook from the Project window on the left, and double-click *ThisWorkbook* to display the code module (see **FIGURE 1**). Select *Workbook* from the drop-down list on the left side of the module. 'Open' will appear on the right, and the cursor will be between the commands Private Sub and End Sub. Enter the following command between these two lines (substituting the sheet name and range, of course):

```
Worksheets("Sheet1").Scroll
Area = "A1:J10"
```

To turn off the ScrollArea feature so that you can edit the worksheet, create another subroutine with a statement like the following:

```
Worksheets("Sheet1").ScrollArea = ""
```

Execute the subroutine whenever you need to turn off the ScrollArea feature.

GETTING ANSWERS ON THE NET

THE NET CONTAINS a wealth of spreadsheet information, but you need to know where to find it. A good place to start is a very useful spreadsheet FAQs (frequently asked questions) page located at www.faqs.org/faqs/spreadsheets/faq. It contains links to spreadsheet newsgroups, mailing lists, and dozens of official (see **FIGURE 2**) and unofficial Web pages.

The Usenet newsgroup comp.apps.spreadsheets covers all spreadsheets, but Microsoft has its own news server that contains several newsgroups on Excel. The Microsoft newsgroups are not part of Usenet, so you need to set up your news software to access the server located at msnews.microsoft.com, then issue a command to refresh the list of newsgroups.

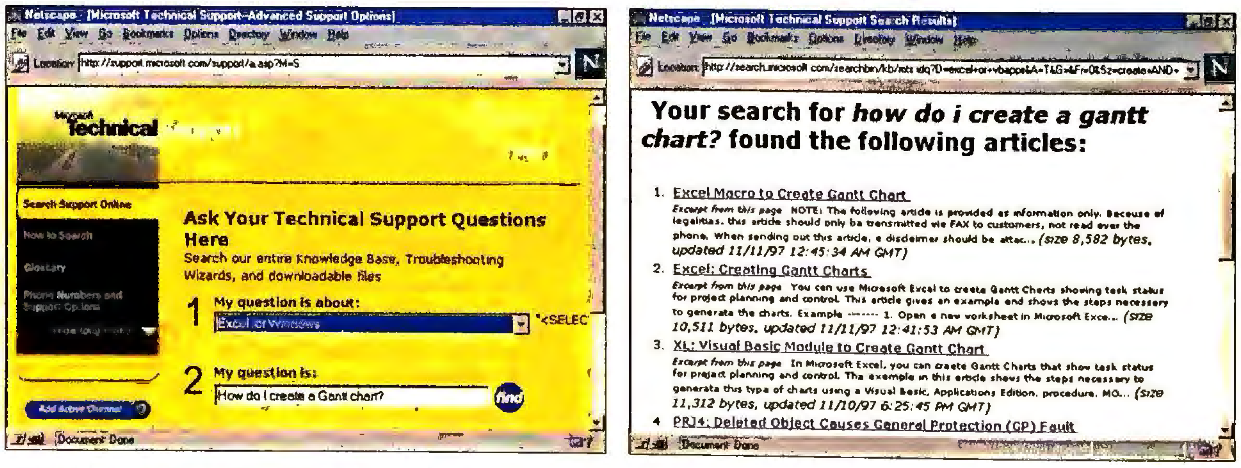
The messages on newsgroups have a limited life span, so you should become familiar with Deja News (www.dejanews.com), an excellent resource that contains a searchable archive of newsgroup posts.

Spreadsheets *welcomes your questions and tips and pays $50 for published items. Contributing Editor John Walkenbach is the author of nearly two dozen books on spreadsheets, and maintains* The Spreadsheet Page *(www.j-walk.com/ss). See page 14 for contact information.* ■

Moving Sheets in 1-2-3 97—Yes, It's Possible!

IN THE NOVEMBER issue, I erroneously stated that you can't move a sheet within a 1-2-3 97 file. Several readers turned me on to a file buried in the Lotus SmartSuite 97 CD-ROM. This file, which is not installed with the suite, contains several 1-2-3 macros—including one for relocating a sheet.

Insert the CD-ROM and open Scripts.txt, located in \extra\123\scripts, for instructions on installing and using the macros.


Netscape - [Microsoft Technical Support–Advanced Support Options]
File Edit View Go Bookmarks Options Directory Window Help
Location: http://support.microsoft.com/support/a.asp?M=S
Technical
Search Support Online
How to Search
Glossary
Phone Numbers and Support Options
Add Active Channel
find
Document: Done
Netscape - [Microsoft Technical Support Search Results]
File Edit View Go Bookmarks Options Directory Window Help
Location: http://search.microsoft.com/searchbin/kb/kb.idq?D=excel+or+vbappsLA=T&G=&Fr=0&Sz=create+AND+
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1. Excel Macro to Create Gantt Chart
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3. XL: Visual Basic Module to Create Gantt Chart
   Excerpt from this page In Microsoft Excel, you can create Gantt Charts that show task status for project planning and control. The example in this article shows the steps necessary to generate this type of charts using a Visual Basic, Applications Edition, procedure. MO... *(size 11,312 bytes, updated 11/10/97 6:25:45 PM GMT)*
4. PRJ4: Deleted Object Causes General Protection (GP) Fault

FIGURE 2: TYPE AN EXCEL QUESTION in Microsoft's technical support page, and receive answers immediately from the company's Knowledge Base and troubleshooting wizards.

ILLUSTRATION: JEFFREY PELO

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Change font sizes quickly ◆ Add dummy text ◆ Save or close all documents

Add Drop Caps to Your Documents

Insert a Bullet Anywhere in Text

THE BULLETED LIST feature in all modern word processors is easy to use. But sometimes you need just one bullet, not a bulleted list, to emphasize a word or line. You won't find this character on your keyboard.

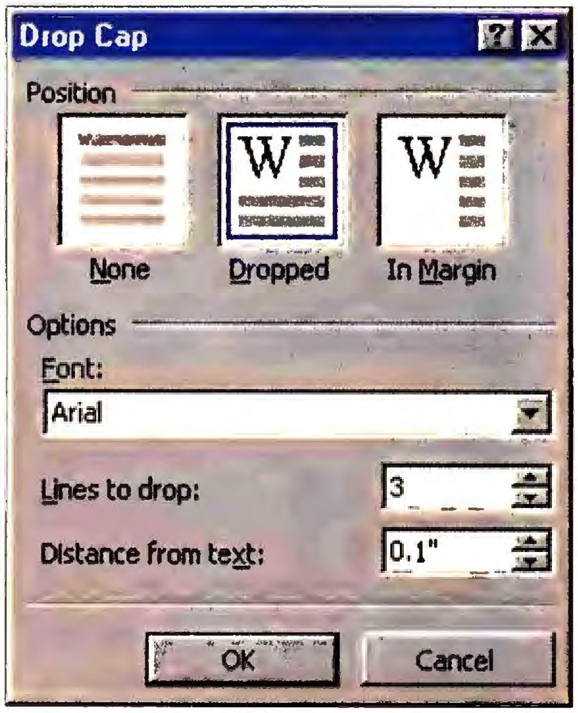
To insert a standard bullet at the cursor location, hold down **<Alt>** while typing **0149** on the numeric keypad. If <Num Lock> is off, you'll have to turn it on. Most but not all TrueType fonts include the bullet character.

ALL CURRENT WORD processors can automatically insert an enlarged capital letter (or letters) at the beginning of a paragraph. Drop caps, as they are called, can give your documents that professional typeset look. Here's how to create drop caps in Word, WordPerfect, and Word Pro.

Word 95 and 97: To create a drop cap for the first letter of the first word in a paragraph, position the cursor anywhere in the paragraph and select *Format•Drop Cap*. To enlarge an entire word (or words), select the text before you select *Format•Drop Cap*. If you're not already in Page Layout view, Word 95 will ask you if you want to switch to that view. Click *Yes*, and the Drop Cap dialog box appears.

In the Drop Cap dialog box, select a *Position* for the dropped cap (see **FIGURE 1**). Your best bet is the *Dropped* option. If you choose *In Margin*, make sure your margins are set wide enough to allow the drop cap to print.

In this dialog box you can adjust the drop cap's font, size (number of lines to drop), and distance from text, but it's usually best to use the current or default settings.

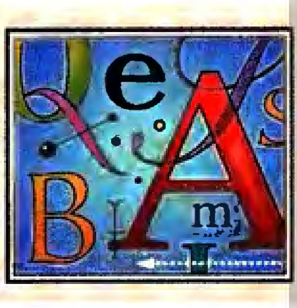


Font: Arial

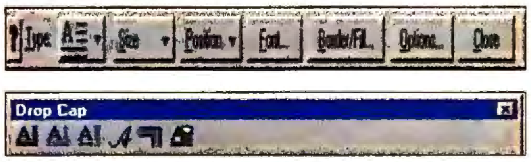
Lines to drop: 3

Distance from text: 0.1"

FIGURE 1: ADD A DROP CAP IN WORD 95 AND 97 by selecting *Format•Drop Cap* from the menu.



WordPerfect 7.0 and 8.0: Position the cursor at the start of the paragraph, then press **<Ctrl>-<Shift>-C**. WordPerfect automatically inserts a default drop cap, then displays the Drop Cap toolbar (in version 7.0, top) or the Drop Cap property bar (in version 8.0) so that you can change the drop cap's style, size, position, font, border, and color, as well as the number of characters included in the drop cap (see **FIGURE 2**). In WordPerfect 8.0, if you don't see the property bar, select *View•Toolbars* and check the *Property Bar* box.



Word Pro 97: Position your cursor at the beginning of the paragraph (or select the text that you want to), then select *Create•Drop Cap*. From the Drop Cap dialog box you can choose the position and size of the enlarged text. Note that Word Pro 97 creates a frame and then inserts either the paragraph's first character or your selected text into the frame, automatically sizing it according to your specifications. Note that if you delete this frame, the text it contains will also be lost.

FINE-TUNE TEXT SELECTION

CURRENT WORD PROCESSORS allow you to select whole words, sentences, or paragraphs in a single operation. Most of the time that's fine, but when you need to extend a selection one character at a time, these tools can just plain get in the way. Here's how to turn off the automatic selection feature and select text character by character:

Word 6.0 and later: Press **<Ctrl>-<Shift>** before or while you click and drag.

WordPerfect 6.1 and later: Press **<Alt>** before or while you click and drag.

Word Pro (all versions): Press **<Ctrl>-<Shift>** while you press the right arrow. There's no way to select character by character with the mouse in this program if SmartSelect is enabled.

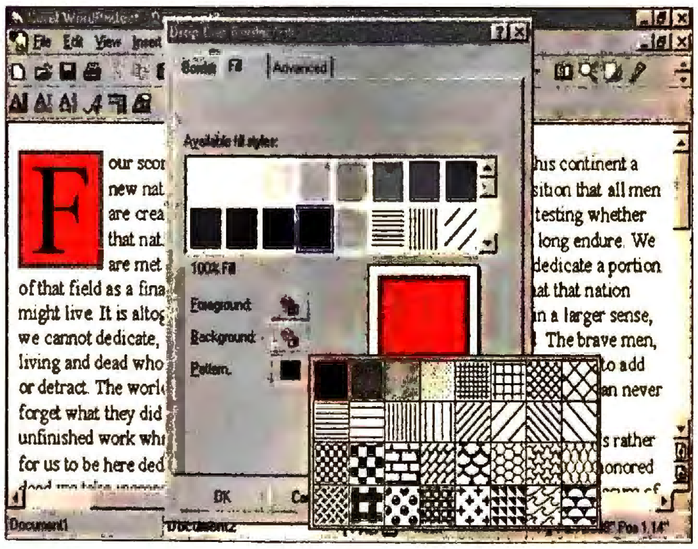


FIGURE 2: WORDPERFECT 7.0 AND 8.0 PROVIDE THE GREATEST NUMBER of options for styling drop caps.

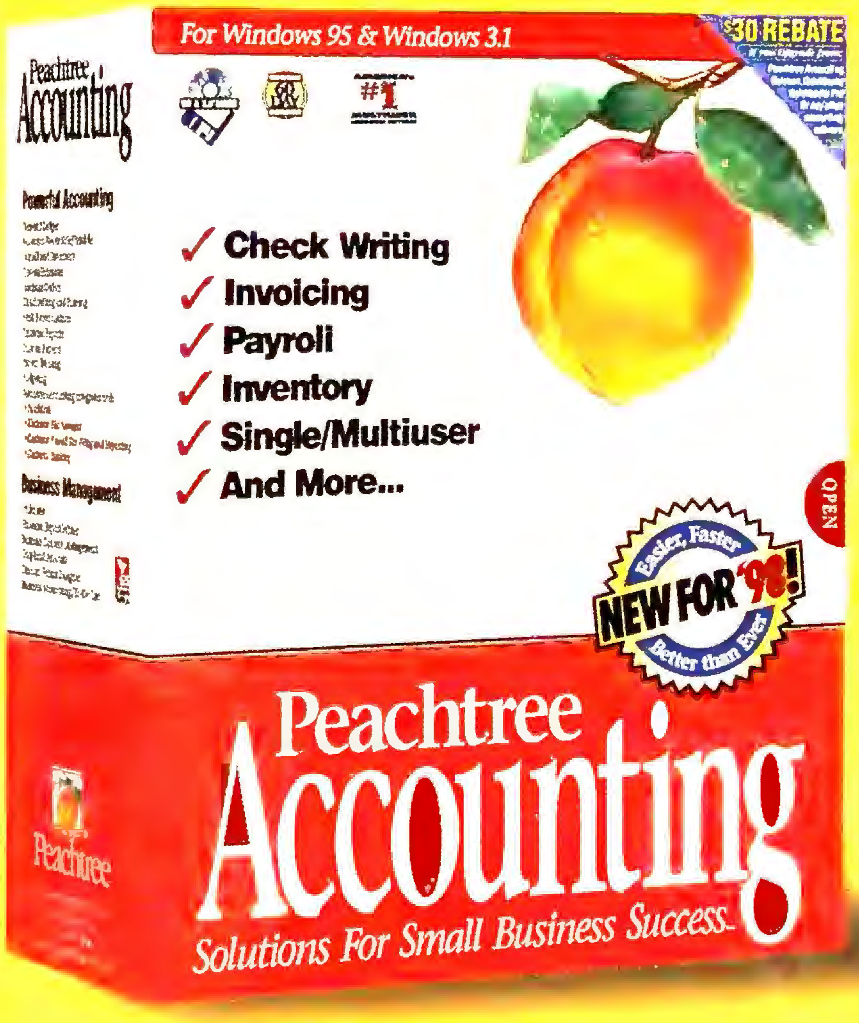
STRETCH AND COMPRESS TEXT IN WORD 97

A NEW BUT LITTLE-KNOWN feature in Word 97 lets you alter the width of any text set in a TrueType font by stretching or compressing it horizontally—very useful in headlines. You can combine this effect with Word's new Outline or Shadow text formatting for even more impact. Here's how to manipulate text this way: ▶

ILLUSTRATION: JEFFREY PELO

Root Canal.
Migraine.
IRS Audit.
~~Accounting.~~
Wasp Sting.
Paper Cut.

Life Just Got Less Painful.



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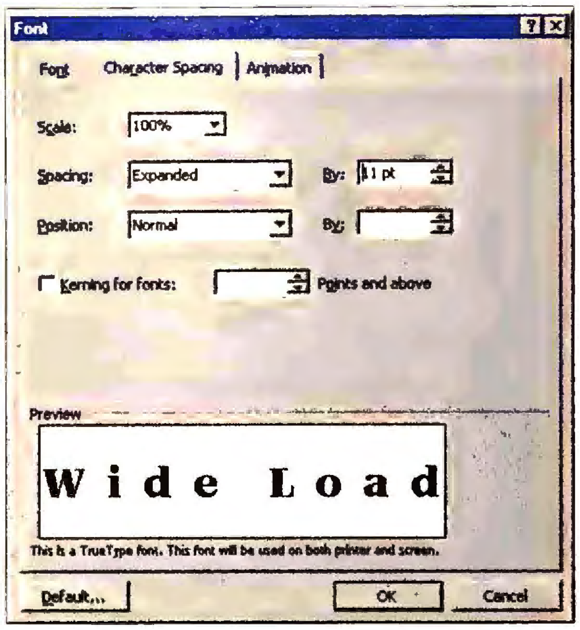

Scale: 100%

Spacing: Expanded By: 1 pt

Position: Normal By:

☐ Kerning for fonts: Points and above

Wide Load

This is a TrueType font. This font will be used on both printer and screen.

FIGURE 3: ADD SPECIAL EFFECTS to display text by stretching or compressing it.

Select the text you want to stretch or compress, then select *Format•Font*. Choose a font and size for the text, then click the *Character Spacing* tab in the Font dialog box (see **FIGURE 3**). Click the *Scale* drop-down list and choose a percentage by which to expand or compress the text horizontally (or type a percentage directly into the *Scale* box). Check the Preview window to see the effect of your selection. Note: The lowest percentage you can enter is **33**.

CHANGE FONT SIZES QUICKLY

WORD 6.0 AND LATER have a set of keyboard shortcuts that increase or decrease the size of selected text, either by the increments specified in the font size drop-down list or by single points. If the text includes more than one font size, the shortcuts will modify all font sizes in proportion. Use them to save time when formatting.

To get this effect	Press this
Increase font sizes in default increments	<Ctrl>-<Shift>->
Increase font sizes by one point	<Ctrl>-]
Decrease font sizes in default increments	<Ctrl>-<Shift>-<
Decrease font sizes by one point	<Ctrl>-[

SEARCH FOR AND REPLACE NONKEYBOARD CHARACTERS

TO FIND OR REPLACE a nonkeyboard character or symbol in a document, you can fill the 'Find what' or 'Replace what' field with the character's <Alt>-*number* code—if you can remember it. Here's an easier way that works in any Windows word processor:

Highlight the first occurrence of the character or symbol and press **<Ctrl>-C** to copy it to the Clipboard. Select your program's Find or Replace command, and press **<Ctrl>-V** to paste the selection into the dialog box. It's even easier in WordPerfect, which automatically pastes the Clipboard contents into the Find field of the Find and Replace dialog box.

You can use this time-saving technique to search for regular text, too.

MORE ON BACKGROUND COLORS IN WORD 97

IN THE OCTOBER 1997 *Word Processing*, I recommended a method for changing the background color of Word 97 documents so it's easier on your eyes. As several readers pointed out, I neglected to mention that this works only in Word's Online Layout view.

And here's a way to change a document's background color in both Word 95 and 97: Select *Tools•Options*, click the *General* tab, check the *Blue Background, White Text* box, and click *OK*.

CREATE DUMMY TEXT IN WORD 97

IF YOU'RE WORKING on a document layout such as a newsletter or brochure, you may want to see what that layout will look like full of text during the design phase. Word 97 has an undocumented feature that lets you create dummy text for this purpose. To do this, type **=Rand(*p,s*)** on a blank line in the document. Substitute numbers for the *p* and *s* to indicate how many paragraphs (*p*) and how many sentences (*s*) you want. For example, **=Rand(15,8)** inserts 15 paragraphs, each containing 8 sentences. All sentences consist of the words "The quick brown fox jumps over the lazy dog."

SAVE OR CLOSE ALL DOCUMENTS IN WORD

YOU CAN QUICKLY save or close all open documents in all versions of Word, using an almost undocumented feature. To do this, hold down the **<Shift>** key while clicking the File menu, then click *Save All* or *Close All*. (The Save All command always appears in Word 6.0 and 7.0 menus.)

OPEN A REMOTE WEB PAGE

IF YOU NEED TO retrieve a Web page from a remote Internet site for editing in Word 97, WordPerfect 8, or Word Pro 97, you can do it in a flash. Just click *File•Open* and type the page's complete URL into the *File name* field, then click *Open*. If you're not currently connected to the Net, the program will start a Web session and retrieve the page. Depending on the program and its default settings, you may have to confirm conversion from HTML and specify whether to import graphics.

You must type the URL for an actual Web page, complete with the **.htm** or **.html** extension. An address like http://www.pcworld.com won't work since it points to a directory, not to an actual Web page.

REPLACING WORDPERFECT 7 WITH WORDPERFECT 8

IF YOU INSTALL WordPerfect 8 while leaving WordPerfect 7 on your system, the two programs will share some files and directory space. If you uninstall WordPerfect 7 later, version 8 may not work properly. You should remove both programs, then reinstall WordPerfect 8. Before doing this, however, back up all changed templates, user dictionaries, macros, and the like, keeping them where they can easily be restored to the appropriate directories.

To remove both programs, insert your WordPerfect Suite 8 disc, click Windows 95's *Start* button, then select *WordPerfect Suite 8•Setup & Notes•Corel Remove Program*. Follow the prompts until you see the list of installed programs; select both *WordPerfect 7* and *WordPerfect 8* and finish the process. Once both apps are removed, restart your PC and reinstall WordPerfect 8. After installation, copy your backed-up files into their original directories.

Word Processing *welcomes your questions and tips and pays $50 for published items. Contributing Editor George Campbell is a contributor to* The PC Bible *(Peachpit Press, 1995, 800/283-9444). See page 14 for contact information.* ■

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Dot Pitch	0.26mm	0.28mm	0.26mm	0.26mm	0.26mm	0.28mm	0.28mm	0.28mm	0.28mm	0.28mm
Max. Resolution	1,600 x 1,280	1,600 x 1,280	1,600 x 1,280	1,600 x 1,280	1,280 x 1,024	1,280 x 1,024	1,280 x 1,024	1,280 x 1,024	1,024 x 768	1,024 x 768
Optimum Resolution	1,280 x 1,024 @88Hz	1,280 x 1,024 @80Hz	1,280 x 1,024 @88Hz	1,280 x 1,024 @79Hz	1,024 x 768 @87Hz	1,024 x 768 @87Hz	1,024 x 768 @87Hz	1,024 x 768 @87Hz	800 x 600 @86Hz	800 x 600 @76Hz

COMPUTER SHOPPER Top 100 1997

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Create a Desktop Shortcut to Browser Bookmarks

DOES IE 4.0 Stop Phoning?

INTERNET EXPLORER 4.0 suffers the nasty habit of occasionally disengaging Dial-Up Networking from your Internet applications. One fix is to head to the Dial-Up Networking folder and click the icon for your ISP. After you dial your ISP this way, your browser—Communicator or Internet Explorer—will resume dialing out when you load it. A more permanent fix is to create a new desktop shortcut for your ISP by dragging its icon from the Dial-Up Networking folder and dropping it on your desktop.

INSTEAD OF USING the Bookmarks feature in Netscape Communicator, I would like to arrange my URLs in a folder on my desktop, then be able to open my browser and my bookmarked pages from there. Can this be done?

Istvan Horvath, Budapest, Hungary

WHAT YOU HAVE IN MIND is as easy as creating a new folder, then dragging and dropping URLs from Communicator's Bookmarks list (or Internet Explorer 4.0's Favorites/Organize Favorites list). Right-click in an empty place on your desktop and select *New•Folder.* Right-click the *New Folder* icon, select *Rename* from the pop-up menu, and give the folder a new name.

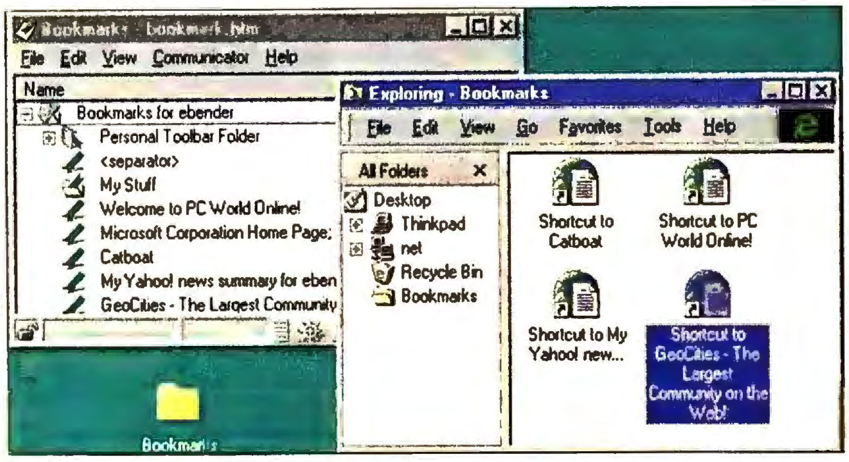

Bookmarks - bookmark.htm
File Edit View Communicator Help
Name
Bookmarks for ebender
Personal Toolbar Folder
<separator>
My Stuff
Welcome to PC World Online!
Microsoft Corporation Home Page;
Catboat
My Yahoo! news summary for eben
GeoCities - The Largest Community
Bookmarks
Exploring - Bookmarks
File Edit View Go Favorites Tools Help
All Folders
Desktop
Thinkpad
net
Recycle Bin
Bookmarks
Shortcut to Catboat
Shortcut to PC World Online!
Shortcut to My Yahoo! new...
Shortcut to GeoCities - The Largest Community on the Web!

FIGURE 1: ORGANIZE YOUR WEB PAGE BOOKMARKS into folders on your desktop. Then open your browser and Web pages from there.

Double-click the folder to open it. In Communicator, click the *Bookmarks* icon and select *Edit Bookmarks.* Then simply drag and drop icons from the Bookmarks list into your new folder (see **FIGURE 1**).

Now when you double-click a bookmark in the folder, you'll automatically launch Communicator and go to that page.

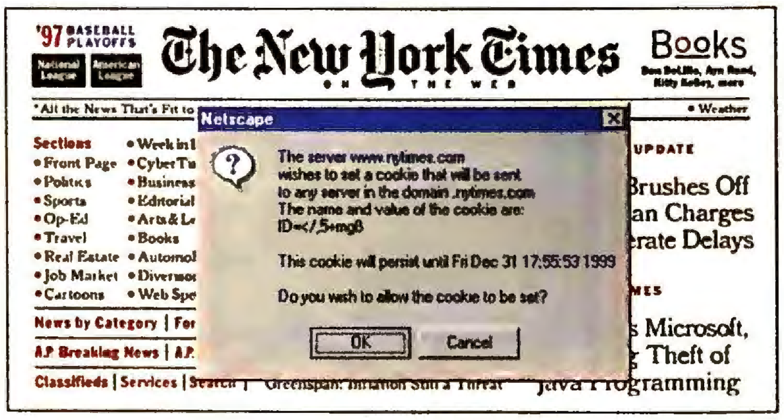
EAT THIS COOKIE—OR ELSE!

IS IT MY IMAGINATION, or does Microsoft prevent users from accessing its Web site if their browsers reject cookies? I downloaded a copy of Cookie Crusher, as recommended in the October 1997 *Internet Tips,* and after installing it I tried to browse Microsoft's site (www.microsoft.com). My Internet Explorer browser spit out an error message reporting that it couldn't open the site.

Gene McDonald, Internet

YES, GENE, A WEB SITE can block your access if you configured your browser to block cookies either through a browser preference setting or with a utility such as Cookie Crusher. Tim Hayes of The Limit Software (www.thelimitsoft.com), the author of Cookie Crusher, comments, "We are not pleased that a few influential corporations have chosen to exert their power over Internet users. We have received dozens of e-mail messages from concerned Internet users who would like to stop the practice of some corporate Web sites that require cookies to access their content." Marty Carlson of AyeCor Software (frontiercomm.net/~mrc/index.html), author of Cookie Cutter PC, calls the practice "rude and arrogant."

It's not just Microsoft that's guilty of cookie arrogance. An increasing number of big public sites like that of the *New York Times* block out browsers that won't swallow their cookies (see **FIGURE 2**). And we have to admit, PC World Online gets complaints about its own cookies. It's true that cookies serve useful functions and help a user navigate a site, but many surfers consider them a violation of privacy because cookies can be used to track readers' activity on the site.



The server www.nytimes.com
wishes to set a cookie that will be sent
to any server in the domain .nytimes.com
The name and value of the cookie are:
ID=</5+mgB

This cookie will persist until Fri Dec 31 17:55:53 1999

Do you wish to allow the cookie to be set?

OK Cancel

FIGURE 2: YOU MUST ACCEPT UP TO FOUR COOKIES from the New York Times site before you're allowed to read the paper.

What can you do? If you find it objectionable that a site bars your entry because your browser won't accept cookies, contact its operator. You can also vote with your browser, and refuse to visit the site again.

OUTLOOK EXPRESS TELLS YOU WHEN NEW MAIL ARRIVES

DAVID WIPERT OF Parsons, Tennessee, has a nifty trick to configure Internet Explorer 4.0's Outlook Express to poll your Internet service provider regularly for mail and inform you when new messages have arrived.

From the Mail menu, select *Tools•Options,* then click the *Read* tab.

In the 'Message is read after being previewed for xx second(s)' box, set the time to 60 seconds. Now the envelope ▶

ILLUSTRATION: JEFFREY PELO

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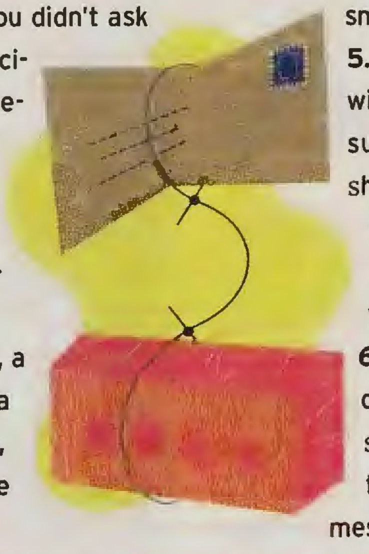
Don't Overload E-Mail Messages With Large Attachments

THERE'S NOTHING WORSE than twiddling your thumbs while your mail program downloads 500KB of something you didn't ask for or can't read. To preserve civility in e-mail exchanges, remember these simple rules:



1. Never attach an image or a document to an e-mail message if the recipient isn't expecting it.
2. If you're sending text (say, a press release, a résumé, or a submission to *Internet Tips*), don't convert it to a huge Adobe Acrobat attachment.
3. Never send an attachment to a mailing list discussion group unless it's encouraged.
4. Before sending a message with an attachment, always ask recipients how they want the file to be sent–inserted inside the message as encoded text, or sent as several small attachments.
5. When you reply to a message with an attachment, always make sure the attachment will not be shipped back to the sender with your reply. Many mail programs do this automatically unless you tell them not to.
6. It's generally wise to attach only one file to an e-mail message. If you're sending multiple files, attach each to a separate message–especially if you're sending them to someone on America Online.
7. If you're sending a big file and you know that the recipient has a compression utility like WinZip or PKZip, compress the file.

symbol will be displayed beside the clock on the Taskbar for 60 seconds after a new message arrives.

Select the *General* tab, and set a time in the 'Check for new messages every xx minute(s)' box. Check the *Play sound when new messages arrive* box and click *Apply*.

To change the sound that plays, select *Start•Settings•Control Panel* and double-click the *Sounds* icon. In the Sounds Properties dialog box, select *New Mail Notification* in the Events list, click *Browse*, and navigate to and select the sound file of your choice. Click *OK* to close the dialog box and save your change.

GOZILLA VERSUS THE NET DOWNLOAD

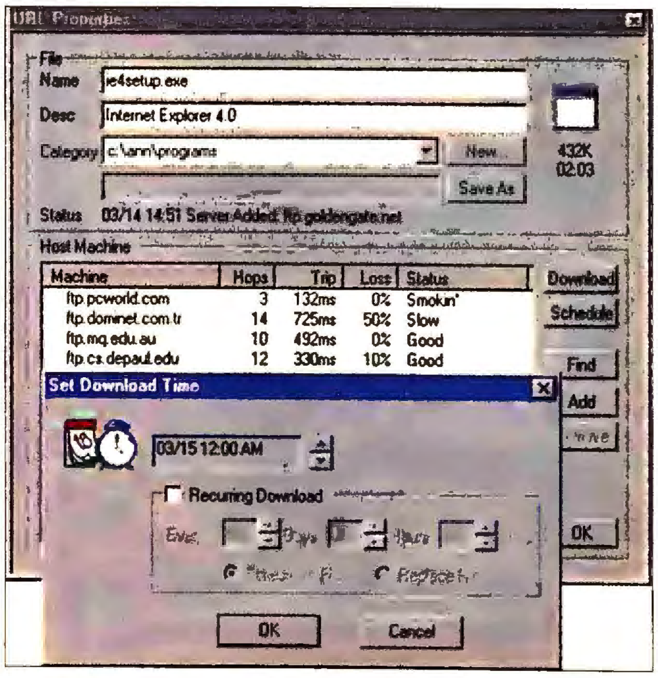
STEVEN LARSON OF Bartlet, Tennessee, writes that the most multitalented Internet download utility to come down the wires lately is GoZilla by Aaron Ostler.

I agree. Drag file names off the Internet and drop them into this inexpensive browser work-along, and GoZilla searches the Net for the fastest FTP sites from which to download the files, then snatches them up for you at the time you specify (see **FIGURE 3**).

If you're downloading a big file and your Internet connection goes haywire halfway through the capture, GoZilla will come to the rescue and later resume the download where it left off.

You can also set the program to log on to the Net while you're sleeping, download the files you've specified, and then log off. It will even scan the downloaded files for viruses, store them in folders or directories you indicate, and include Shortcuts to them on your desktop so you can easily find them when you wake up.

Download GoZilla from PC World Online or from www.gizmo.net/gozilla. The registration fee is $15. GoZilla runs under Windows 95 and NT. Note: You should load GoZilla after you start your browser or you may get error messages.



File

Name: ie4setup.exe

Desc: Internet Explorer 4.0

Category: c:\ann\programs

432K
02:03

Status: 03/14 14:51 Server Added: ftp.goldengate.net

Host Machine

Machine	Hops	Trip	Loss	Status
ftp.pcworld.com	3	132ms	0%	Smokin'
ftp.domnet.com.tr	14	725ms	50%	Slow
ftp.mq.edu.au	10	492ms	0%	Good
ftp.cs.depaul.edu	12	330ms	10%	Good

Set Download Time

03/15 12:00 AM

☐ Recurring Download

FIGURE 3: DOWNLOAD LARGE FILES from the fastest sites or at off-peak hours with the help of GoZilla.

COMPRESS YOUR BROWSER'S CACHE

JEREMY HALE OF Nanaimo, British Columbia, writes that you can limit browser cache sprawl by putting your cache on a compressed drive. Compressed drives can be tricky, and you may want to think twice about creating one if you plan to add another real drive in the future. But if you're pinched for space, it's an easy way to give your browser's cache extra room.

To create the compressed drive, arm yourself with the Microsoft Plus Pack for Windows 95, along with your Windows 95 installation and start disks. Select *Start•Programs•Accessories•System Tools•DriveSpace*. In the DriveSpace dialog box, select *Advanced•Create Empty*. Type in the number of megabytes you want the cache to be—50MB is a good size—and click *Start*.

After you've created a compressed drive, you'll need to restart Windows. Now head to the compressed drive and create a directory for your browser's cache.

Last, you need to move your browser's cache directory to the compressed drive. In Netscape Communicator, select *Edit•Preferences*. Click *Advanced* under Category, then click *Cache*. Type in the name of your new disk cache folder—for example, **H:\netcache**. Then click *OK*.

If you're using Internet Explorer 4.0, select *View•Internet Options*. Click the *General* tab, and under Temporary Internet Files click the *Settings* button. In the Settings dialog box, click the *Move Folder* button. In the Browse for Folder dialog box, click the *H:* drive icon and head to the directory you created. Click *OK*.

Find files from this article on PC World Online at www.fileworld.com. Internet Tips *welcomes your questions and tips and pays $50 for published items. Contributing Editor Judy Heim is a coauthor of* The Quilter's Computer Companion *(No Starch Press, 1997, 800/420-7240). See page 14 for contact information.* ■

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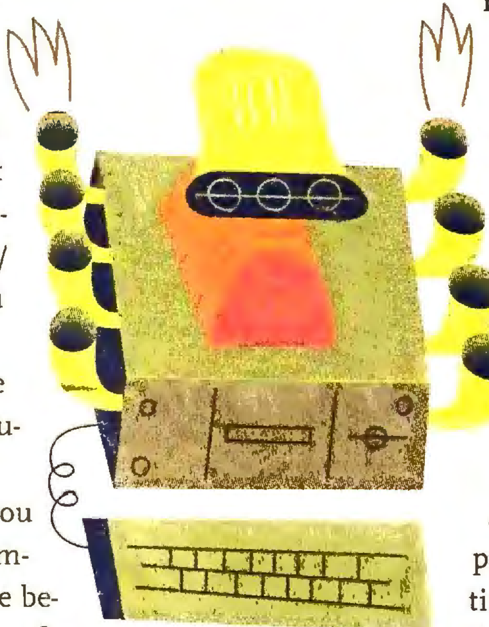
The ups and downs of overclocking CPUs ◆ Is your PC ready for high-speed games?

Pick the Right CPU for a Trouble-Free Upgrade

THIS IS A GREAT TIME to upgrade your CPU. Intel's Pentium MMX OverDrive chips and their rivals often can turbocharge your old PC without costing an arm and a leg (see "Can't-Miss Upgrades," November 1997). But before you order an upgrade, check out these guidelines for avoiding glitches.

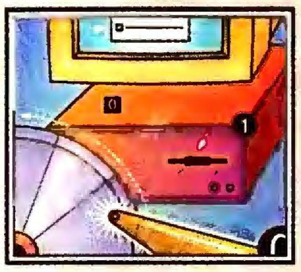
Identify your motherboard. Start by figuring out your motherboard's make and model. If you're lucky, you'll find it in your PC's manual. If not, see if your PC came with a separate motherboard manual.

No manual? Call your PC's manufacturer. If the manufacturer can't help, pop the top off your PC and see if the make or model is printed on the motherboard. If it isn't, look for a Federal Communications Commission number. The FCC's On-line Equipment Authorization Database at www.fcc.gov/fcc-bin/ead lets you search by ID number and should give you at least the manufacturer's name.



As a last resort, you can watch your computer's screen at the beginning of the boot-up for the BIOS ID number. Press the **<Pause>** key to freeze the screen, then write down the number. If you have a BIOS from either Award or AMI, go to Wim's BIOS Page (www.ping.be/bios/) and try to match your BIOS version with a motherboard manufacturer and model.

Examine your BIOS. You'll also need to know your BIOS version if you buy from Intel or Evergreen, since chips from both companies may require that you upgrade your computer's BIOS as well. Evergreen provides you with the BIOS update, while Intel does not. But Intel does offer a utility (available at www.intel.com/overdrive/bios/) that determines whether your current BIOS needs an upgrade. If it does, see if your PC vendor has one and has posted it on its Web site.



Updating your BIOS is usually done by booting from a floppy with the update program on it. Follow all directions to the letter, and *always* be sure to make a backup copy of your old BIOS. Most BIOS installation programs give you this option. You may have to set a jumper on your motherboard to enable the update. Make sure that you reset the jumper when you're done with the update.

Check with vendors about compatibility. Evergreen (www.evertech.com), Intel (www.intel.com/overdrive), and Kingston (www.kingston.com/prod/processor) all post compatibility information on their Web sites. Check these lists of motherboards and systems that work with specific upgrade chips before buying. Check with your system vendor as well.

Study up on socket science. If you can't find any information on your motherboard, the next best thing is to identify your CPU socket. There's a reasonable chance that an upgrade processor will work on your system if you have the right socket. Just make sure you buy from a retailer that has a return policy for the processor, in case it doesn't work.

Peaceful Processor Upgrades

BEFORE HANDLING THE CPU (or any other component for an upgrade), always remember to ground yourself by touching the PC's metal frame, with the PC turned off but still plugged in. Also keep in mind that the easiest way to destroy a CPU is to place it in the socket with the wrong alignment and turn on the power. And (have you heard this before?) *always* read the directions all the way through before you roll up your sleeves.

Each CPU upgrade chip has its own socket requirement. Pentium systems have one of three zero insertion force CPU sockets: socket 4, socket 5, or socket 7. Most but not all Pentium MMX upgrade chips can be used in systems having either socket 5 or socket 7.

To identify which socket your Pentium has, look for the name of the socket embedded in the edge of the plastic module on the motherboard. If you don't see it, check your documentation, or as a last resort, do some deep-breathing exercises and then count the number of pinholes in the module (see **FIGURE 1**, page 314).

Next, take another look inside your PC to make sure the upgrade chip will fit in your configuration. Upgrade chips come with their own fan or heat sink, which may get in the way of an expansion card.

Install the CPU with due care. From here on, installing an upgrade chip is a snap. The ZIF socket has a small lever on its side that locks down the CPU. To remove the CPU, gently raise the lever and lift out the CPU. For more on CPU upgrades, see *Upgrade Guide*, November 1997.

SHOULD YOU ROCK THE CLOCK?

AFTER READING ABOUT how you can increase your computer's performance by pushing the clock speed past the CPU's standard clock setting, I gave it a try. I reset the jumpers on the motherboard to make my Pentium-100 run at 120 MHz. No problem. I ran a diagnostic that said I was running at 120 MHz. And ▶

ILLUSTRATIONS: JEFFREY PELO (TOP), DOUG ROSS (BOTTOM)

Trying to get your head around AGP?

ATI has long been leading the way in 3D chip and board manufacturing - delivering breakthrough technology to top OEMs including IBM, DELL, SONY, Gateway, ACER and NEC. So, when Intel launched AGP, who else would you expect to be leading the way with fully-implemented AGP solutions except ATI?

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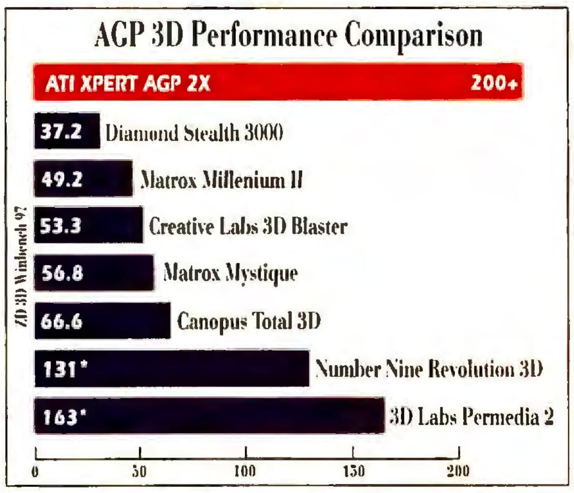

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3D Performance Comparison graph: Tested on Pentium II MMX-266MHz/32MB/512 cache/ Windows95-OSR2 Test Mode: 640x480x16bpp@75Hz - Tested using Driver Version: ATI XPERT AGP 2X 4.1088H+/Diamond Stealth 3000 4.03.00.3205/Matrox Millenium II 4.03.3600/3D Blaster 4.02.020/Matrox Mystique 4.03.00 3410/Canopus 4.03.00.9001 *Reported results.

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I didn't change anything else. But rather than showing an improvement, my PC seems to be a tiny bit slower! Did I damage my machine, or does overclocking just not work?

Peter Fly, Dallas

PROBABLY NEITHER. Overclocking is a much-debated technique for increasing system performance by increasing your CPU's internal processing speed or your motherboard's system bus speed beyond the manufacturer's recommended values. Some CPUs *can* be pushed to higher rates. And some motorcycles *can* be driven at 130 mph. And in both cases, everything *may* turn out all right.

Overclocking may improve your PC's performance, sometimes substantially. Or, as in your case, it may help only a little or not at all. In the worst case, it can result in a dead CPU. Here's why:

Inside the CPU, data moves at the computer's designated speed—originally 100 MHz for your system. But this internal clock speed is actually a multiple of your motherboard's system bus speed. Your Pentium-100 motherboard's system bus runs at a speed of 66 MHz, and its CPU multiplies that by 1.5 to get 100 MHz.

Pentium machines typically support system bus speeds of 50 MHz, 60 MHz, and 66 MHz (a few even go to 75 MHz) and multipliers ranging from 1 to 3.5. You can select different CPU speeds by setting your motherboard jumpers for the appropriate combination of system bus speed and multiplier (see **FIGURE 2**, below).

You didn't see a boost in performance because to get your CPU running at 120 MHz, you actually had to *reduce* the system bus speed to 60 MHz and increase the multiplier to 2. Since lots of data moves around outside the CPU, the faster CPU was offset by the slower motherboard.

FIGURE 3: FLASHY GAMES LIKE UBISOFT'S POD are among the first programs to tap the power of MMX processors.

So why not set the motherboard to 66 MHz with a multiplier of 3 and reap the benefits of a 200-MHz system? Because your CPU might not be able to handle it. At higher speeds, CPUs generate a lot more heat. And if they're not cooled properly, they can fry. Also, bumping up the system bus speed past 66 MHz can prevent some PCI cards and some types of memory from functioning properly.

Match Your CPU Socket to the Right Upgrade

Socket	CPU	Maximum upgrade	Number of pins
4	60-, 66-MHz Pentiums	Pentium-133	273
5	75-MHz and higher Pentiums	Pentium MMX-200	320
7	latest Pentiums	Pentium MMX-200	321
8	Pentium Pro	Pentium II (mid-1998)	387
slot 1	Pentium II	n/a	n/a

n/a = not applicable

FIGURE 1: MAKE SURE YOUR SOCKET is the right one for the CPU upgrade you have in mind.

CPU Speeds and the Bus Speeds They Require

CPU internal processing speed (MHz)	Motherboard system bus speed (MHz)	CPU multiplier
90	60	1.5
100	66	1.5
120	60	2
133	66	2
150	60	2.5
166	66	2.5
200	66	3
233	66	3.5

FIGURE 2: IS YOUR MOTHERBOARD running at full speed? With overclocking, sometimes not.

In short, this is an inexact science. For more details, point your browser to www.sysopt.com/overc.html.

ENOUGH MUSCLE FOR MULTIMEDIA?

I JUST BOUGHT a very inexpensive Pentium-166 with 16MB of memory, a 1GB hard disk, and a 10X CD-ROM drive. I've noticed an MPC 3 rating on a lot of the multimedia titles I've recently bought. Does my system meet that spec, and does it have the muscle for games?

Glenn Gurle, New Orleans

IT MEETS THE Multimedia PC 3 spec. But that spec came out in 1995 and was a little skimpy even then, so if you like fast games, you may want more power. At minimum, upgrade to 32MB of memory and get a 3D video card with 4MB of RAM if you don't already have one.

If you're really crazed for speed, consider upgrading to a CPU that runs MMX software. Very few MMX software programs are on the market yet, but there is a fair selection of high-performance games (like UbiSoft's Pod, shown in **FIGURE 3**, above), and more are on the way.

Hardware Tips *welcomes your questions and pays $50 for published items. Kirk Steers is a* PC World *contributing editor. See page 14 for contact information.* ■

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DARE TO COMPARE

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STAN MIASTKOWSKI

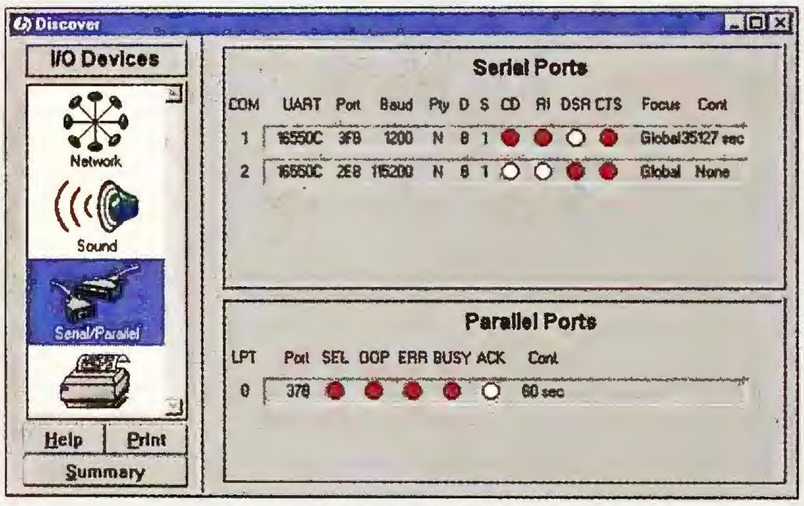
Install Faster Serial and Parallel Ports

THOSE HUMBLE serial and parallel ports on the back of your PC still provide crucial connections to the outside world—and they may need an upgrade if you want to hook up an external 56-kilobits-per-second modem, a Zip drive, or another slick new parallel port device.

You're especially likely to require enhanced input/output ports if you've got an older PC that came with two serial ports and one parallel port on an add-in card. Neither port type may be quick enough to keep up with today's fast peripherals. But even recent machines, whose ports are typically on the system board, may need an upgrade before you can add an external high-speed modem or more than one parallel port peripheral.

Serial ports are built around a chip called a UART, for Universal Asynchronous Receiver/Transmitter. Early PCs used UART models 8250 and 16450, neither of which is up to the demands of today's fast modems. The 16550 UARTs are most common in current PCs. The latest models, 16650 and 16750, are what you need for ISDN connections and above; these chips usually aren't built onto the system board. (Note, though, that *internal* modems come with the proper UARTs built in, so this is not a problem.)

SERIAL PORT



Serial Ports

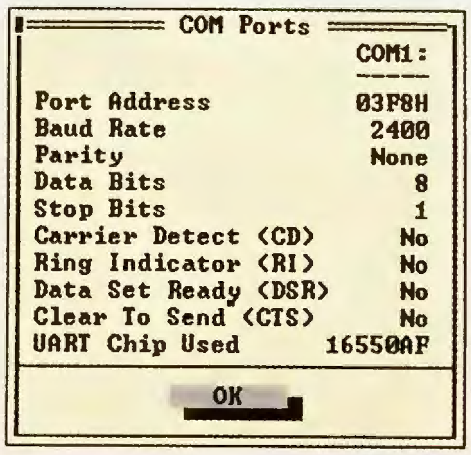
COM	UART	Port	Baud	Pty	D	S	CD	RI	DSR	CTS	Focus	Cont
1	16550C	3F8	1200	N	8	1	●	●	○	●	Global	35127 sec
2	16550C	2E8	115200	N	8	1	○	○	●	●	Global	None

Parallel Ports

LPT	Port	SEL	OOP	ERR	BUSY	ACK	Cont
0	378	●	●	●	●	○	60 sec

1 Check your serial ports. For the most accurate overview of your COM ports, you need a software utility. Helix's Nuts & Bolts (www.helixsoftware.com), shown above, also offers advanced diagnostics.

As a fallback, try the Microsoft System Diagnostic utility. On the Windows 95 CD-ROM, you'll find the MSD program in the Other\Msd directory. Run it and choose the *COM Ports* box (below) to see a listing of COM ports and their UARTs. (Note that if you have a mouse connected to one of the COM ports, the utility won't report that port's UART correctly. But dual serial ports always use the same UART models, so assume that the fastest UART listed applies to both of yours. Also, the MSD utility sometimes misidentifies newer UARTs.)



```
              COM Ports
                              COM1:
                              -----
 Port Address                 03F8H
 Baud Rate                     2400
 Parity                        None
 Data Bits                        8
 Stop Bits                        1
 Carrier Detect (CD)             No
 Ring Indicator (RI)             No
 Data Set Ready (DSR)            No
 Clear To Send (CTS)             No
 UART Chip Used             16550AF

                 OK
```

If you're a Windows 3.*x* user, you'll find MSD in the DOS directory. Unlike the Windows 95 version, it reports both COM ports identically.

2 Buy your new card. If the UARTs in your PC are older models, your best bet is a combination serial/parallel I/O card that updates everything, such as Siig's I/O Professional (shown below on the left.)

If you just want to prepare your PC for a 56-kbps modem, buy an add-in card with one high-speed port backed by at least a 16550 UART. Another alternative is a card such as the Siig I/O Expander 2S (below right), which offers a 9-pin serial port plus a 25-pin serial port option.

3 Install the card. Back up your data, turn off your PC, and then remove the PC's case. If you're replacing an old I/O card, take out any mouse or modem cables that are connected to it and remove the card.

If your new card has jumpers or switches, read the instructions that came with it. (Jumperless Plug and Play cards are more common.)

Find a free slot, plug in the new card, and tighten the screw that holds it. Reconnect the mouse and modem cables if needed.

Start up your PC and watch for odd behavior. Install any software that was included with the card. If the new card doesn't have jumpers and your PC is a recent model, settings should be handled by Plug and Play. With older PCs (or Windows 3.*x*), you'll have to set up a jumperless card using the included software.

If the ports are on the motherboard, you may have to disable them (through your system's setup program) to get the new card to work.

PHOTOGRAPHS: KEVIN CANDLAND

The most recent PCs have been shipping with a single parallel port that supports the Enhanced Parallel Port and Extended Capabilities Port standards. These ports can transfer data at 1MB to 2MB per second—plenty fast for most tasks. But you'll probably need a second port if you're adding another parallel port peripheral, because pass-through connections can be a problem. (If, for example, you've got a printer and a scanner installed, you may have to turn off one to use the other.)

Several companies make a variety of add-in I/O cards. Two prominent vendors are Lava Computer (www.lavalink.com) and Siig (www.siig.com). Pacific Commware (www.turbocom.com) makes the TurboExpress Port 920, which costs about $80 and uses the 16750 UART. Installing an additional parallel port card in your PC will set you back about $30. If your older PC needs a complete I/O transplant, a board with two serial ports (one 16550 UART for each port) and one parallel port will do the trick for about $40. These are all ISA boards; some vendors ship PCI versions, which offer no advantages unless you lack a free ISA slot.

Eventually all of these well-aged ports will be replaced by the Universal Serial Bus, the future host for most external peripherals that's been built into most systems shipped in the past year. But adding a USB board to an old machine makes no sense right now—peripherals that support it are scarce and require a version of Windows 95 OEM Service Release 2 that Microsoft won't let you install. Upgrading to USB may become a more compelling option when Windows 98 and more USB peripherals arrive.

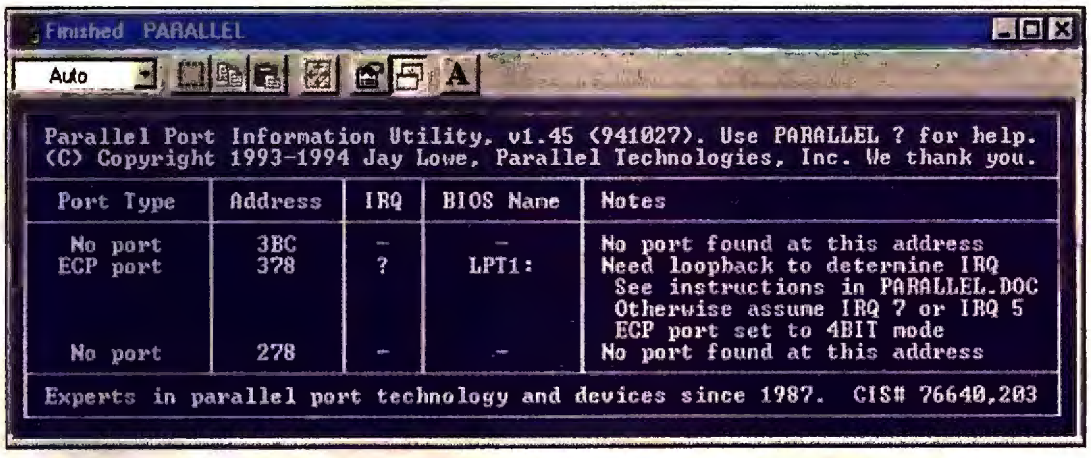
Or maybe not.

In the meantime, here's how to install a new serial or parallel port.

Stan Miastkowski is a PC World *contributing editor.* ■

PARALLEL PORT

1 Check your parallel port. In most recent PCs, the I/O ports are on the system board, so it's relatively easy to tell whether your current parallel port supports high-speed EPP and ECP modes. To do so, enter your system's setup program and check the port section (usually designated something like 'Integrated Peripherals'). If your parallel port is on an add-in card, check the card's manual if available. Otherwise, a freeware utility called parallel.exe, available from Parallel Technologies (www.lpt.com), will show whether your port supports EPP and ECP.



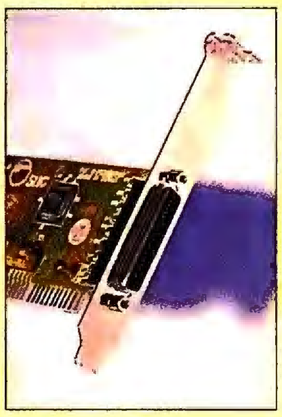
```
Parallel Port Information Utility, v1.45 (941027). Use PARALLEL ? for help.
(C) Copyright 1993-1994 Jay Lowe, Parallel Technologies, Inc. We thank you.

 Port Type    Address   IRQ   BIOS Name   Notes

  No port       3BC      -        -       No port found at this address
 ECP port       378      ?      LPT1:     Need loopback to determine IRQ
                                           See instructions in PARALLEL.DOC
                                           Otherwise assume IRQ 7 or IRQ 5
                                           ECP port set to 4BIT mode
  No port       278      -        -       No port found at this address

Experts in parallel port technology and devices since 1987.  CIS# 76640,203
```

2 Buy your new parallel port card. If you just want to add a second parallel port to your existing system, a simple single-port card such as the Siig Parallel Pro (shown here) is your best bet. Make sure to buy one that's EPP/ECP capable—such models are sometimes identified as 'IEEE 1284'.



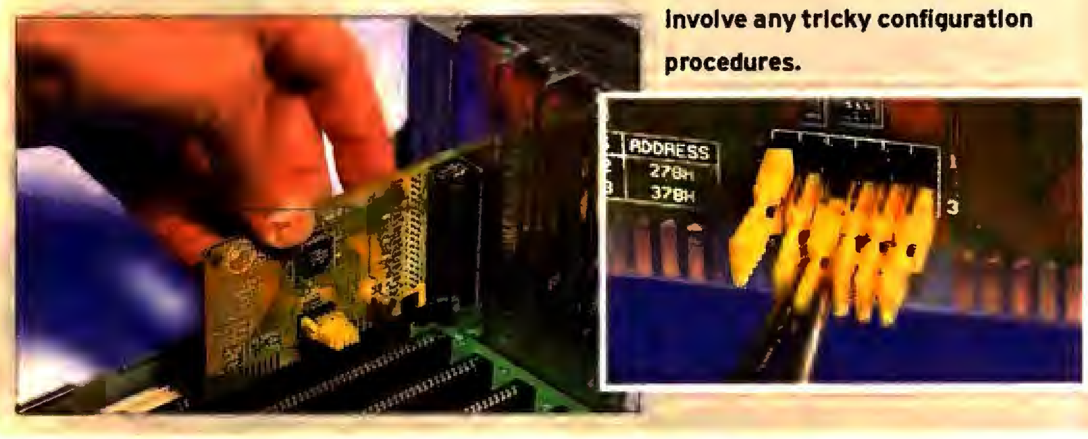
You can add more than two parallel ports, but installation gets complex: You may run up against I/O addresses and interrupt requests that conflict with other

3 Install the new card. Back up your data, turn off the PC, and remove its case.

Most parallel port cards have jumpers; read the card's manual carefully. Usually, the second parallel port in a PC is set for an I/O address of 278 and IRQ 5. ECP ports also require a direct memory access channel, usually channel 1.

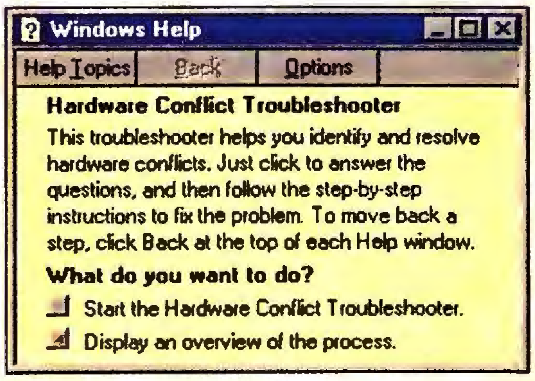
Find a free slot, plug in the new card, and tighten the screw that holds it. Don't put the case back on until you're sure that everything is working correctly.

Now start up your computer. Unlike just about any other hardware upgrade you'll make to your system, parallel ports don't require any special software, nor do they (usually) involve any tricky configuration procedures.



TROUBLESHOOTING TIP

Make sure your ports are open. In Windows 95, select *Start•Settings•Control Panel•System.* Click the *Device Manager* tab. An exclamation point next to the Ports heading means there is a problem. If so, select *Start•Help* and search for hardware conflict troubleshooter. Open the Troubleshooter and follow the step-by-step directions.



Hardware Conflict Troubleshooter

This troubleshooter helps you identify and resolve hardware conflicts. Just click to answer the questions, and then follow the step-by-step instructions to fix the problem. To move back a step, click Back at the top of each Help window.

What do you want to do?

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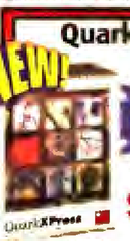

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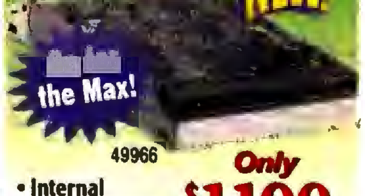

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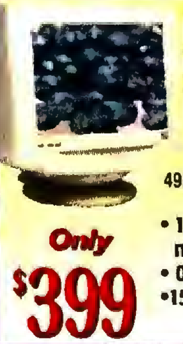

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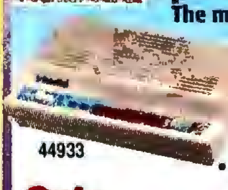

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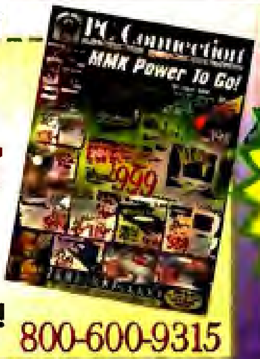

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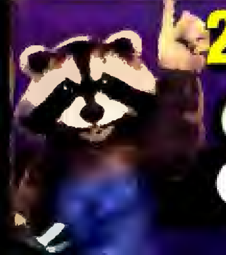

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#14708	1540OM	150MHz MMX	16MB	2.1GB	20X	12.1" CSTN	7.5	$2,199	$88
#94064	1550OM	133MHz	16MB	1.4GB	10X	12.1" TFT	7.35	$2,199	$88
#97388	1580DMT	133MHz MMX	16MB	2.1GB	10X	12.1" TFT	7.5	$2,699	$108
#14710	1590DMT	166MHz MMX	16MB	2.1GB	20X	12.1" TFT	7.5	$3,199	$128

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#24679	460CDX	166MHz w/MMX*	32MB	2.1GB	10XCD	12.1" FSTN	6.9	$1,949	$78
#97051	440CDT	133MHz w/MMX*	16MB	1.44GB	10XCD	12.1" TFT	6.9	$1,949	$78
#97052	460CDT	166MHz w/MMX*	32MB	2.0GB	10XCD	12.1" TFT	6.9	$2,849	$114
#24680	480CDT	233MHz w/MMX*	32MB	4GB	10XCD	12.1" TFT	6.9	$3,849	$154

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#15086	750CDT	233MHz w/MMX*	32MB	4.7GB	20XCD	13.3" TFT	8.4	$4,899	$196

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#96041	560E	166MHz MMX	16MB	2.1GB	12.1" CSTN	4.1	$2,849	$114
#11247	560X	233MHz MMX	32MB	4GB	12.1" TFT	4.1	$3,419	$137

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Netserver LH Plus 5/133, 5/166 (EDO, ECC)	16Meg/32Meg/64Meg/128Meg	99/189/409/875
Netserver 4/33LM – 5/100LM (pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Netserver 5/75LS – 5/133 LS4 (pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Pavilion 5010-7170 (pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Vectra 500 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Vectra VA 6/180, 6/200 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Vectra VE2 5/75 – 5/133 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Vectra XA 6/180, 6/200 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Vectra XM4 Series	4Meg/8Meg/16Meg/32Meg	17/34/49/94

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IBM APTIVA, PC, P/S1 & P/S2

Aptiva 300, 500 Series	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Aptiva 700 Series (pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Aptiva A Series (pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Aptiva C Series (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
Aptiva M Series	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 330 Models 6571-6576	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 330 Model 6577 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 340 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 350 Models 6581-6585	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 350 Model 6586 (pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 350 Model 6587 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 730 Models 6875-6876 (pairs)	4Meg/8Meg/16Meg/32Meg	19/34/57/109
PC 730 Model 6877 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC 750 Models 6885-6886 (pairs)	4Meg/8Meg/16Meg/32Meg	19/34/57/109
PC 750 Model 6887 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	17/34/49/94
PC Server 310 (pairs)	4Meg/8Meg/16Meg/32Meg	19/34/57/109
PC Server 500 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249
P/S 1, 30 Pin Simms	1/Meg/4Meg	10/24
P/S 1, 72 Pin Simms	4Meg/8Meg/16Meg/32Meg	19/34/57/109
P/S 2, 55SX, 65SX	4Meg	39
P/S 2, 53, 53LS, 56, 57	4Meg/8Meg	29/59
P/S 2 Server, 95, 195, 295 (ECC, pairs)	4Meg/8Meg/16Meg/32Meg	59/79/119/249

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IBM NOTEBOOK & LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Thinkpad 340, 345, 355, 360, C, CE	*4Meg/8Meg/16Meg/32Meg*	*49/69/99/199*	*129.00*
Thinkpad 365C, CS, CD, E, ED	*4Meg/16Meg*	*30/80*	*120.00*
Thinkpad 365X, 365XD	*8Meg/16Meg/32Meg*	*40/84/150*	*120.00*
Thinkpad 380, 380D, 385D	*4Meg/8Meg/16Meg/32Meg*	*49/60/99/109*	*120.00*
Thinkpad 500, *510CS*	4Meg/8Meg/16Meg	49/69/99	*180.00*
Thinkpad 560, 560E	8Meg/16Meg/32Meg/64Meg	49/84/159/339	
Thinkpad 700, 720, 750, CL575X	*4Meg/8Meg/16Meg/32Meg*	*39/70/150/268*	*170.00*
Thinkpad 701, 701C, 701CS	*4Meg/8Meg/16Meg/32Meg*	*39/40/84/180*	*100.00*
Thinkpad 755C, CE, CD, CS	*4Meg/8Meg/16Meg/32Meg*	*49/60/99/100*	*159.00*
Thinkpad 760C, CD, L, LD	*8Meg/16Meg/32Meg*	*40/89/180*	*150.00*
Thinkpad 760E, ED, EL, ELD	*8Meg/16Meg/32Meg*	*40/84/150*	*159.00*
Thinkpad 760XD, 760XL	*8Meg/16Meg/32Meg/64Meg*	*49/64/159/330*	*150/260*
Thinkpad 765D, 765L	*8Meg/16Meg/32Meg64Meg*	*49/84/159/330*	*150/260*
Thinkpad 770 (SDRAM)	16Meg/32Meg/64Meg	149/319/649	

COMPAQ MEMORY MODULES

Deskpro 386, 486 M Series	2Meg/4Meg/8Meg	29/39/69
Deskpro M Series Expansion Board	0K (no memory)	119.00
Deskpro 450, 4100, 575, 590, 5100, 5133	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 575, 5120, 5133, 5150, 5160 (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 2000, 4000, 6000 Series (EDO, pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Deskpro 5/60M, 5/66M, XE560 (quads)	2Meg/4Meg/8Meg/16Meg/32Meg	19/28/54/69/139
Deskpro XL 6150, 6200 (ECC, pairs)	8Meg/16Meg/32Meg/64Meg, 128Meg	Call
Deskpro 2000, Presario 4112, 4122, 4712, 4716, 5526, 5528	1Meg Video	39
Presario 5536, 9232, 9234, 9240, 9250, 9260, 9642, 9660	1Meg Video	39
Presario 510, 520, 524, 660, 720, 724, 860	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 920, 924, 954, 974, 978, 992	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 833, 850, 860, 866	4Meg/8Meg/16Meg/32Meg	39/64/119/239
Presario 5528, 7110, 7152	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 7170, 7180, 9536, 9546, 9548, 9564 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Presario 9232, 9234, 9240, 9250, 9642, 9660 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Proliant 1000 5/60, 2000, R, 4000, R (quads)	4Meg/8Meg/16Meg/32Meg	19/28/54/69
Proliant 1500, 1500R (pairs)	4Meg/8Meg/16Meg/32Meg	36/62/99/189
Proliant 4500, 4500R (quads)	4Meg/8Meg/16Meg/32Meg/64Meg	39/64/119/239/599
Proliant 5000, 5000R (pairs)	32Meg/64Meg/128Meg/256Meg	Call
Prolinea 4/25S, 4/33, 4/66	2Meg/4Meg/8Meg	29/39/69
Prolinea 575, 590, 5100, 5120, 5133 (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 5100, 5120, 5133, 5150, 5166 (EDO pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 575E, 100E, 120E, 575MX (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 590MX, 5120MX (pairs)	4Meg/8Meg/16Meg/32Meg	22/39/59/119
Prolinea 6150E, 6180E (pairs)	8Meg/16Meg/32Meg	39/59/119
Prosignia 300 5/75, 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139
Prosignia 500 5/90, 5/120, 5/150 (pairs)	4Meg/8Meg/16Meg/32Meg	28/54/69/139

COMPAQ NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Armada 1100, 1120T, 1120, 1125	*8Meg/16Meg/32Meg/64Meg*	*49/89/169/349*	*119.00*
Armada 1130, 1130T (pairs)	*4Meg/8Meg/16Meg*	*44/60/99*	*119.00*
Armada 1510DM, 1520DM, 1550DMT	16Meg/32Meg/64Meg	89/169/349	
Armada 4100, 4110, D, 4120, T, 4130T (pairs)	4Meg/8Meg/16Meg	39/59/119	
Armada 7710MT, 7730MT, 7750DMT	16Meg/32Meg/64Meg	89/169/349	
Concerto 4/25, 433	*4Meg/8Meg/16Meg*	*44/69/99*	*130.00*
Contura 4/25, 4/25C, 4/25CX	*4Meg/8Meg/16Meg*	*44/69/99*	*109.00*
Contura 400C, 400CX, 410C, 410CX	*4Meg/8Meg/16Meg*	*44/69/99*	*100.00*
Contura 420C, 420CX, 430C, 430CX	*4Meg/6Meg/16Meg/24Meg*	*44/69/99/180*	*109.00*
Contura Aero	*4Meg/8Meg/16Meg*	*39/59/99*	*109.00*
LTE 5000, 5100, 5200, 5300	*8Meg/16Meg/32Meg/64Meg Kit*	*29/89/169/350*	*130.00*
LTE Elite 440C, CX, 4/75CX	*4Meg/8Meg/16Meg/24Meg*	*39/69/109/189*	*130.00*
LTE Lite 425	*4Meg/8Meg/16Meg*	*49/79/136*	*105.00*
Presario 1000, 1010, 1020, 1030, 1070, 1080	*8Meg/16Meg/32Meg*	*49/89/169*	*119.00*
Presario 1207, 1210, 1610	16Meg/32Meg/64Meg	89/189/369	

DELL MEMORY

Dimension XPS M166S, M2090, P133s, 166s 200s, P133v, 166v, 200v	8Meg/16Meg/32Meg	39/69/119
Dimension XPS P60, P75, P90, P100 (pairs)	4Meg/8Meg/16Meg/32Meg	17/32/49/94
Dimension XPS P100c, 120c, 133c, 166c, XPS P75T, 100T (pairs) FPM or EDO	4Meg/8Meg/16Meg/32Meg	20/38/59/119
Dimension XPS Pro 150, Pro 200 (quads)	4Meg/8Meg/16Meg/32Meg	28/48/69/129
Dimension XPS Pro 150n, 180n, 200n (Edo pairs)	4Meg/8Meg/16Meg/32Meg	17/32/49/94
Optiplex GL, GM, GMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	17/32/49/94
Optiplex GS, GXL, GXM, GXMT (Edo pairs)	4Meg/8Meg/16Meg/32Meg	17/32/49/94
Optiplex GXI, GXpro, 6180, 6200 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg	99/179/399/799
PowerEdge 2100, 4100 (Edo, Ecc)	16Meg/32Meg/64Meg/128Meg/256Meg	99/179/399/799/1799

LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED	0K Bd	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631, 641, 645	–	–	39	59	–	–	–	–	–	–	–	–
Canon LBP 430	–	–	19	–	–	–	49	–	–	–	–	–
Canon LBP 860, 1260	–	–	–	19	–	–	49	–	–	59	79	139
Epson Action Laser 1100, 1600	–	–	19	29	–	–	49	–	–	69	89	–
Epson Action Laser II	–	–	74	–	123	–	–	180	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	–	–	74	–	123	–	–	180	–	–	–	–
Epson 1000, 1500, 5000, 5200	–	–	–	49	–	–	98	–	–	–	–	–
HP 2, 2D–	–	–	–	59	–	–	79	–	–	–	–	–
HP 3, 3D, 3P, 2P+	–	–	–	*59*	–	–	*80*	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX	–	–	–	19	–	–	39	–	–	69	–	–
HP 4L	–	–	29	–	–	–	–	–	–	–	–	–
HP 4MP, 4P	–	–	9	19	–	–	34	–	–	59	–	–
HP 4+, 4M+, 4V, 4MV	–	–	9	19	–	–	34	–	–	59	79	139
HP 5, 5M, 5MP, 5N, 5P, 5SI, 5MX	–	–	9	19	–	–	34	–	–	59	79	139
HP 5L, 6L	–	–	–	–	–	–	49	–	–	99	–	–
HP 6MP, 6P	–	–	9	19	–	–	34	–	–	59	79	139
HP Design Jet 200, 220	–	–	–	–	–	–	39	–	–	69	–	–
HP Design Jet 230, 250C	–	–	–	–	–	–	39	–	–	69	89	149
HP Design Jet 330, 350C	–	–	–	–	–	–	39	–	–	69	89	148
HP Design Jet 600, 650C	–	–	–	–	–	–	39	–	–	69	–	–
HP Design Jet 650C PS	–	–	–	–	–	–	39	–	–	69	89	149
HP Design Jet 700, 750C, Plus, 755	–	–	–	–	–	–	39	–	–	69	89	149
HP Deskjet 500, 500C, 510, 550,560	–	29	–	–	–	–	–	–	–	–	–	–
HP Deskjet 1200C, 1200C/PS, 1600C,1600CM	–	–	–	–	–	–	39	–	–	69	–	–
IBM Laser 4019, 4019E	–	–	–	–	–	109	–	–	–	–	–	–
IBM Laser 4029, 4037	–	–	–	–	–	–	49	–	–	–	–	–
IBM Laser 4039, 4070	–	–	–	*39*	–	–	*69*	–	–	*90*	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	–	–	–	39	–	–	59	89	149
Lexmark Valuwriter 300,600	–	–	29	39	–	–	69	–	–	–	–	–
Lexmark Winwriter 200, 400, 600	–	–	29	39	–	–	69	–	–	–	–	–
Lexmark S Series	–	–	–	–	–	–	–	–	–	–	–	149
NEC 90, 290	–	–	–	89	–	–	–	–	–	–	–	–
NEC 95, 97	–	–	–	59	–	–	–	–	–	–	–	–
Oki 400E, 400EX, 410E, 410EX	–	–	67	89	169	–	189	–	–	–	–	–
Oki 810E, EX, 600E, EX, 610E, EX	–	–	29	79	–	–	119	–	–	149	229	–
Panasonic 4420/4450i	–	–	–	79	–	–	109	–	–	–	–	–
Panasonic 4410/4430	–	–	–	*59*	–	–	*99*	–	–	–	–	–
Panasonic 4450	–	–	89	–	–	–	–	–	–	–	–	–
Panasonic 4400/5400	–	–	49	69	–	–	109	–	–	–	–	–
Panasonic 4440, 5410	–	–	69	–	–	–	109	–	–	–	–	–
Panasonic 6500	–	–	14	14	–	–	49	–	–	–	–	–
Sharp 9400, 9460, 9600, 9700E	–	–	49	69	–	–	119	–	–	–	–	–
Sharp 9500, E, H, 9700, H	–	–	49	–	–	–	236	–	–	–	–	–

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Compaq Contura 3/25, 4/25	109	Sharp 3010, 3020, 3050, 3060, 3150	129
Compaq Aero, 400, 410, 420, 430	109	Sharp 8700, 8800, 8900	129
Compaq LTe 5000 Series	139	TI 4000E	100
Epson Action Note 650, 660	119	Toshiba 400, 405, 410, 415, 420, 425, 430 (NIMH)	219
Epson Action Note 800, 866, 880, 910	119	Toshiba 100, 105, 110, 115, 200, 205	105
IBM Thinkpad 355, 360	119	Toshiba 2100 Series	99
IBM Thinkpad 365 C, ED, XD	129	Toshiba 2400, 2450, 1900, 1950, 1960	109
IBM Thinkpad 701	109	Toshiba 4700, 4800, 4850, 4900	109
IBM Thinkpad 750, 755	179	Toshiba T4500, T4600	159
IBM Thinkpad 755 CD, CE, CV, CX	179	Winbook XPC, XP, XP5	119
NEC Versa 2400, 2405, 2430, 2435	159		

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
Libretto 50CT	8Meg/16Meg	69/118	
Tecra 500CDT, CS, 510CDS, CDT	*8Meg/16Meg/32Meg/48Meg/128Meg*	*49/89/169/269/889*	*259.00*
Tecra 520CDT, 530CDT	*8Meg/16Meg/32Meg/48Meg/128Meg*	*49/60/169/260/689*	*259.00*
Tecra 700CS, 700CT (SDRAM)	*8Meg/16Meg/32Meg*	*69/109/200*	*279.00*
Tecra 710CDT, 720CDT, 730CDT	*6Meg/16Meg/32Meg/64Meg/128Meg*	*49/89/169/359/889*	*279.00*
Tecra 730XCDT, 740CDT	*8Meg/16Meg/32Meg/64Meg/128Meg*	*49/69/169/359/680*	*270.00*
T2000SXE	*8Meg*	*94*	*170.00*
T2100 Series	*4Meg/6Meg/16Meg/24 Meg*	*29/40/99/159*	*119.00*
T1900, T4500, T4600, T4700, T4900 All Models	*4Meg/6Meg/16Meg/32Meg*	*39/64/109/169*	*100.00*
T2400, T3400, T3400CT, T3600	*8Meg/16Meg*	*49/69*	*119.00*
Satellite T100CS, 105CS, 110CS, 110CT, 115CS	*8Meg/16Meg/32Meg*	*59/99/189*	*119.00*
Satellite 200CDS, 205CDS Series	*8Meg/16Meg/32Meg*	*59/99/180*	*110.00*
Satellite 220CDS	8Meg/16Meg/32Meg/48Meg/128Meg	49/89/169/289/689	
Satellite T400 Series, T600 Series	*8Meg/16Meg/32Meg*	*59/99/169*	*229.00*
Satellite Pro 440, 460	8Meg/16Meg/32Meg/48Meg/128Meg	49/89/169/289/689	
Portege 300	16Meg/32Meg	99/199	
Portege 650CT, 660CT	*8Meg/16Meg/32Meg/64Meg*	*49/89/160/359*	*265.00*

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY PRICE
ACERNote 730C, 735C, 760C, 760CX, 780CX	*4Meg/8Meg*	*49/60*	*129.00*
ACERNote 763, 765, 782, 784, 786	4Meg/8Meg/16Meg	29/59/89	
ACERNote Light 350, 352, 355	*4Meg/8Meg/16Meg*	*29/59/69*	*179.00*
ACERNote Light 356, 358, 359, 361 (pairs) edo	*4Meg/8Meg/16Meg*	*39/59/99*	*179.00*
ACERNote Nuovo 971, 972, 372, 373, 374	8Meg/16Meg/32Meg	49/99/179	
ACERNote Pro 950, 954, 955, 957, 959 (pairs)	4Meg/8Meg/16Meg	39/59/99	
Ambra SN Series	*4Meg/16Meg*	*40/119*	*120.00*
Ambra N-75, N-100	*4Meg/8Meg/16Meg*	*49/79/119*	*139.00*
AST Ascentia A41, A42	*8Meg/16Meg/32Meg/64Meg*	*49/89/189/369*	*179.00*
AST Ascentia P30, P50	8Meg/16Meg/32Meg	69/109/199	
AST Ascentia J10, J30, J50 (pairs)	*8Meg/16Meg/32Meg/40Meg*	*30/59/100/169*	*180.00*
AST Ascentia 800N, 810N, 900N, 910N	*8Meg/16Meg*	*69/109*	*129.00, 105.00*
AST Ascentia 950N	*8Meg/16Meg*	*69/109*	*199.00*
AST Bravo & Explorer	*4Meg/16Meg*	*49/99*	*155.00*
AT&T Globalyst 130, 200, 250	*4Meg/8Meg/16Meg*	*49/69/109*	*139.00*
Austin DX4, DX2, SX2, SX Series	*4Meg/16Meg*	*69/189*	*150.00*
Austin Edge CD P-133 edo	8Meg/16Meg/32Meg	69/109/199	
Austin Edge Duet (pairs) edo	8Meg/16Meg	49/89	
Canon 1100, 300P (pairs)	*4Meg/8Meg/16Meg*	*39/59/90*	*120.00*
Canon Innova Book 150, 175	*4Meg/16Meg*	*40/139*	*129.00*
Canon Innova Book 350CD, 360, 475	8Meg/16Meg	49/89	
Canon Innova Book 480, 490 edo	*8Meg/16Meg*	*40/89*	*130.00*
CTX EZ Book **500**, 600, 700 Pent, Series	4Meg/8Meg/16Meg	29/49/89	140.00
DEC HiNote	*4Meg/8Meg/16Meg*	*29/49/80*	*120.00*
DEC HiNote Ultra, Ultra II	4Meg/8Meg/16Meg/32Meg	29/49/89/179	
DEC HiNote VP 520, 525, 535, 545 (pairs)	*4Meg/8Meg/16Meg*	*29/49/89*	*129.00*
DEC HiNote VP 5100, 5120	*8Meg/16Meg/32Meg/64Meg*	*40/89/179/379*	*129.00*
DEC HiNote VP, Css, LSS, CTS, LTS	8Meg/16Meg/32Meg/64Meg	49/89/179/379	
Dell Lattitude LM (pairs)	4Meg/8Meg/16Meg	29/49/89	
Dell Lattitude 433, C, CX	4Meg/16Meg	49/99	
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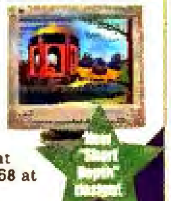

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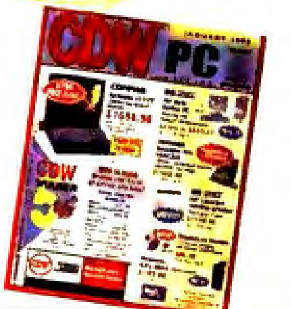

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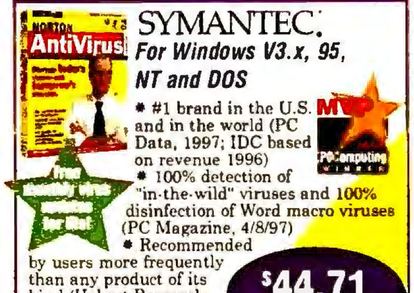

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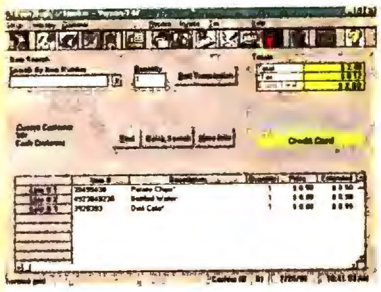

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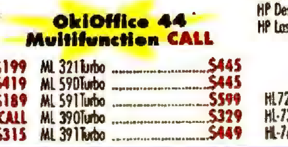

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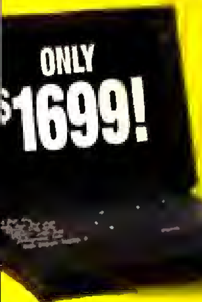

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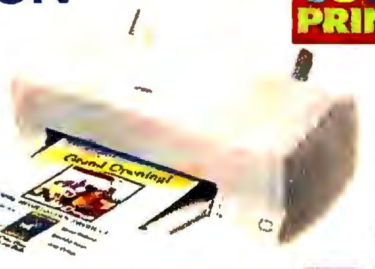

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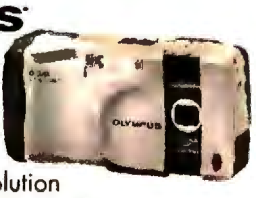

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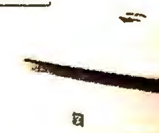

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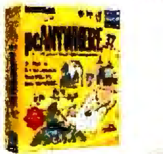

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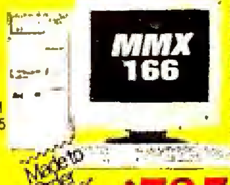

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TX-C7	17"	1600x1200	25mm	879
FX-E7	21"	1280x1024	28mm	1686
FX-E8	21"	1600x1200	26mm	2299

HITACHI

Pro 500	15"	1280x1024	28mm	299
Elite 630	17"	1600x1280	22mm	569
Elite 751	19"	1600x1200	22mm	999
Pro 800	21"	1600x1200	22mm	1362

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7BM749	14"	720X400	Monochrome	105
CM2089	14"	1024x768	28mm	135
MV5011	15"	1024x768	24mm	209
MB7000	17"	1280x1024	24mm	419
CM5600	20"	1600x1280	28mm	949

MITSUBISHI

TFM8705SK	17"	1600x1200	25mm	599
TFW9105SK	21"	1600x1200	28mm	1239

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447ZA	17"	1024x768	27mm	569
445XI259	21"	1600x1200	22mm	1386

SONY

CPD-100ES	15"	1280x1024	25mm	329
CPD-100SF	15"	1280x1024	25mm (digital)	359
CPD-100VS	15"	1280x1024	25mm w/speakers	459
CPD-200SX	17"	1280x1024	25mm	599
CPD-200SF	17"	1280x1024	25mm (digital)	659
CPD-220VS	17"	1280x1024	25mm w/speakers	739
GDM-17SE2T	17"	1600x1200	25mm	815
CPD300SFT	20"	1280x1024	30mm	1191
GDM-400PS	19"	1600x1200	25mm	1165
GDM-20SE2T	20"	1600x1200	25mm	1519

VIEWSONIC

V655 OPTI	15"	1280x1024	28mm	249
V773 OPTI	17"	1280x1024	26mm	439
Q100 OPTI	21"	1600x1280	28mm	999
15GS	15"	1280x1024	28mm	294
17PS	17"	1600x1280	25mm	629
G810	21"	1600x1200	25mm	1239

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MF-8515G	15"	1280x1024	28mm	299
MF-8617E	17"	1600x1280	26mm	579
MT-9017E	17"	1600x1280	25mm	639
MT-9021E	21"	1600x1280	30mm	1399
MT-9221	21"	1800x1440	28mm	1529

MULTIMEDIA

Altec Lansing ACS500 5-Channel Dolby Speakers	249
Creative Labs Awe 64 Gold 4M	179
Creative Labs Discovery 12X Kit w/SB 32	283
Creative Sound Blaster 16 Value IDE Card	89
Labtec 3210 20-watt Speakers (call for other models)	82

NETWORKING

3COM Etherlink IIIB ISA 10BT TPO	57
3COM 3C905TX PCI / 5-pack	89/419
3COMSuperstack II 12-pt Hub/24-pt Hub	248/379
Artisoft Lantastic V7.0 1-user/5-user	86/319
Digi......ALL MODELS IN STOCK	CALL
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Intel EtherExpress Pro 10/100TX PCI	79
Linksys EtherFast 10/100BT TX LAN	74
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SMC Tigerstack 28Port 10BT	799
SMC TigerHub 10BT 6-ports / 12-ports	159/343
SMC EtherEZ PCMCIA	129
Xircom NextGeneration E-net 10/100 Ready	139
Xircom 10BT/56K Combo	299
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Novell IntraNetware v4.11 10-user	1249
Novell IntraNetware v4.11 25-user	2099
Novell IntraNetware v4.11 50-user	2799

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Smart-UPS 420VS/650VS/1000VS	259/295/435
Smart-UPS 450/700/1400/2200	275/338/594/1029
Back-UPS Office 250	119

PRINTERS

ALPS

MD2010	600dpi	color	inkjet	236
MD2300	600dpi	color	inkjet	619
MD4000	600dpi	color	w/scanner	419

CALCOMP

TechJet 720C	D-size / E-size	1989/2379

ENCAD

Croma 24	24" 600x300dpi	color	1759

EPSON

Stylus 400/600	4ppm	720/1440	color	191/255
Stylus 800	8ppm	1440x720	color	362
Stylus 1520	6ppm	1440x720	color, 17x22"	739
Stylua 3000	7ppm	720x720	color 13x19"	1699

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Deskjet 720cxl / 870cxl / 890cxl					332/299/419
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DeskJet 1000CXI		600dpi	color	letter,11x17	469
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LaserJet 4MV	16ppm	600dpi	12MB	11x17,PS	2539
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LaserJet 4000TN	17ppm	1200dpi	8MB	3tray/enet	1579

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Optra ES+	6ppm	600dpi	2MB	Heavy Paper	539
Optra ES+	6ppm	1200dpi	8MB		1939
Optra N240	24ppm	600dpi	4MB	11x17	2637
Optra N245	24ppm	600dpi	16MB	11x17	3199
Optra S1250	12ppm	1200dpi	4MB		999
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Dptra S1650N	16ppm	1200dpi	4MB		1454
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Optra SC1275	12ppm	600dpi	16MB	Color	3699
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Pacemark 3410 Dot Matrix (multi-part forms)				1369
OkiPage 4W	4ppm	600dpi		192
OkiPage 6E	6ppm	600dpi		287
OkiPage 6EX	6ppm	600dpi	2MB	419
DL810E	8ppm	600dpi	2MB	575

QMS

Magicolor CX	12ppm	600dpi	20MB	Color	4999

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Aatra 1210S 600x1200dpi w/Pholodeluxe	249
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AITech Pro PCTV+ / Wavewatcher TV-2	139/268
ATI 3D Graphica XPression + PC2TV 2MB	119
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Sigma Real Magic Ultra MPEG	294

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Presario 2200	MGX-180	16M	1.6G	8X	33.6K	819
Presario 4505	P166MMX	16M	2.1G	16X	33.6K	999
Presario 4508	P200MMX	24M	3.2G	16X	33.6K	1199
Presario 4528	P233MMX	32M	3.2G	24X	33.6K	1499
Presario 4840	Pent II-266	32M	6.5G	DVD	56K	2079
Presario 4850	Pent II-300	32M	6.5G	DVD	56K	2399

SONY

Vaio PCV-200	Pent II-233	32M	4.3G	24X	56K Zip	2049
Vaio PCV-220	Pent II-266	32M	6.4G	24X	56K Zip	2215
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Deskpro 2000	Pent II-233	32M	3.2G	24X	Matrox 4MB	1889
Deskpro 2000	Pent II-266	32M	3.2G	24X	Matrox 4MB	2099
Deskpro 2000	Pent II-300	32M	3.2G	24X	Matrox 4MB	2479
Deskpro 4000N*	P166MMX	32M	1.6G		10/100TX	1073
Deskpro 4000N*	P233MMX	32M	2.1G		10/100TX	1419
Deskpro 4000S**	P166MMX	16M	2.1G		10/100TX	999
Deskpro 4000S**	P233MMX	32M	2.1G		10/100TX	1469
Deskpro 4000	P166MMX	16M	2.4G		10/100TX	1145
Deskpro 4000	P166MMX	32M	3.2G	16X	10/100TX	1639
Deskpro 4000	P233MMX	32M	3.2G	16X	10/100TX	1899
Deskpro 4000	Pent II-233	32M	3.2G	24X	10/100TX	2059
Deskpro 4000	Pent II-300	32M	3.2G	24X	10/100TX	2799
Deskpro 6000	Pent II-233	32M	2.1G	24X	Ultra SCSI	2379
Deskpro 6000	Pent II-266	32M	4.3G	24X	Ultra SCSI	2869
Deskpro 6000	Pent II-300	64M	4.3G	24X	Ultra SCSI	3519

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Equium 6230D	Pent II-233	32M	3.0G	24X	10BT / audio	1925
Equium 6260M	Pent II-266	32M	4.0G	16X	10BT / audio	2619

SERVERS

COMPAQ

Prosignia 200	Pent II-233	32M	no HD	16X	Netelligent	2199
Proliant 800	Pent Pro 200	32M	no-HD	8X	Auto Recovery	2329
Proliant 850R	Pent Pro 200	32M	no-HD	8X	Web Server	3268
Proliant 2500	Pent Pro 200	32M	no-HD	8X	5 Plug Bays	4179
Proliant 5500	Pent Pro 200	128M	no-HD	8X	Netelligent	1099
Proliant 6500	Pent Pro 200	128M	no-HD	16X	exp. 4 Proces.	14699
Proliant 7000	Pent Pro 200	128M	no-HD	16X	18 HD Bays	16919

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Netserver E40	Pent Pro 200	32M	no-HD	8X	4 HD Bays	1899
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Netserver LD	Pent Pro 200	32M	no-HD	4X	UW-SCSI	2738
Netserver LH	Pent Pro 200	64M	no-HD	12X	exp. 2 P-Pro	4999
Netserver LXE	Pent Pro 200	64M	no-HD	4X	6 Hotswap Bays	8479
Netserver LXR	Pent Pro 200	128M	no-HD	4X	exp. P-Pro	13999
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EZ364D-K	P166MMX	12.1"D	40M	2.0G	16X		2125
EZ354T-K	P150MMX	12.1"Tx	40M	2.0G	16X		1899
EZ364T-K	P166MMX	12.1"Tx	40M	2.0G	16X		2099

FUJITSU

Lifebook 435DX	P133MMX	12.1"D	16M	1.6G	20X	56K	1399
Lifebook 535TX	P133MMX	12.1"T	16M	2.0G	20X	33.6	1699
Lifebook 765TX	P166MMX	12.1"T	32M	3.2G	20X	56K	2099
Lifebook 585TX	P233MMX	12.1"Tx	32M	4.0G	20X	33.6	3489

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Omnibook 2000CS	P133	12.1"D	16M	1.4G			2099
Dmnibook 2000CT	P133	12.1"T	16M	1.4G			2199
Omnibook 3000	P233	12.1"T	16M	2.1G			3819
Omnibook 5700CT	P150MMX	12.1"T	16M	2.0G			2429
Omnibook 5700CTX	P166MMX	12.1"Tx	16M	2.0G			3299

HITACHI

Visionbook Plus	P150MMX	12.1"D	16M	1.4G	10X	33.6	1899
Visionbook Plus	P166MMX	12.1"T	16M	2.1G	10X	33.6	2137
Visionbook Elite	P166MMX	13.3"Tx	16M	2.1G	10X	56K	3347
Vialonbook Pro	P166MMX	13.3"Tx	32M	3.0G	10X	56K	4279
Visionbook Pro	P233MMX	13.3"Tx	32M	3.2G	20X	56K	CALL

IBM

Thinkpad 380E	P150MMX	12.1"D	16M	2.1G			1919
Thinkpad 380ED	P166MMX	12.1"D	16M	2.1G	20X		2399
Thinkpad 560E	P166MMX	12.1"T	16M	2.1G			3659
Thinkpad 760XD	P166MMX	12.1"Tx	32M	3.0G	8X	28.8	3981
Thinkpad 765D	P166MMX	13.3"Tx	32M	3.0G	8X	33.6	4099
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SHARP

PC9330T	P150MMX	12.1"T	32M	2.1G	14X	33.6	2519
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QUALITAS	P166MMX	13.3"Tx	16M	2.1G	20X	33.6	2999
SUPERUS	P166MMX	14.2"Tx	32M	2.1G	20X	33.6	3619
SUPERUS	P166MMX	14.2"Tx	32M	3.0G	20X	33.6	3799
SUPERUS	P200MMX	14.2"Tx	32M	3.0G	20X	33.6	3979

TOSHIBA

Libretto 70CT	P120	6.1"T	16M	1.5G			1899
Satellite Pro 440CDX	P133MMX	12.1"D	16M	1.4G	10X	33.6	1569
Satellite Pro 440CDT	P133MMX	12.1"Tx	16M	1.4G	10X	33.6	1949
Setellite Pro 460CDT	P166MMX	12.1"Tx	32M	2.1G	10X	33.6	2859
Satellite Pro 460CDX	P166MMX	12.1"D	32M	2.1G	10X	33.6	2399
Satellite Pro 480CDT	P233MMX	12.1"T	32M	3.8G	10X	33.6	3860
Portege 300CT	P133MMX	10.4"T	32MB	1.6G		33.6	2419
Portege 650CT	P133	11.3"T	16M	1.2G			2119
Portege 660CDT	P150	11.3"T	16M	1.3G	10X		1989
Tecra 520CDT	P166MMX	12.1"T	32M	2.1G	10X	33.6	2899
Tecra 530CDT	P166MMX	12.1"Tx	32M	2.1G	10X	33.6	3099
Tecra 730XCDT	P150MMX	12.1"Tx	16M	2.0G	10X	28.8	2449
Tecra 740CDT	P166MMX	13.3"Tx	16M	3.0G	10X	28.8	3199
Tecra 750CDT	P233MMX	13.3"Tx	32M	4.7G	20X	56K	4949
Tecra 750CDM	P233MMX	13.3"Tx	32M	4.7G	20X	56K	CALL
Tecra 750DVD	P233MMX	13.3"Tx	64M	4.7G	2xDVD	56K	5599

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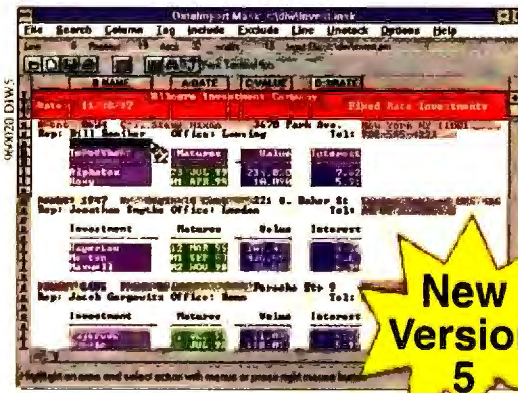

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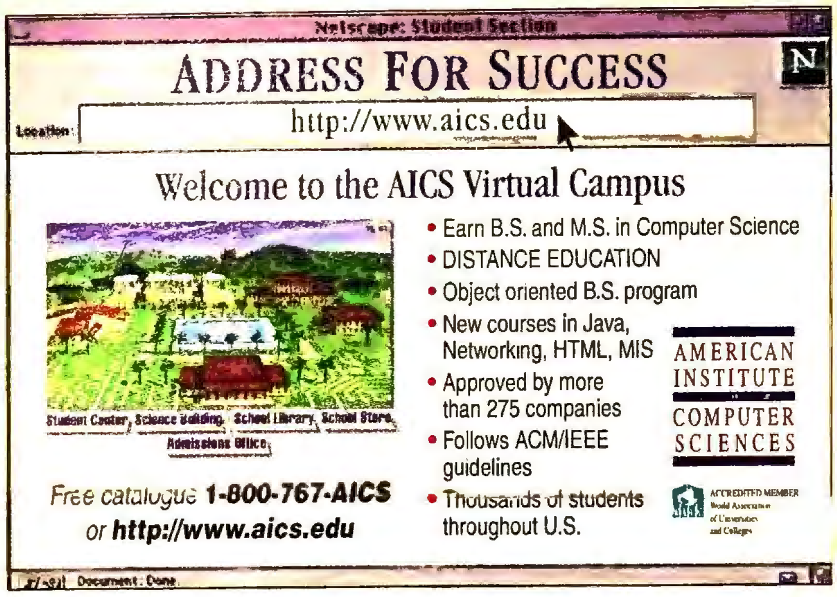
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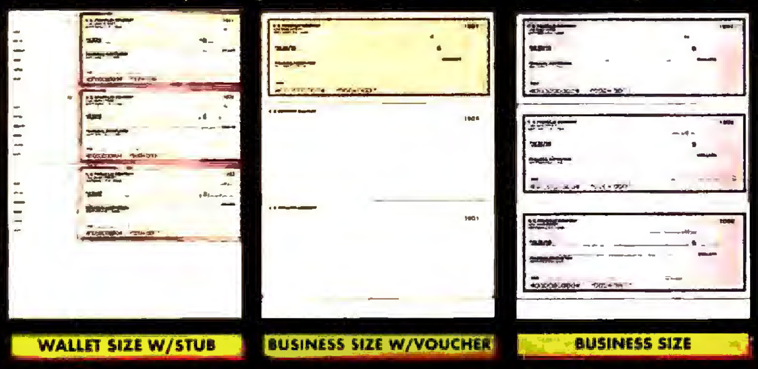

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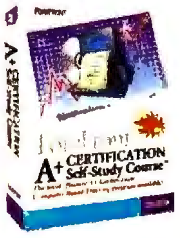

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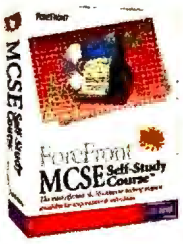

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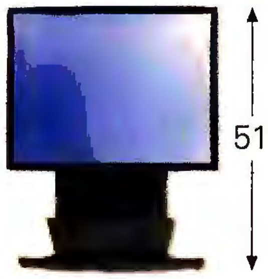

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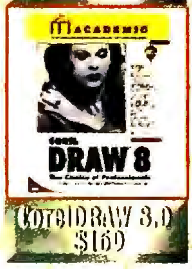
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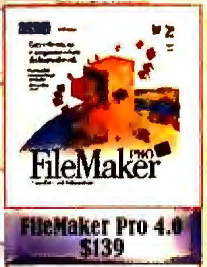
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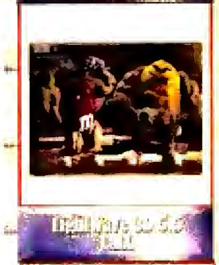
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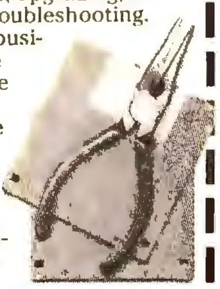

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LTE Lite/20 (386)	4Meg	65
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LTE Elite 4140C,CX 4-75CX	4Meg-8Meg-16Meg-24Meg	60-80-130-205
DynaPad T100X	4Meg	85
DynaBook SS450/475	4Meg-8Meg-16Meg-24Meg	50-75-125-180
DynaBook V486V	4Meg-8Meg-16Meg	60-85-135
DynaBook R575, S575	4Meg-8Meg-16Meg-24Meg	85-135-240
Libretto 20, 30	8Meg 12Meg	105-135

TOSHIBA NOTEBOOK MEMORY

Libretto 50	8Meg-16Meg	90-150
Protege 650CT, 660CDT	8Meg-16Meg-32Meg-64Meg	75-125-225-525
Tecra 500, 510 CDS/CDT	8Meg-16Meg-32Meg-64Meg	75-125-240-350
Tecra 700 (SDRAM)	8Meg-16Meg-32Meg	105-169-249
Tecra 710 720, 730 CDT	8Meg-16Meg-32Meg 64Meg-128Meg	80-135-240-570-1155
T2000SXE-2200SX-T1800, 1850, C	4Meg-8Meg	75-115
T2100, 2195 2155 2110 2115	4Meg-8Meg-16Meg-24Meg	50-75-125-189
T4500, C, T4600, T4700,T1900, T1910, T1950 (3.3v)	4Meg-8Meg-16Meg	60-80-135
T4850 T4850CT, T4900, T4900CT	4Meg-8Meg-16Meg-32Meg	60-60-135-250
T3400CT, T2400 T3600	4Meg-8Meg-16Meg	40-65-130
T100, 105, 110, 115, 400, 405, 410, 415 420, 425	8Meg-16Meg-32Meg	80-135-240
T400CS 400CDT 105EDO, 600, 610, CT EDO	8Meg-16Meg-32Meg	80-135-240

NOTEBOOK MEMORY

ACERNote 730C, 735C, 760C, 760CX, 780CX	4Meg 8Meg	45-70
ACERNote 760i, 763, 765, 782, 784, 786	4Meg-8Meg-16Meg	45-70-115
ACERNote Light 350, 352, 355	4Meg-8Meg-16Meg	69-125-250
ACERNote Light 350P, 510, 810 372, 373, 374	8Meg-16Meg-32Meg	69-120-265
ACERNote 970CX, 370/C370CX	4Meg-8Meg-16Meg	40-65-115
ACERNote Light 356, 358, 359, 361(pairs)	4Meg-8Meg-16Meg	35-65-125
ACERNote Pro 950, 954, 955, 957 959(pairs)	4Meg-8Meg-16Meg	35-60-105
AST Ascentia A40, A41, A42	8Meg-16Meg-32Meg	65-120-265
AST Ascentia P30, P50	8Meg-16Meg-32Meg	79-145-299
AST Ascentia J10, J30, J50 (install pairs)	8Meg-16Meg-32Meg	65-105-CALL
AST Ascentia 900N, 800N, 810, 910	4Meg-8Meg-16Meg	70-85-130
ASTBravo & Explorer	4Meg-16Meg	55-110
AST Prem Exec 386SX-20-25-25L	4Meg	50
AST Power Exec 3-25, 425EL, 425SL, 4-33SL	4Meg-16Meg	85-140
AT & T Globalyst 130	4Meg-8Meg-16Meg	40-65-135
AT & T Globalyst 250/250P	4Meg-8Meg-16Meg-32Meg	85-120-155-265
AT & T Globalyst 200 Safari 351	8Meg-16Meg	105-189
Cannon Innova Book 1100P, 120T, P-75, P-50	4Meg-8Meg-16Meg	40-69-120
Cannon Innova Book 18300P 75/540C	8Meg-16Meg	65-115
Note Jet 486	4Meg-8Meg	45-60
Note Jet III (pairs)	4Meg-8Meg-16Meg	45-69-120
Cannon Innova Book 150, 175	4Meg-16Meg	65-135
Cannon Innova Book 200LS	4Meg-8Meg-16Meg-24Meg	65-95-215-345
Cannon Innova Book 350CD, 360, 475	8Meg-16Meg	65-115
Cannon Innova 486-10	4Meg-16Meg	75-215
CTX EZ Book 5x86 Pent., 500 Pent, 600 Pent. Series	4Meg-8Meg-16Meg	40-65-115
CTX EZ Book 700 Pent. CTX, X953NS	8Meg-16Meg-32Meg	65-120-245
DEC 325SL, 425SLC, 425SL, 433	4Meg-8Meg-16Meg	69-85-115
DEC 425SE, 433SE	4Meg-16Meg	55-110
DEC 425SL, Premium, 433 SLC	4Meg-16Meg	89-140
DEC Ultra HiNote II 5000 Series	4Meg-8Meg-16Meg-32Meg	40-69-120-320
DEC HiNote, Ultra HiNote	4Meg-8Meg-16Meg	40-80-115
DEC HiNote VP	8Meg-16Meg-32Meg	65-125-245
Epson ActionNote 500C	4Meg	45
Epson ActionNote 910	4Meg-8Meg-16Meg	50-80-165
Epson ActionNote 650, 650C, 660C, 660CX	4Meg-8Meg-16Meg	55-85-125
Epson ActionNote 700, 700C, 700CX	4Meg-16Meg	75-185
Epson ActionNote 880, 866C, 890	4Meg-8Meg-16Meg	45-75-165
Epson ActionNote 4LC-25, 4LC-33, 4SLC-2-50, 400	6Meg	60
Everex Tempo LX, LX20, Carrier	2Meg	85
Everex StepNote 486	4Meg-8Meg	40-115
Fujitsu Monte Carlo, Milan, Montego	8Meg-16Meg-32Meg	65-120-265
FMV -Biblo 400 Series	4Meg-8Meg-16Meg	40-70-120
Gateway 2000 Colorbook 4-33	4Meg-16Meg	65-175
Gateway 2000 Nomad 425 DXL-SXL	4Meg-16Meg	155-755
Gateway 2000 486 Handbook or Liberty	4Meg-16Meg	55-165
Hitachi C-Series	8Meg-16Meg-32 Meg	80-145-325
Hitachi E-Series	8Meg-16Meg	80-145
Hitachi M-Series	8Meg-16Meg	100-150
HP Omnibook 300, 480, 425	4Meg	70
HP Omnibook 430	4Meg	60
HP Omnibook 530, 600	4Meg-8Meg-12Meg	60-85-115
HP Omnibook 800CS, CT	8Meg-16Meg-32Meg	85-145-299
HP Omnibook 430	4Meg	60
HP Omnibook 4000	4Meg-8Meg-16Meg	65-89-130
HP Omnibook 5000	8Meg-16Meg-32Meg	85-135-225
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HP Palmtop 200LX	4Meg-8Meg-12Meg-16Meg-20Meg	125-169-210-255-299
Leading Edge Aviva 2000	4Meg-16Meg	65-175
Lexmark SE10	4Meg	65
Magnavox Metalis	4Meg	115
Micron Transport Pentium	8Meg-16Meg	115-215
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Midwest Micro Elite or Soundbook Plus, Soundbook II, IIP	4Meg-8Meg-16Meg	75-115-195
NCR Satan 3180, 3181	4Meg-8Meg-16 Meg	85-119-155
NEC ProSpeed 486	4Meg	40
NEC Ultralite Versa, E, V, MP	4Meg-8Meg-16Meg-32Meg	85-119-155-265
NEC Versa, S, Versa 2000 & 2000D, 500	4Meg-8Meg-16Meg	40-75-115
NEC Versa 2530	8Meg-16Meg	60-115
NEC Versa 2600	32Meg	240
NEC Versa 4000, 4050-4080	4Meg-8Meg-16Meg-32Meg	85-119-155-265
NEC Versa 6000	8Meg-16Meg-32Meg-64 Meg	90-145-245-495
NEC Versa 6200	16Meg-32Meg-64 Meg	119-280-525
Olivetti Echos P75-P133S (pairs)	4Meg-8Meg-16Meg	35-60-105
Packard Bell Statesman	2Meg-8Meg	40-60
Panasonic CF-V21P, CF-V41	4Meg-8 Meg-16Meg	80-105-155
Panasonic CF-580, CFV21P5X	4Meg16Meg	65-149
Samsung Sens 500 Series	8Meg-16Meg 32Meg	65-120-265
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Sanyo 17-18 NB	2Meg	85
Sharp 400 Series	8Meg-16Meg-32Meg	80-130-255
Sharp 3030, 3070	8Meg-16Meg	79-145
Sharp 6781, 6881, 6785, 8700, 6800, 6741	2Meg-4Meg	45-60
Sharp 8150, 8650, 8660, 7700, 7760	4Meg-16Meg	60-130
Sharp 8700, 8800, 8900	4Meg-8Meg-16Meg	65-90-140
Sharp 3010, 3020, 3050, 3060	4Meg-8Meg-16Meg	40-65-115
Sharp 9000, 9030	8Meg-16Meg-32Meg	85-130-255
Sharp 9040, 6070 (pairs)	4Meg-8Meg-16Meg	40-65-115
TI Travel Mate 3000	2Meg	50
TI 4000, 4000E, 4000M	4Meg-16Meg	140-715
TI 5000, 5100, 5200, 5300	8Meg-16Meg	85-140
TI 6020, 6030, 6050, 6160	8Meg-16Meg-32Meg	65-120-310
TI Extensa, 450, 450T, 455, 455T, 570	4Meg-8Meg-16Meg	40-65-115
TI Extensa, 550, 555, 560, 560 (pairs)	4Meg-8Meg-16Meg	35-60-110
TI Extensa 600 Series, 900 Series	8Meg-16Meg-32Meg	65-120-310
Winbook XP	16Meg-32Meg	185-335
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Zenith Master Sport SL, SLE, 600, 620, 625NL	2Meg	45
Zenith Z-Note 425LN, LNC, LNP	4Meg	70
Zenith Z-Note MX	4Meg-8Meg-16Meg	50-90-150
Zenith Z-Note GT	8Meg 16Meg-32 Meg	60-115-210
Zenith Z-Note Flex 486, Flex Pentium	4Meg-8Meg-16Meg	40-69-119
Zenith Z-Star 4-33	2Meg-8Meg	40-79
Zenith Z-Star EX	4Meg-8Meg-16Meg	40-65-115

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PowerEdge XE Pentium (all mdls)	16-32-64MB	120-210-425
OmniPlex 560/ME,566/ME 590/ME		
PowerEdge XE 450 466 433 433s	8-16-32-64MB	30-45-90-180
OmniPlex ME Series		
System 433TE, System 425TE	8-16MB	80-145
OptiPlex DGX Series (Pentium)	8-16-32-64MB	70-120-210-425
OptiPlex G & GX Series (Pentium)	8-16-32-64MB	60-115-230-420
Low Profile Power Desktop (all)	4 16MB	30-120
Power Desktop (all models)		
OptiPlex 4100s 466s 450s 433/3	4-16MB	30-90
OptiPlex V Series (all models)		
Performance 1, L, M (all models)		
Dimension & Dimension XPS Series	4-8-16-32MB	25-39-68-129
(Pentium) * Installed in pairs	4-8-16MB EDO	20-35-65

DELL NOTEBOOK MEMORY

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Latitude LX (486)	4-8-16MB	55-95-130
Latitude 433m,mc,450mc, mcx	4-8-16MB	55-95-130
Latitude 433, 433c 433cx	4 16MB	55-115

DIGITAL DESKTOP MEMORY

DECpc MT,MTE(all models)	4-16MB	40-115
Prioris MTE (all models)		
DECpc LP,LPx,LPx+(all models)		
Venturis Series (Pent)	4-8-16-32MB	30-55-95-185
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Celebris Series (Pentium)	4-8-16-32MB	30-55-95-185
* Installed in pairs		
Celebris XL Series (Pentium)	8-16-32 64 MB	Call
Celebris GL & GLST Series (Pentium) * Installed in pairs	4-8-16-32MB EDO	20-35-65-125
Venturis 560,4100 466 450s2,433	4-8-16-32MB	30-55-95-185

DIGITAL NOTEBOOK MEMORY

HiNote VP (Pentium)	8-16-32-64MB EDO	69-125-250
HiNote Ultra II (Pentium)	4-8-16 32MB	40-70-120
HiNote Ultra (all models)	4-8-16-32MB	40-70-120
HiNote 486 DX4/75 DX2/50,SX/33	4-8-16-32MB	40-70-120
HiNote VP (Pentium)	8MB EDO	169

GATEWAY DESKTOP MEMORY

Destination Big Screen PCI's	4-8-16-32MB EDO	20-35-65-125
P5-75,120,166 166XL,133,150		
Family PC P5-75,100,120 133		

HEWLETT PACKARD MEMORY

Pavilion Series (Pentium)	4-8-16-32MB EDO	30-55-95-185
* Installed in pairs		
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Vectra XP/60 VL2 Pent ,Vectra		
NetServer LE Series 486DX/33	4-8-16-32MB EDO	40-65-110-200
486SX/33, 486DX/66		
NetServer 4/33 LM		
Vectra VE/4 & XM3 Series	4-8-16-32MB EDO	30-50-90-175
* Installed in pairs(XM3 Series)		
Vectra VE/5 VL4 & XM4 Series	4-8-16-32MB EDO	20-35-65-125
* Installed in pairs		
Vectra XU 5/90, 90C(GX), 100	4-8-16-32MB	30-55-95-185
Vectra XM3, VL3		
Vectra M2,N2,XM2,(all models)	4-8-16-32MB	30-55-95-185
Vectra VL2 486 (all models)		
Vectra EM, ST Series (all models)	4-8-16MB	35-65-120
Vectra PC (all models)	512MB VRAM Kit 8MB	45-65
Vectra 486 PC	4-8MB Module	35-65
Vectra 486/33I, 486/25T	512MB VRAM Kit, 4-8MB	40-35-65
Vectra N, M, NI (all models)	4-8-16-32MB	35-65-120
Vectra 486/66VL, 33VL, 25VL	4 8-16-32MB	35-65-120

MICRON DESKTOP MEMORY

Pro180 Magnum, 200 Magnum Plus	4-8-16-32MB	25-39-69-129
P133, P266 PowerServer SMP		
4100 PCI Magnum		
P150PCI Millenia, P166PCI Millenia Plus	4-8-16-32MB	20-35-65-125
P75, P100 PowerStation		
P100 Home MPC, P150 Home MPC Pro		

NEC DESKTOP MEMORY

Image Pentium (all models)	4-8-16-32MB	25-39-60-120
Image 4100m 4100es,486ex;450es;433es		
PowerMate Express/II (all models)		
PowerMate Express 486/50Te,66Te	4-16MB	40-110
PowerMate Express 486SX/25Te		
PowerMate Express 486/33e, 66e		
PowerMate V Series (486 & Pent.)	4-8-16-32MB	40-65-110-220
* Installed in pairs on Pentiums		
Power Mate Express 486/50e	4-16MB	40-119
Power Mate Express 486SX/20e,25e		
Image 466; 433, 425	4-16MB	40-130
PowerMate 477es; 433es 425es		
Ready 466es; 433es 425es.		
PowerMate P600, P60M	4-8-16-32MB	40-65-110-220
Ready P60M, 433, 425		
PowerMate 4100M 466M, 4660		
PowerMate 466M		
Ready 4100M 466m 466D, 433D		
PowerMate 425, 433, 466	4-16MB	40-140

NEC NOTEBOOK MEMORY

UltraLite SL/25C, UltraLite III	2-4-6MB	65-125-190
UltraLite SL/20, UltraLite SL/20P	2 6MB	95-100
Versa M, P, V (all models)	4-8-16-32MB	65-119-155-265
Versa 4000,4050,4080,4200		
Versa S (all models), 500, 550	4-8-16MB	40-75-115
Versa 2000,2200C,2205,2400CD		
Versa 6000 (Pentium) Models	8-16-32-64MB	90-145-245-495
	Credit Card	

LASER PRINTER MEMORY

AMOUNT UPGRADED	0K	256k	1	2	3	3.5	4	5	6	8	16	32
Brother 630, 631,641,645	—	—	40	59	—	—	—	—	—	—	—	—
Brother HL-4, 4PS, 4V	—	—	70	85	—	—	125	—	—	—	—	—
Brother HL-6 Series	—	—	—	70	—	—	90-	—	—	—	—	—
Brother HL-8 Series	—	—	80	100	—	—	—	—	—	—	—	—
Brother HL-10V, 10DV 10PS	—	—	—	65	—	—	85	—	—	—	—	—
Brother HL-10H	—	—	20	—	—	—	35	—	55	—	—	—
Cannon LBP 860, 1260	—	—	—	—	—	—	40	—	—	—	115	225
[illegible]												

LASER PRINTER MEMORY

AMOUNT UPGRADED	0K	256k	1	2	3	3.5	4	5	6	8	16	32
Kyocera FS-3600, FS-3600+	—	—	25	30	—	—	40	—	—	70	115	225
Lexmark Medley 4C, 4X, 4SX	—	—	Call	Call	Call	—	—	—	—	—	—	—
Lexmark Optra L, LX, R, RX	—	—	—	30	—	—	35	—	—	55	85	170
Lexmark Valuwriter 200,300 400,600	—	—	25	35	—	—	45	—	—	—	—	—
NEC 90 290	—	—	—	125	—	—	—	—	—	—	—	—
NEC Silentwriter 95, 95fx, 97, 97fx	—	—	35	40	—	—	—	—	—	—	—	—
Oki 400	—	—	85	80	—	—	—	—	—	—	—	—
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4MB X 8-80NS SIMM	[illegible]
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4MB X 8-60NS SIMM	[illegible]
30 PIN 9 BIT SIPPS	
1MB X 9-100NS SIPP	20
1MB X 9-80NS SIPP	20
1MB X 9-70NS SIPP	20
1MB X 9-60NS SIPP	20
256K X 9-70NS SIPP	10
30 PIN PARITY/9-BIT	
4MB X 9-70NS SIMM 3 CHIP	25
4MB X 9-60NS SIMM 3 CHIP	25
4MB X9-60NS SIMM 3 CHIP LOGIC	20
4MB X9-70NS SIMM 3 CHIP LOGIC	20
4MB X 9-80NS SIMM 9 CHIP	25
4MB X 9-70NS SIMM 9 CHIP	25
4MB X 9-60NS SIMM 9 CHIP	25
1MB X 9-100NS 9 CHIP SIMM	10
1MB X 9-80NS 3 CHIP SIMM	10
1MB X 9-80NS 9 CHIP SIMM	10
1MB X 9-70NS 3 CHIP SIMM	15
1MB X 9-70NS 9 CHIP SIMM	15
1MB X 9-60NS 3 CHIP SIMM	15
1MB X 9-60NS 9 CHIP SIMM	15
16MB X 9-70NS/60NS SIMM	100
256K X 9-80NS/70NS SIMM	10
72 PIN MEMORY	
256 X 36-1MB-70NS	15
512 X 35-2MB-70NS	20
512 X 36-2MB-80NS	20
1X36-4MB-70NS/60NS LOGIC	20
1X36-4MB-70NS/60NS MAJOR	30
2X36-8MB-70NS/60NS LOGIC	35
2X36-8MB-70NS/60NS MAJOR	45
4X36-16MB-70NS/60NS LOGIC	50
4X36-16MB-70NS/60NS MAJOR	60
8X36-32MB-70NS LOGIC	110
8X36-32MB-60NS LOGIC	110
8X36-32MB-70NS MAJOR	130
8X36-32MB-60NS MAJOR	130
16X36-64MB-70NS/60NS	325
1 X 32-4MB-70NS/60NS	15
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ST19101W	9.1GB	8MS	975-1175
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ST32272WC	2.1GB	8MS	375-500
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WD4360W	5.1GB	8MS	495-645
WD9100W	5.1GB	8MS	775-925
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MPA3052U	5.2GB	10MS	245-345
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ULTRA SCSI DRIVES			
M2954S	4.4GB	8MS	535-660
M2949S	9.1GB	8MS	885-1010
ULTRA WIDE SCSI DRIVES			
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M2949W	9.1GB	8MS	960-1110

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952 Notebook computers
953 Windows 95 software
954 Monitors and video boards
955 Accounting software
956 Graphics software
957 Network/sharing products
958 Printers
959 Multimedia products
960 Utilities
961 Mail order companies
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To enter and get full details, visit our website:
www.pcworld.com/sweeps
or see rules for alternate method of entry.

Game Room II
Sweepstakes
presented by
PC WORLD

the rules

No Purchase, Payment, Online Entry or Contribution Necessary. Must be U.S. resident living in the U.S. to enter.

To enter electronically, follow all entry instructions appearing on the screens. Online entrants may be requested to answer certain survey questions. These questions need not be answered in order to qualify. To enter by mail, see mail-in instructions within these rules. Your entry must be received by the date(s) specified elsewhere in this offer or by 6/1/98, whichever is sooner. Regardless of entry method, there is a limit of one entry per person, e-mail address, or household per day.

To enter electronically, follow all instructions and complete the presenting company's official online entry form and click on "Enter Sweepstakes." OR, to enter by mail, hand print your name, address, telephone number, e-mail address (if you have one), and presenting company's name to Game Room 2, P.O. Box 9245, Medford, NY 11763-9245. Write-in entries need not include answers to questions. Please spell your name the same way each time you enter and use the same e-mail address. Sweepstakes begins at 12:01 a.m. (Eastern Standard Time) on 6/1/97. Biweekly electronic entries must be received by midnight EST on Saturdays beginning 6/14/97 and ending 5/30/98. Biweekly mail-in entries must be postmarked by Saturdays beginning 6/14/97 and ending 5/30/98, and received by Thursdays beginning 6/19/97 and ending 6/4/98, for Friday's drawing. Biweekly drawings will be conducted every other Friday (for 26 weeks beginning 6/20/97 and ending 6/5/98) from among all eligible entries received for the biweekly drawing pursuant to the deadlines described herein. Each entry is only eligible for one biweekly drawing. No photocopied or mechanical reproductions permitted. To qualify for the Grand Prize drawing, electronic entries must be received by midnight EST 6/1/98, and mail-in entries must be received by 6/5/98. All eligible biweekly entries will also be entered in the Grand Prize drawing which will take place on or about 6/30/98 from among all eligible entries received. Entrants need not be present to win.

Estimated maximum retail value of prizes: Grand Prize (1) $10,000 (cash alternative: $10,000); Biweekly Prize (26): $200 each. One Biweekly Prize is drawn every two weeks from eligible entries received for that biweekly drawing. Total maximum retail value of all Game Room 2 prizes: $15,200. Odds of winning are determined by the total number of eligible entries received for each drawing. Entry distribution estimated not to exceed 500,000,000.

Prizes fulfilled within 90 days following 6/30/98. No substitutions for prizes except as offered or as may be necessary due to unavailability, in which case a prize of equal or greater value will be awarded. All Game Room 2 prizes are guaranteed to be awarded provided there are sufficient entries. Winners will be determined in random drawings on or before dates specified above, by and at the offices of Ventura Associates, Inc., 1040 Avenue of the Americas, New York, NY 10018.

Open to legal residents of the U.S., living in the U.S., and governed by U.S. law (entrants under 18 years of age should get parent's or legal guardian's permission). No photocopied or mechanically reproduced entries will be accepted. In the case of multiple entries received per day, only the first entry will be accepted—subsequent entries will be disqualified. In the event of a dispute regarding an online entry, the entry will be deemed made by the authorized account holder of the e-mail account at the time of entry and the potential winner may be required to provide proof that he or she is the authorized account holder of the e-mail address associated with the potentially winning entry. Sponsor is not responsible for error, omission, interruption, deletion, defect, delay in operations or transmission, theft or destruction or unauthorized access to or alterations of entry materials, or for technical, network, telephone equipment, electronic, computer, hardware or software malfunctions of any kind, or inaccurate transmissions of or failure to receive entry information by sponsor on account of technical problems or traffic congestion on the Internet or at any Web site or any combination thereof. Sponsor is also not responsible for any injury or damage to entrant's or any other person's computer related to or resulting from playing or downloading any materials in the sweepstakes, or for mail-in entries that are lost, late, misdirected, damaged, incomplete, altered, illegible or postage-due. All entries become property of sponsor and will not be returned. The use of any automated equipment to participate in the Sweepstakes is prohibited. Caution: any attempt by an entrant to deliberately damage any online service or Web site or undermine the legitimate operations of the sweepstakes is a violation of the criminal and civil laws. Should such an attempt be made, the sponsor reserves the right to disqualify such entrant and to seek damages from any such entrant to the fullest extent permitted by law. The sponsor reserves the right to modify or cancel the sweepstakes if it becomes technically corrupted. Entries that have been tampered with or altered are void. Employees of Sweepstakes Administrator, its service vendors, presenting organizations, their advertising agencies and promotional companies involved in this promotion and their families, agents, successors and assignees are ineligible to participate in this promotion and shall not be eligible for any prize covered herein. All federal, state and local laws and regulations apply. Void in Puerto Rico and where prohibited by law.

Any potential winner will be notified by either e-mail, U.S. mail, or Federal Express and will be required to complete and have notarized an affidavit of eligibility and liability/publicity release which must be signed and returned so that it is received within 14 days of date printed on notification before being confirmed as a winner. Failure to comply will result in forfeiture of all rights to prize. If an affidavit, prize notification letter or prize is returned as undeliverable, potential winner will lose all rights to prize. If prize is won by an eligible minor, it will be awarded in name of parent or legal guardian who must sign all required documents. A prize is not transferable or redeemable for cash. All taxes on prize are winner's responsibility. Acceptance of prize constitutes permission (except where prohibited) to use winner's name, I.D., hometown, and likeness for advertising, promotion, publicity or display purposes, including online announcements, without additional compensation. Entrants consent to the use and publication of their name and state online in connection with the Sweepstakes.

This sweepstakes is presented by various participating Web sites and online services. Prizes and prize insurance have been provided by Ventura Associates, the independent judging organization whose decisions are final in all matters relating to this sweepstakes. Ventura is not responsible for any information, content or material displayed on any presenting companies' Web sites or home pages or on any Web sites or home pages through which users may link to the Sweepstakes. Sweepstakes may be presented in different creative presentations by different presenting organizations. Values at a given prize level will be approximately the same.

For a winners list (available in August 1998), send a self-addressed, stamped envelope before 5/30/98 to: Game Room 2 Winners, P.O. Box 9145, Medford, NY 11763-9145. The name of the prize winners may also be displayed online by Ventura on the Internet.

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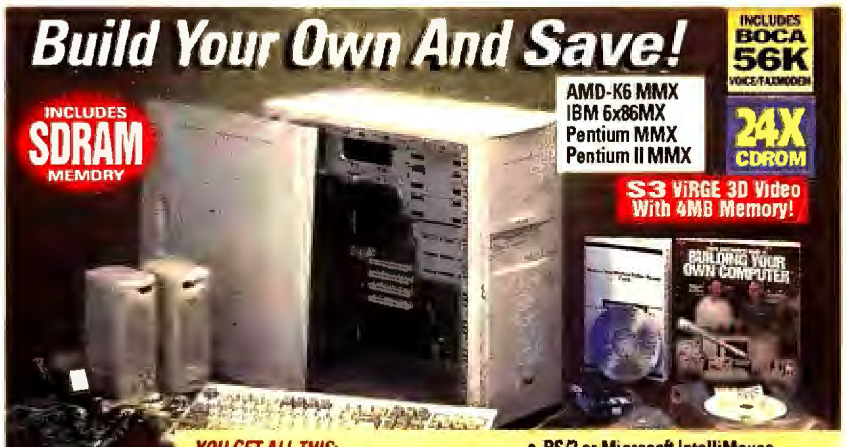
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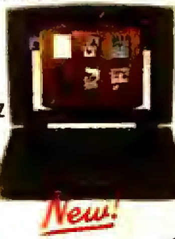

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PCs: Where Quality Is Job 187

IF MY VIRTUAL COMPUTER HALL OF SHAME is any indication, quality is fast becoming little more than a marketing buzzword. Each week the list of offenders keeps growing. Look at just some of what slithered under the door in the course of a typical month:

A computer with a CD-ROM drive that could play music discs but not CD-ROMs. A videophone designed to work with a TV set that couldn't produce a picture except with special cables—and didn't work properly even then. A removable-media drive that couldn't read its own installation cartridge.

But wait! There's more! Speakers that crackled if I bumped the cables. Another speaker set that picked up interference from radio stations. PCs and monitors that lacked power cords. A computer with a built-in DVD-ROM drive that dropped frames from movies and loaded audio with interference. A computer with a CD-ROM drive tucked behind a jazzy bezel that made it almost impossible to work the eject button.

FIXES FIRST, PRODUCT LATER

IN OTHER WORDS, about the only problem I *didn't* run into was a product's catching fire and setting the office ablaze. (Maybe that'll happen next week.) And I haven't even mentioned software, a business where quality is so nonexistent that bug fixes actually arrive before the product (check out the Myst sequel Riven for details). The unhappy conclusion? If the companies that make these products even take the time to itemize their goals ("1. Make an obscene amount of money, 2. Keep the stock price climbing"), product quality must now rank closer to the bottom of the list than it ever has, right behind Job 186: Develop new ways to charge customers for support calls.

> Product quality now ranks behind Job 186: Develop new ways to charge customers for support calls.

What's causing this technoflu epidemic? First, there's the recent rash of price cutting. Shaving the last few cents off the cost of components is bound to affect the way they behave. Cheap CD-ROM drives in some low-end PCs I tried were crying uncle with a marginal disc I use for testing; costlier drives had no trouble with it.

Product turnover is another likely suspect. Nowadays, new models arrive and disappear so fast that before a product's final design can be subjected to careful scrutiny, it's supplanted by the next version. And products often undergo subtle upgrades as problems are discovered. Later editions may be quite different from the originals, but users who sprang for the early versions may never see the needed improvements.

IT'S THE SOFTWARE: STUPID

SOFTWARE IS another culprit. Hardware products like video cards and modems increasingly depend on software drivers, but experience suggests that developers have great trouble getting the drivers right the 1st time, or the 2nd, or the 18th. No matter what you buy, it's a safe bet you will be downloading driver upgrades sooner or later—often sooner *and* later. And the Web's existence has made things worse, not better. Now anyone who makes a product that can be upgraded through software can minimize quality control, proclaim the thing "ready to ship," and post fixes on the Web after users spot the bugs. Having customers do the work themselves costs even less than using third-world labor.

Most depressing, even companies with a reputation for high-quality products seem all too willing to cut corners when it comes to delivering the goods. In the long run, you would expect these compromises to come back to haunt offenders. After getting burned by a product that can't be installed or that breaks down shortly after purchase, how many customers are likely to come back for a second helping? But as long as everybody plays much the same game, consumers have nowhere to turn.

In the short run, how can you protect yourself? First, refuse to waste time on defective goods (beyond ensuring they're actually defective). Get a money-back, no-questions-asked guarantee, buy only products you know you can test immediately, and put them through their paces as soon as possible. If a product has obvious problems, don't waste much effort trying to fix it: Take the thing back for an exchange.

And if the replacement doesn't work either, demand a refund. As far as I'm concerned, you get three strikes only in baseball.

PC World *contributing editor Stephen Manes is a columnist for the* New York Times *and is half of the* Digital Duo, *a new technology program that premiered on public television last fall.* ■

PHOTOGRAPH: ERIK BUTLER

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NEW DELL DIMENSION XPS D333
333MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 128MB SDRAM Memory
- *NEW* 9.1GB Ultra ATA Hard Drive (9.5ms)
- 1200HS 19" Monitor (17.9" v.i.s.)
- *NEW* Diamond 8MB AGP Video Card
- 32X Max^^ Variable CD-ROM Drive
- Sound Blaster AWE64 Value Sound Card
- Altec ACS-495 Full Dolby Surround Sound Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive
- *NEW* Dell Comfort Key Keyboard

$3249

Personal Lease◊°: $157/Mo., 24 Mos.
Order Code #500204

DELL DIMENSION XPS D300
300MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 128MB SDRAM Memory
- 6.4GB Ultra ATA Hard Drive (9.5ms)
- 1000TX 17" Trinitron Monitor (15.9" v.i.s.)
- STB nVidia 4MB AGP Video Card
- DVD-ROM Drive and Decoder Card
- Sound Blaster AWE64 Value Sound Card
- ACS-295 Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive
- Dell Quiet Key Keyboard

★ *Upgrade to an 8.4GB Ultra ATA Hard Drive, add $49.*

$2899

Personal Lease°: $140/Mo., 24 Mos
Order Code #500203

DELL DIMENSION XPS D266
266MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 64MB SDRAM Memory
- 6.4GB Ultra ATA Hard Drive (9.5ms)
- 1000TX 17" Trinitron Monitor (15.9" v.i.s.)
- STB nVidia 4MB AGP Video Card
- 32X Max^^ Variable CD-ROM Drive
- Integrated Yamaha Wavetable Sound
- ACS-295 Speakers with Subwoofer
- Iomega Zip 100MB Internal Drive
- Dell Quiet Key Keyboard

★ *Upgrade to a 1200HS 19" Monitor (17.9" v.i.s.), add $175.*

$2399

Personal Lease°: $117/Mo., 24 Mos.
Order Code #[illegible]

DELL DIMENSION XPS D233
233MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

Common features listed above plus:
- 32MB SDRAM Memory
- 4.3GB Ultra ATA Hard Drive (9.5ms)
- 1000LS 17" Monitor (15.9" v.i.s.)
- STB nVidia 4MB AGP Video Card
- 32X Max^^ Variable CD-ROM Drive
- Integrated Yamaha Wavetable Soun
- Altec Lansing ACS-90 Speakers
- Dell Quiet Key Keyboard

★ *Upgrade to 64MB SDRAM, add $99.*

★ *Upgrade to a 6.4GB Ultra ATA Hard Drive, add $49.*

$1899

Personal Lease°: $93/Mo., 24 Mos.
Order Code #500201

These are just a few of the th

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- xcel 97
- ublisher 97
- utlook 97
- mall Business Financial Mgr. 97

Iicrosoft Home Essentials
includes:

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- ncarta 98 Encyclopedia
- loney 98
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DELL WORKSTATION

NEW DELL WORKSTATION 400
333MHz PENTIUM II PROCESSOR
FEATURING MMX TECHNOLOGY

- 128MB ECC EDO Memory (512MB Max)
- 9.1GB Ultra-Wide SCSI-3 Hard Drive
- *NEW* 1600HS 21" Trinitron Monitor (19.8" v.i.s., .26dp)
- Matrox 8MB WRAM PCI Video Card
- 24X Max§ Variable SCSI CD-ROM
- Integrated 16-bit Sound Blaster Pro Compatible Audio Controller
- Integrated 3Com 3C905 Fast EtherLink XL 10/100 PCI Interface
- Remote Manageability via DMI 2.0
- MS Windows NT® Workstation 4.0
- Microsoft Mouse
- 3 Year Limited Warranty† with 1 Year On-site^ Service

$4999

Business Lease◊: $177/Mo., 36 Mos.
Order Code #990201

DELL POWEREDGE® SERVERS

Common features: ◆ 512KB Integrated L2 ECC Cache ◆ Integrated PCI Ultra-Wide SCSI-3 Controller ◆ Intel Pro/100B PCI Ethernet Adapter ◆ HP OpenView™ NNM Special Edition ◆ 24X Max§ Variable SCSI CD-ROM Drive

DELL POWEREDGE 2200 SERVER
300MHz PENTIUM II PROCESSOR
DUAL PROCESSOR, RAID CAPABLE WORKGROUP SERVER

Common features listed above plus:

- 128MB ECC EDO Memory
- 9GB Ultra-Wide SCSI-3 Hard Drive
- MS Windows NT Server 4.0 (10 Client Access Licenses)
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/ 3 Internal 3.5"
- 3 Year Next-Business-Day On-site^ Service
- 7x24 Dedicated Server Hardware Technical Telephone Support

$4699

Business Lease◊: $166/Mo., 36 Mos.
Order Code #250110

DELL POWEREDGE 2200 SERVER
266MHz PENTIUM II PROCESSOR
DUAL PROCESSOR, RAID CAPABLE WORKGROUP SERVER

Common features listed above plus:

- 64MB ECC EDO Memory
- 4GB Ultra-Wide SCSI-3 Hard Drive
- 6 Expansion Slots: 3 PCI/3 EISA
- 6 Drive Bays: 3 External 5.25"/ 3 Internal 3.5"
- 3 Year Next-Business-Day On-site^ Service
- 7x24 Dedicated Server Hardware Technical Telephone Support
- ★ *12/24GB Variable SCSI DAT Tape Backup Unit, add $849.*

$2899

Business Lease◊: $106/Mo., 36 Mos.
Order Code #250108

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ELL NOTEBOOKS – DELL INSPIRON™ 3000

ommon features: ◆ 512KB L2 Pipeline Burst Cache ◆ Modular Options Bay accepts 20X Max°° Variable CD-ROM, 3.5" Floppy Drive (both included) or Optional 2nd mart Li-Ion Battery ◆ **Stereo Speakers with 3D Surround Sound and Yamaha Software Wavetable** ◆ Smart Lithium Ion Battery ◆ Zoom Video and USB Ports Cardbus Ready/Fast IR1.1 ◆ Touchpad ◆ MS Windows 95 ◆ MS Internet Explorer ◆ Extendable 1 Year Limited Warranty†

EW DELL INSPIRON 3000 M266XT
6MHz PENTIUM PROCESSOR
TH MMX TECHNOLOGY

mmon features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 144MB SDRAM Memory
- GB Ultra ATA Hard Drive
- 128-bit Graphics Accelerator with 5K Colors at 1024x768
- eather Carrying Case
- MS Office 97 Small Business Edition
- .9 Pounds*
- *56K Capable** x2 Modem, add $149.*
- *2nd Smart Li-Ion Battery, add $169.*
- *3Com 10/100 Fast Ethernet Adapter, dd $169.*

3899

siness Lease◊: $138/Mo., 36 Mos.
der Code #890217

NEW DELL INSPIRON 3000 M266XT
266MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 3.2GB ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- MS Office 97 Small Business Edition
- 6.9 Pounds*
- ★ *Upgrade to 80MB SDRAM, add $299.*
- ★ *Upgrade to a 4GB Ultra ATA Hard Drive, add $99.*
- ★ *56K Capable** x2 Modem, add $149.*

$2999

Business Lease◊: $109/Mo., 36 Mos.
Order Code #890207

DELL INSPIRON 3000 M233XT
233MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 13.3" XGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 65K Colors at 1024x768
- MS Office 97 Small Business Edition
- 6 9 Pounds*
- ★ *Upgrade to a 266MHz Pentium Processor with MMX Technology, add $100.*
- ★ *Upgrade to 64MB SDRAM, add $199.*
- ★ *Leather Carrying Case, add $99.*

$2799

Business Lease◊: $102/Mo., 36 Mos.
Order Code #890209

DELL INSPIRON 3000 M200ST
200MHz PENTIUM PROCESSOR
WITH MMX TECHNOLOGY

Common features listed above plus:

- 12.1" SVGA Active Matrix TFT Display
- 32MB SDRAM Memory
- 2.1GB ATA Hard Drive
- 128-bit Graphics Accelerator with 16 Million Colors at 800x600
- MS Office 97 Small Business Edition
- 6.4 Pounds*
- ★ *Upgrade to 48MB SDRAM, add $99.*
- ★ *Upgrade to a 4GB Ultra ATA Hard Drive, add $199.*
- ★ *Upgrade to MS Office 97 Professional, add $215.*

$2399

Business Lease◊: $87/Mo., 36 Mos.
Order Code #890211

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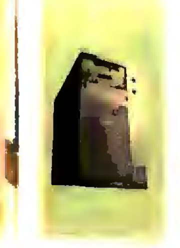

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