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transfer rate may vary from 150 to 600 Kbps; for writing to CD-RW media, the data transfer rate may vary from 150 to 300 Kbps; for reading to CD media, the data transfer rate may vary from 150
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Intel Pentium III Processor, 650 MHz	Intel Pentium III Processor, 600E MHz	Intel Pentium III Processor, 500 MHz	Intel Celeron™ Processor, 500 MHz
128 MB 100 MHz SyncDRAM expandable to 384 MB	128 MB 100 MHz SyncDRAM expandable to 384 MB	128 MB 100 MHz SyncDRAM expandable to 384 MB	128 MB 100 MHz SyncDRAM, 4 MB Shared for Video
13.4 GB (7200 rpm) UltraDMA Hard Drive	13.0 GB UltraDMA Hard Drive	13.0 GB UltraDMA Hard Drive	10.0 GB UltraDMA Hard Drive
10X DVD-ROM Drive	10X DVD-ROM Drive	32X Max CD-ROM Drive	32X Max CD-ROM Drive
Creative Labs 3D Blaster 32 MB TNT-2 Ultra Graphics Accelerator	Voodoo 3 1000 2X AGP Graphics Card with 16 MB	Voodoo 3 1000 2X AGP Graphics Card with 16 MB	2X AGP with 64-bit Hardware Accelerated 3D Graphics
Sound Blaster Live! Value PCI Audio	Sound Blaster Live! Value PCI Audio	ESS Solo PCI Audio	ESS Solo PCI Audio
56K ITU V.90 Modem	56K ITU V.90 Modem	56K ITU V.90 Modem	56K ITU V.90 Modem
JBL Pro Amplified Speakers with Subwoofer	JBL Pro Amplified Speakers	JBL Pro Amplified Speakers	JBL Pro Amplified Speakers
Digital Creativity Imaging Center	Digital Creativity Imaging Center	Digital Creativity Imaging Center	Creativity Action Center
Microsoft Featured Home Collection	100 MB Iomega Zip Built-In™ Drive + 1 disk	Microsoft Featured Home Collection	Microsoft Featured Home Collection
Microsoft Word	Microsoft Featured Home Collection + MS® Word	Microsoft Word	Microsoft Word
Microsoft Windows98	Microsoft Windows98	Microsoft Windows98	Microsoft Windows98
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250 MB Iomega Zip Built-In™ Drive + 1 disk: Add $149	4X CDRW (Read/Writeable) Drive: Add $199	4X CDRW (Read/Writeable) Drive: Add $199	APC Back-UPS Pro Office 280: Add $89
Klipsch v.2-400 Watt Speaker System: Add $175	Klipsch v.2-400 Watt Speaker System: Add $224	Intel Create and Share Camera Pack: Add $99	6.0Mb Max Digital Modem: Add $99

PRESARIO 1800T-PIII 450 INTERNET NOTEBOOK PC	**PRESARIO 1900T- PII 366 INTERNET NOTEBOOK PC**	**PRESARIO 1800T-PIII 450 INTERNET NOTEBOOK PC**	**PRESARIO 1800T-466 INTERNET NOTEBOOK PC**
Intel Mobile Pentium III Processor, 450 MHz	Intel Mobile Pentium II Processor, 366 MHz	Intel Mobile Pentium III Processor, 450 MHz	Mobile Intel Celeron Processor, 466 MHz
15.0" TFT Active Matrix Display	13.3" TFT Active Matrix Display	14.1" TFT Active Matrix Display	14.1" TFT Active Matrix Display
96 MB SyncDRAM	128 MB SyncDRAM	64 MB SyncDRAM	64 MB SyncDRAM
6.4 GB UltraDMA Hard Drive	6.4 GB UltraDMA Hard Drive	6.4 GB UltraDMA Hard Drive	4.8 GB UltraDMA Hard Drive
6X DVD-ROM Drive	6X DVD-ROM Drive	24X Max CD-ROM Drive	24X Max CD-ROM Drive
ATI Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Mobility Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory
56K ITU V.90 Modem (PCI)	56K ITU V.90 Modem (PCI)	56K ITU V.90 Modem (PCI)	56K ITU V.90 Modem (PCI)
Ultra Hi-Capacity LiIon Battery	Ultra Hi-Capacity LiIon Battery	Ultra Hi-Capacity LiIon Battery	Ultra Hi-Capacity LiIon Battery
256 KB Integrated "On-chip" cache	256 KB Integrated "On-chip" cache	256 KB Integrated "On-chip" cache	128 KB Integrated "On-chip" cache
Microsoft Featured Home Collection	Microsoft Featured Home Collection	Microsoft Featured Home Collection	Microsoft Featured Home Collection
Microsoft Windows98	Microsoft Windows98	Microsoft Windows98	Microsoft Windows98
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Diamond Phoneline Network USB: Add $69	Extra AC Adapter: Add $49	Extra AC Adapter: Add $49	6.4 GB UltraDMA Hard Drive: Add $100
Compaq Value Case: Add $39	Extra Ultra Hi-Capacity LiIon Battery: Add $129	6X DVD-ROM Drive: Add $150	6X DVD-ROM Drive: Add $150

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) to 3600 Kbps. An appropriate license may be required. 24X Max CD-ROM data transfer rates may vary from 1500 to 3600 Kbps. 6X DVD-ROM Drive transfer rate is up to 8115 Kbps compared to 1352 Kbps for 1X DVD-ROM Drives.
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- 32X Max CD-ROM Drive[2]
- 2X AGP w/64-bit Hardware Accelerated 3D Graphics
- ESS Solo PCI Audio
- 56K ITU V.90 Modem[3]
- JBL Pro Amplified Speakers
- Creativity Action Center
- Microsoft® Featured Home Collection
- Microsoft Word
- Microsoft Windows®98
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- 24X Max CD-ROM Drive[2]
- ATI Mobility Hardware Accelerated 3D Graphics with 8 MB Video Memory
- 56K ITU V.90 Modem (PCI)[3]
- Ultra Hi-Capacity LiIon Battery
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- Microsoft Windows98

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- Compaq Backpack: Add $69

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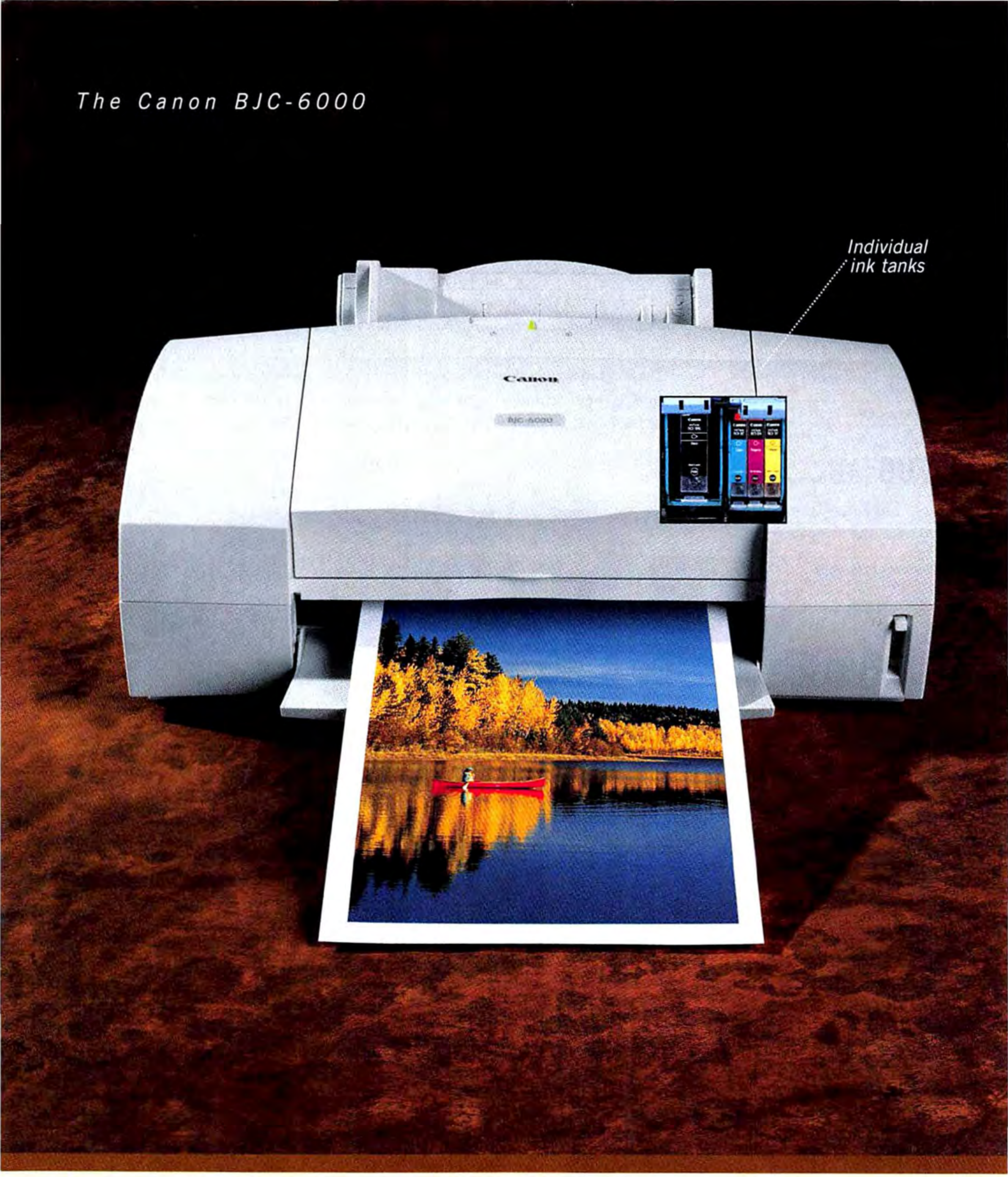
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PC WORLD

DECEMBER

VOLUME 17 ◆ NUMBER 12

COVER STORY

158 **ULTIMATE BUYERS GUIDE: HOME PCs**

REVIEW Glamorous new models ranging from an iMac look-alike to a sleek LCD-equipped unit from NEC may turn your head, but boring-looking beige boxes from Dell and Micron still offer the most computer for your money. Our review helps you find the system you need, whether you're after a PC for the kids or a home-office powerhouse.

181 **ULTIMATE BUYERS GUIDE: COLOR PRINTERS**

REVIEW With the holidays just around the corner, should you add a color ink jet to your wish list? Prices are lower than ever and print quality is soaring. We pick two that will tickle you pink—one for the home, one for small business.

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134 **THE DIGITAL CENTURY**

A LOOK BACK A lot has changed since "portable" computers weighed more than your desk, or even since Pong was fun. As Y2K rears its overhyped head, we remember 100 computing events (crucial, improbable, or downright absurd) that changed our lives, opened our eyes, or made us smile. Next month, we'll gaze into our LCD ball at computing's future.

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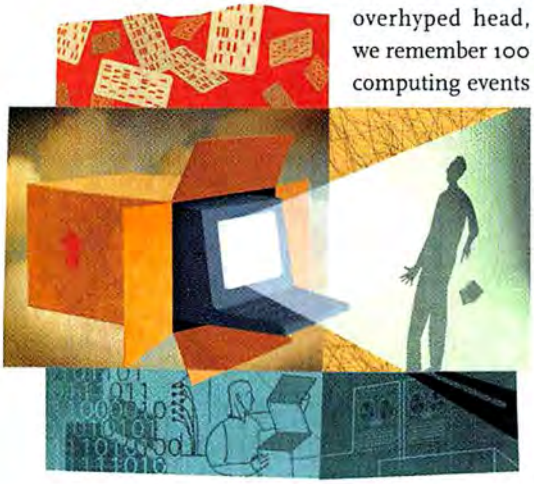
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COVER *Photography by Stan Musilek*

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HOW-TO Overwhelmed by e-mail? Here's how to control your in-box and spiff up your messages in AOL, Eudora, Outlook, Outlook Express, Netscape Messenger, and Hotmail and other Web-based mail services.

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SAVVY SHOPPER

223 **ATTENTION, SHOPPERS!**

Shopping bots promise to gather the best bargains on the Web—but do they really work? We sent out dozens of automated shopping assistants to collect books, toys, clothing, and a camcorder. Find out which bots brought home the bacon.

ICONS: JEFFREY PELO

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Intel and AMD continue their dizzying duel to produce the fastest CPU—and this time, you can feel the performance difference.

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The mobile Pentium III processor brings near-desktop performance to portables.

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Microsoft wants to teach small businesses a thing or two about succeeding online.

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Rent an office suite in cyberspace.

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TOP 100

266 PICK THE PERFECT NOTEBOOK
TOP 100 The new midrange notebooks category expands our portables list to a Top 15. Meanwhile, on the desktop front, AMD's Athlon processor gives computers power—but will vendors give it a chance?

268 POWER PCs
TOP 10 We're seeing double. Two AMD Athlon machines—a new 650-MHz Polywell and a 600-MHz Sys—break the monotony of wall-to-wall Pentium IIIs.

274 MIDRANGE PCs
TOP 10 In a category dominated by Pentium IIIs, Celerons occupy third and fourth place. The only new PC to crack the the Top 10 is a PIII-600–based Micron.

280 BUDGET PCs
TOP 10 Almost half the systems on this month's chart carry three-digit price tags. Among them are a couple of $999 newcomers: the Sys TaskMaster 500 and the Premio Apollo II CS1.

288 NOTEBOOK PCs
TOP 15 The sleek, snappy Gateway Solo 9300LS earns top honors on our power list, while returning contenders from Micron and Toshiba snap up Best Buys in the midrange and budget divisions.

293 SCANNERS
TOP 10 Scanning gets easier this month—most units on the chart have at least one quick-start button for launching their multiple functions.

295 19- AND 21-INCH MONITORS
TOP 10 Nine of the ten best displays are new this month. Our top picks: a 19-inch Samsung and a 21-inch Mitsubishi.

299 GRAPHICS BOARDS
TOP 10 On our AGP list, the affordable new ATI XPert 2000 captures a share of the Best Buy honors.

HERE'S HOW

304 WINDOWS TIPS Use Thumbnail View to see many files at once, make My Documents your own, life after Active Desktop.

308 WINDOWS NT Master NT's command line interface, power-off by shutting down.

310 ANSWER LINE Bypass password requests, share a printer between two PCs.

314 INTERNET TIPS Fight flaky freeze-ups in America Online 4.0, customize the printing of Web pages, ban banner advertisements.

318 WORD PROCESSING Automate often-performed tasks with supermacros, correct your custom dictionaries, control hyphenation.

327 SPREADSHEETS Safeguard your data in Excel 97 and Excel 2000 using built-in protection options; display a permanent count of AutoFiltered rows.

328 HARDWARE TIPS Use Direct Cable Connection or other methods to transfer files to and from your notebook with ease, get your PC to redial your ISP automatically.

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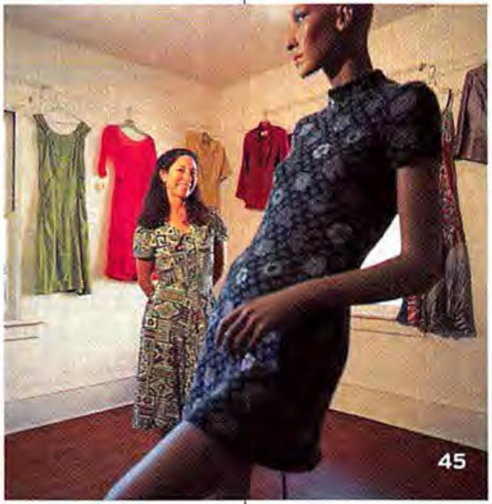

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41 ON YOUR SIDE Free-PC scams, the downside of e-commerce, a clarification on ISP 800 access numbers.

45 GOT A PROBLEM? Dismayed that Windows 98 doesn't include a fax utility? Here are two simple solutions.

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376 FULL DISCLOSURE As the millennium approaches, Stephen Manes reflects on the unforeseen strides computers have made.

PCW ONLINE

CHAT ROOMS FOR GROWN-UPS

HOW-TO Take a guided tour of Internet Relay Chat, the Net's original real-time chat system.
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HP	Kingston	**Crucial**
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Vectra VL Series 8	$214.00	152.99
Apple	Kingston	**Crucial**
iMAC	$214.00	158.39
Power Mac 6500 Series	$222.00	161.99
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Power Mac G3 PC100	$214.00	152.99

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COMING UP

IN JANUARY

THE FUTURE PC

Eye of newt and wool of bat. *PC World* consults industry soothsayers and examines telltale portents. What changes may befall PCs, the Net, our very lives? What shall be the next Microsoft? The next dread virus? Forsooth!

PC RELIABILITY & SERVICE

Which vendors deliver problem-free PCs and dependable tech support, and which sabotage you with component failure and endless hold times? Our readers vote for the best and the worst.

DIGITAL SHOOTING STARS

The contenders in our fourth annual shoot-out are smaller, lighter, and faster on the download. We test 20 digital cameras, from $299 way up to $999.

BACK FROM DISASTER

You know the sound—the cry of the enraged rhino—and it's coming out of you. You've deleted the data, savaged the hard disk—and you haven't backed up. We'll tell you how to recover.

ISPs FOR A SMALL BUSINESS

Ready to launch a Web site and open the doors of a virtual showroom? We survey 5000 small businesses about their Internet service providers and tell you how to choose and use a service.

ALSO NEXT MONTH

- **The PC World Top 100:** The best Power, Midrange, and Budget Desktops; Notebooks; Printers; Monitors; Graphics Boards; and Scanners.
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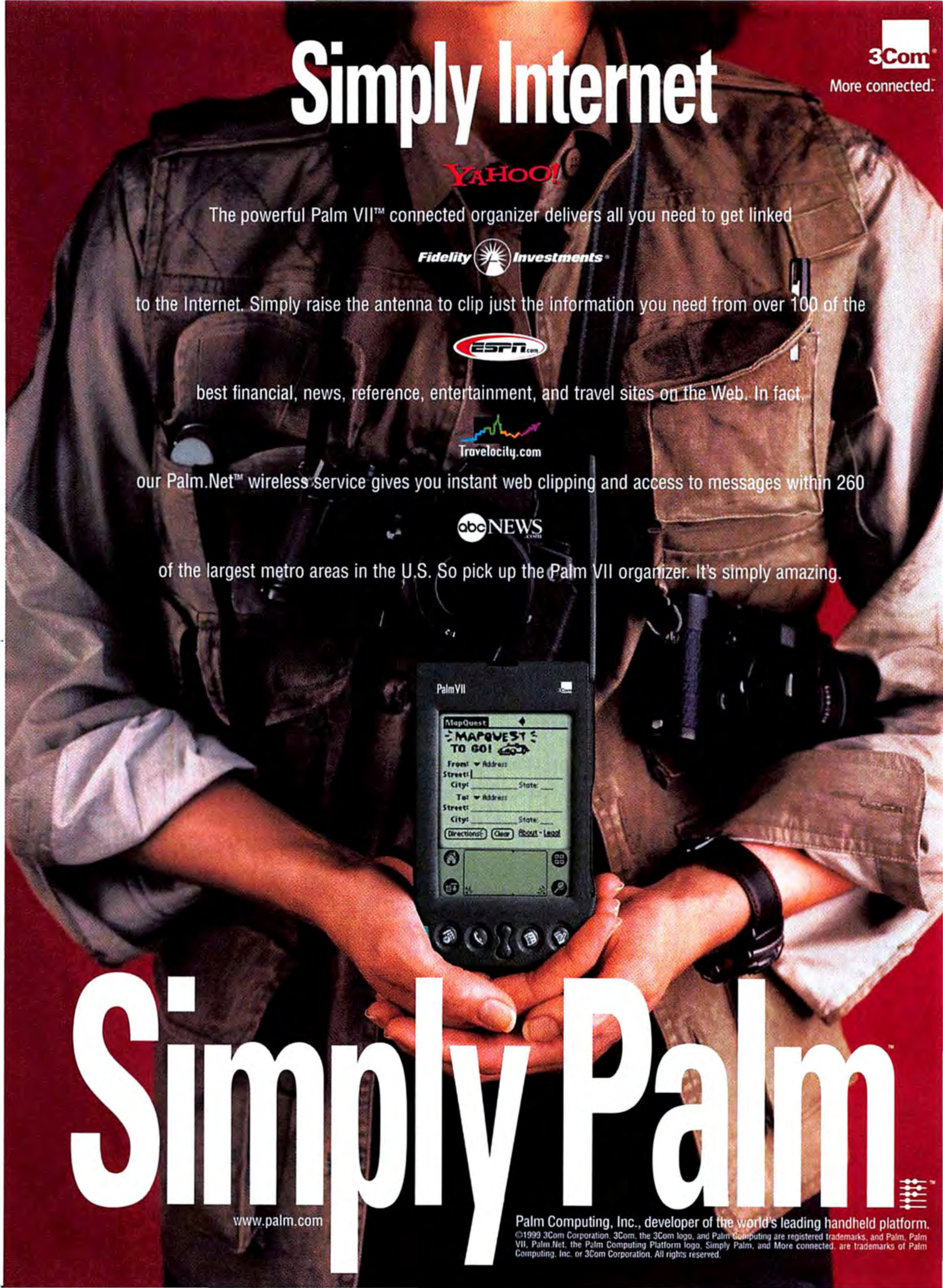
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E-Shoppers of the World, Unite!

FOR MILLIONS OF CONSUMERS, technology has wrought profound changes in that great American pastime: shopping. Forget the mad rush to the mall, trash that stack of catalogs. Instead, fire up the modem, load up the shopping cart with a few clicks of the mouse, and—voilà! The packages arrive on your doorstep a few days later. At its best, online shopping can't get much easier.

By year's end, some 17 million households will be shopping online, up from 10 million a year ago. During this holiday season, consumers will log on to the Web in record numbers, racking up over $6 billion in online purchases—more than double what they spent last year at this time. Consumer expectations are high, with Web-savvy shoppers looking for easy-to-navigate sites, secure credit card transactions, efficient customer service, and fast site performance. But at the same time, recent surveys show, consumer satisfaction is sinking, with fewer online shoppers as satisfied with Web shopping as they were a year ago.

With **record** Web **sales** expected this **season,** the potential for **unhappy holidays** is staggering.

The statistics are hardly surprising. Think about the bungled orders that plagued all too many shoppers during last year's holiday frenzy. Many saw Web shopping at its worst, as retailers failed to maintain overloaded servers, fill orders on time, or deliver minimal customer service. With twice as many sales expected this season, the potential for unhappy holidays assumes staggering proportions.

RULES FOR RETAILERS

WITH BILLIONS OF dollars in Web sales dancing like visions of sugarplums, more than 300 online business, government, and community leaders banded together earlier this year to devise a set of e-commerce guidelines. The goal: to increase consumer satisfaction and trust and, of course, boost profits for merchants.

Due to be released in December, the Standard for Internet Commerce aims to codify the best e-commerce practices. Merchants will be able to use this code as a specification for conducting business online, while consumers can be assured of Web retailers' reputability. Pay attention—now's your window of opportunity to have a voice in shaping this document.

The proposed guidelines address more than 60 policies and practices. Their broad range of focus includes the following categories:

Basic merchant and product information

- A central information center, easily accessible throughout a site, listing a physical address and contact information
- Specifics about product availability, including estimated shipping date and notification about back orders
- Clear itemization of charges, including estimated shipping and handling fees
- Info on product warranties, support, and service, including a description of coverage, whom to contact, and duration of support or warranty
- Clear disclosure of a site's policy on accepting payment from an advertiser or sponsor for content not easily identified as advertising

Measures to ensure privacy and security

- Disclosure of what customer data the site gathers, how it uses that data, and if and how customers can limit the use of that data
- Encryption throughout the buying process, along with encryption of customer data

Order handling and status

- Notification that a customer order has been received, along with shipping information and the merchant's credit-card charging policy
- Access to information on the status of an order
- Specifics about cancellation, return, and refund policies
- A mechanism for submitting feedback, complaints, and questions
- Response to complaints or questions within a specified time

YOUR CHANCE TO WEIGH IN

FOUNDING MEMBERS WHO ARE involved in developing the Standard for Internet Commerce are currently voting on the second draft. The final version of the guidelines will include all practices and policies approved by at least 60 percent of voting members.

The hitch? More than 70 percent of those voting represent e-commerce merchants. With Web businesses making up the largest voting bloc, it's hardly a stretch to imagine that when the final votes are tallied, profits will outweigh consumer interest.

If you're among the 17 million households expected to shop on the Web this holiday season, we urge you to let founding members know your preferences and vote on the proposed guidelines. Voting on the second draft takes place from mid-October until November 22—simply log on to www.commercestandard.com and cast your vote *before* you shop.

Cathryn Baskin is editorial director of PC World. ■

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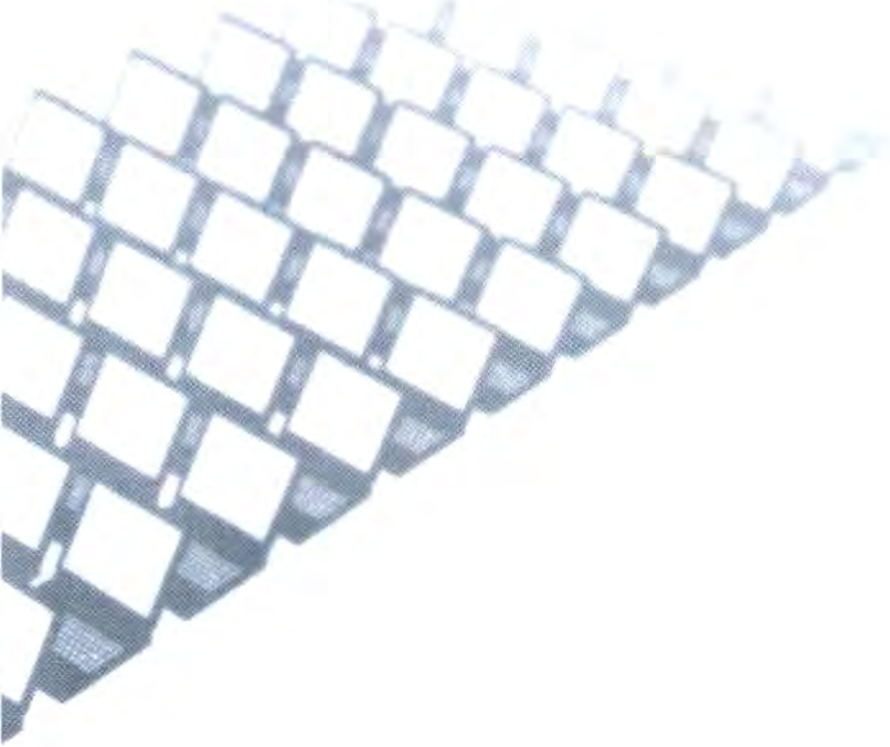

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YOUR TAKE ON: The AOL-Microsoft slugfest ◆ Operating systems ◆ Backing up

IS AOL BECOMING ANOTHER MICROSOFT?

YOUR EDITORIAL on the Instant Messenger battle [*Up Front*, October] was concise and even-handed, but it missed the delicious irony of Microsoft—king of do-it-my-way proprietary software and operating systems—whining about AOL "preventing people with different...systems from communicating with each other."

Microsoft's mental operating system won't let the company do the obvious: Buy into the licensing until a standard, open system is developed. So, big, brawny Microsoft is trying to hack its way into AOL's servers? It's downright hilarious, and I wish you'd do your part to make sure Redmond hears all of us laughing.

Milo D. Folley, Nicholasville, Kentucky

I'M ON THE SIDE of Microsoft and all of us. AOL is quickly turning into the "diva" of online services. It's become pushy, demanding, and arrogant. What's so wrong with other services coming up with their own version of Instant Messenger and linking them?

I know that there are still battles ahead for AOL and Microsoft, and I hope we, the customers, are not caught in the middle. But it would be wonderful if all customers were able, in some way, to IM each other. I have so many friends on my Buddy List, it's frustrating when I can't IM them. So, fight on Microsoft! I'm in your corner—with the stool, the towel, the bandages, and the smelling salts!

Duane D. Brodnick
Jersey City, New Jersey

IT'S SCARY that AOL might gain a Microsoft-like monopoly on Internet software. Its acquisition of Netscape and ICQ points to this possibility.

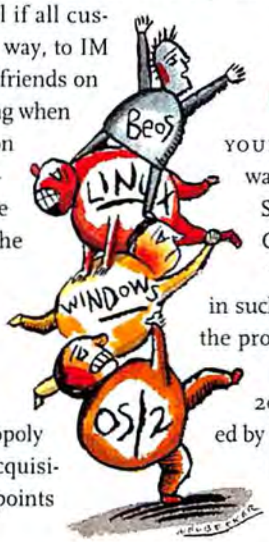

ILLUSTRATION: ROBERT NEUBECKER

AOL is one company that would truly love to take control of the Internet and plaster an ad on everything. Like Steve Case says, "We took a look at the Internet and said, 'What a wonderful opportunity.'" If AOL succeeds, Internet users everywhere will be the losers.

Jeff Wilder, Sunrise, Florida

Y2K CHAOS? INTELLIQUIS RESPONDS

YOUR RECENT article on Y2K software tools disappoints me ["Get Smart! Control Your Y2K Chaos," September].

You slammed IntelliFix 2000 in such a way that I suspect most of the products you looked at were not thoroughly tested. IntelliFix 2000 has been completely tested by KeyLabs and certified to fix the files it finds. Your reviewer's statement that our fix didn't remedy anything is com- ▶

HOT BUTTON

Windows vs. BeOS vs. OS/2 vs. Linux vs....

SEEING A MAINSTREAM magazine cover alternative operating systems in such depth ["Windows vs. Windows vs. the World," October] is great! However, contrary to your statement, BeOS does have a full-featured office suite. In fact, it has two: AbiSource is an open-source suite originally written for Linux that also runs on BeOS. Gobe Productive is a fast, full-featured Be-native suite with advanced features. It will soon be able to import Word and Excel files.

Adam Milner, Socorro, New Mexico

Author's response: Neither Gobe Productive nor AbiSource is a full-blown suite à la Microsoft Office, SmartSuite, or WordPerfect Office. Gobe is an integrated package akin to Microsoft Works; AbiSource—currently available just in "experimental" form for BeOS—is a word processor only. —Harry McCracken

BeOS BLEW ME AWAY! I defy *any* other operating system to outperform it. I don't think your article clearly covered just how difficult Linux is to install and update. I spent two weeks trying to install and run one Linux clone. BeOS *does* prefer higher-end hardware, but that is being changed. Also, BeOS runs fine on just 200MB of disk space. If people try it, the vendors will come.

Paul D. Yost
Prospect, Pennsylvania

YOU CORRECTLY report that IBM is more than a bit shy about OS/2. Nonetheless, nearly every Fortune 500 company has OS/2 running somewhere.

You state that Warp 4.0 hasn't been upgraded in years, but you must never have visited IBM's OS/2 sites and seen the array of FixPacks for Warp 4.0 and even Warp 3.0.

IBM recently reported that so far it has sold 34 percent more copies of OS/2 than it projected for this year. Apparently, we OS/2 users are alive and well.

Nicholas Avery
Irvine, California

YOU NEGLECTED to mention VMWare (www.vmware.com), which allows you to run a Win 95/98/NT virtual machine *inside* Linux. This tactic basically crashproofs Windows *and* lets you run Linux apps right alongside them—ideal for someone who already has Windows but wants to eventually move to Linux to achieve a more stable system.

Bernard Mikowski
Traverse City, Michigan

LINUX HAS MORE software than any other OS. Among ICQ chat programs, for example, Windows users have only a few choices: the standard ICQ, JavaICQ, and maybe one or two Visual Basic clones. Linux has about 12 different versions, plus JavaICQ, plus the ability to run all the Windows and Mac versions through emulation. And about 90 percent of all Linux software is free. Not shareware, not Microsoft crashware, *free*.

Jim Kehoe
Hanover Park, Illinois

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pletely false. You also downplay the importance of our hardware test, and claim that we are trying to sell an unnecessary fix. It must be because both Norton and GMT don't offer—nor do they have the technology to build—an ISA card solution. The reviewer also failed to mention that IntelliFix repairs Y2K hardware problems without installing a TSR [Terminate and Stay Resident program]. TSRs are dangerous memory hogs, can accidentally be removed, and are at best temporary fixes.

Most of the programs you evaluated offer information at best, and can't be called Y2K solutions. Solutions fix problems; they do not review or explain issues. IntelliFix 2000 is recommended as a solution by many organizations, including EDS, America Online, and Microsoft; the U.S., Canadian, British, Japanese, and Kingdom of Saudi Arabia governments; and many others.

It amazes me that you review Y2K products that give only advice and not products that fix the problem. They are out there; they just can't afford your ad costs.

Mark Tippets
VP of Sales and Marketing, Intelliquis

Author's response: Intelliquis paid for KeyLabs' tests, which were conducted in the summer of 1998. These tests were limited to issues involving hardware and Windows 95's DOS module. There was no testing of applications or data files (unless you consider autoexec.bat to be a data file). By contrast, I tested IntelliFix on a computer with a large number of Y2K software and data problems, ranging from recent popular software with minor issues, to old DOS programs that were in no way compliant, to badly entered data. All are common problems on Windows-based desktop systems. IntelliFix didn't find a single one. I agree with Mr. Tippets about TSRs, but I did not find any TSR solutions in the programs I reviewed. -**Lincoln Spector**

OSHA ERGONOMICS

REGARDING YOUR article "OSHA Seeks Cure for PC Pain" [*Top of the News*, October]: Every business owner, large and small, should closely watch OSHA's oversight of ergonomics. As a practicing dentist, I have lived through OSHA's ▶

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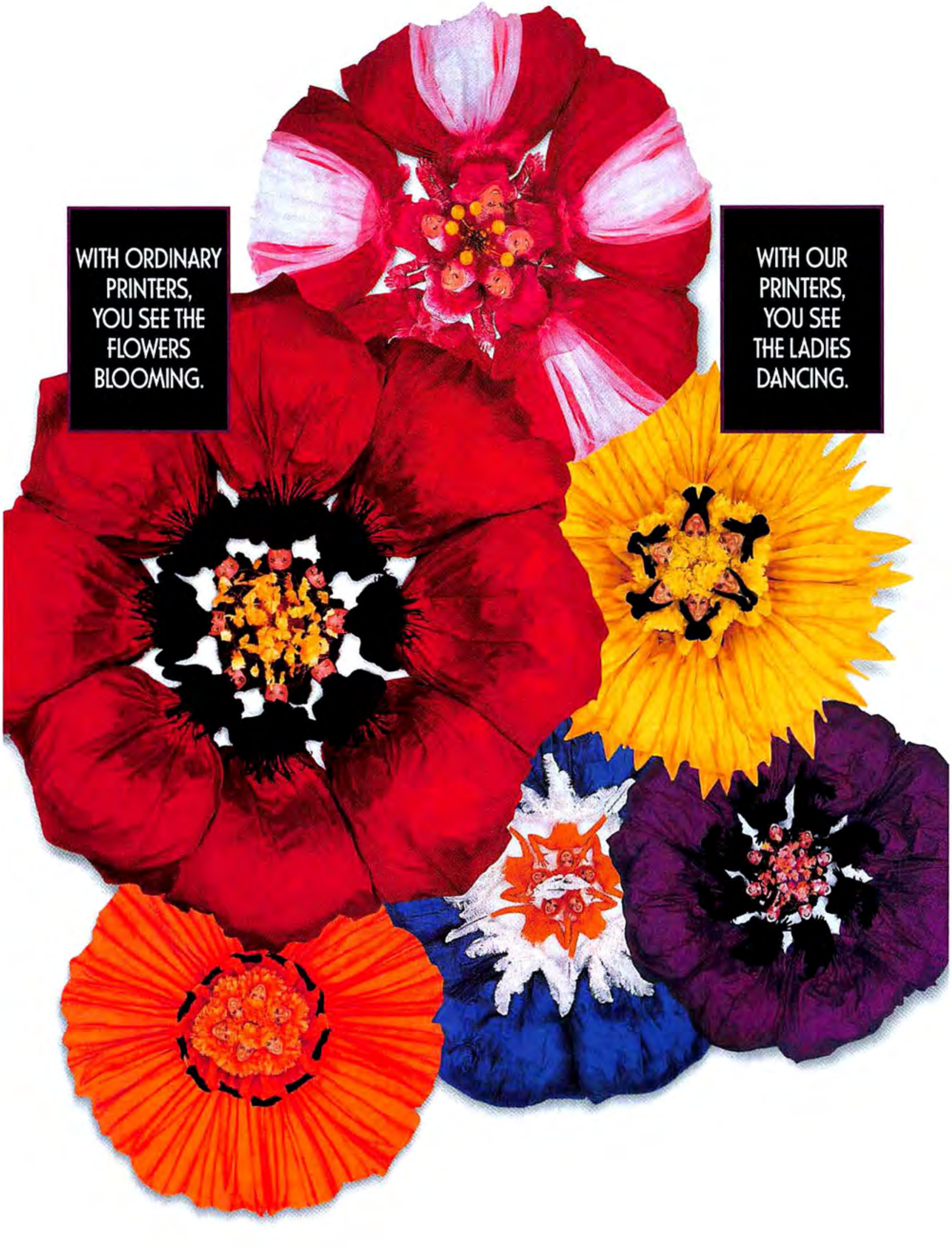
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micromanagement of my profession and have had to deal with paperwork jungles much more suited to a large industrial facility than my two-chair practice.

As quoted by you, Neal Taslitz [of the National RSI Association] is dead wrong in his comments about those of us who would keep a tight rein on OSHA. We are *not* "the same groups that lobbied against seat belts." We are people who have been burned by expensive, inaccurate, and, frankly, dishonest government regulations in the past, and have no desire to deal with such strictures in the future.

Robert K. Thompson Jr., D.M.D.
Cohasset, Massachusetts

BACKING UP BACKUPS

THERE IS ABSOLUTELY no such thing as a "hassle-free" backup ["The Easy Way to Hassle-Free Backups," October's *Got a Problem?*]. I speak from experience when I say that mirroring your drives is not hassle-free. Recently our main server crashed over the weekend. The cause: Both of the drives mirroring each other fried. After successfully replacing them with two spare drives from another server and restoring the data from tape backup, I was able to get our network up and running. Mirroring is a good tool, but it is not enough. Any company that does not do regular tape backups each night is plain irresponsible and deserves what it gets. It takes only a few seconds to pop a tape into a drive each morning.

Robert Pounders, via the Internet

PC World *welcomes your letters. Send e-mail to letters@pcworld.com.* ■

CORRECTIONS AND CLARIFICATIONS

IN OCTOBER'S "Living Without Windows" (pages 128 and 129), we should have stated that users of the StarOffice suite *can* drag and drop text.

The MaxTech XPV56P NetPacer V.90 Internal PCI Data/Voice/Fax Modem (*Top 10 Modems,* October) does not come with a speakerphone.

September's *Consumer Watch* should have said that Senator Frank Murkowski represents Alaska.

***PC World* regrets the errors.**

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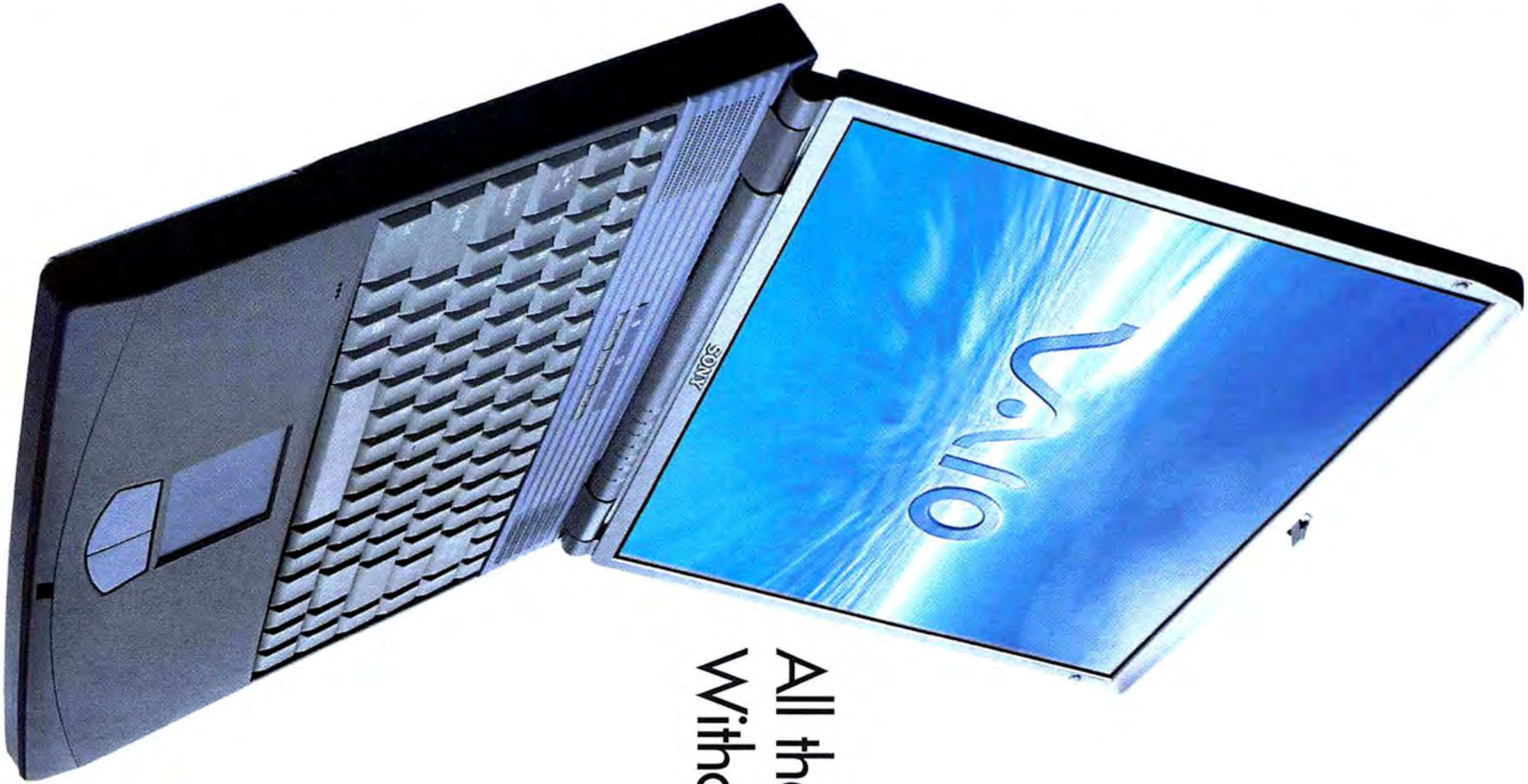

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- Mindspring Internet Service[6]
- Netscape® Communicator
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- Sony BatteryScope
- Sony PowerPanel
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- Sony PPK Setup
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- Adobe PhotoDeluxe® Business Edition
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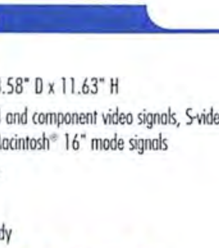

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Saints and Sinners: The Year in Review

As the millennium draws to a close, who is looking out for consumers? And who is ignoring them?

ILLUSTRATIONS: PAMELA HOBBS

SAINT OR SINNER? Sometimes the distinction isn't so clear. One day a company can be riding high, basking in the glow of favorable press, satisfied customers, and steady revenues. The next day, its reps are working overtime, fielding angry phone calls and issuing refunds. Bad news travels awfully fast in the Internet Age.

Just ask Microworkz or Intel or InfoNet, three firms that share the dubious distinction of being named to Consumer Watch's 1999 sinners list. Though the reasons for their fall from grace vary, each of these companies (along with the other 1999 sinners) were guilty of one common mistake: They neglected their customers.

And how do the saints (few though they be this year) earn their lofty title? In a word—service. Service to customers, to fellow consumers, to the community of Net users.

It should come as no surprise that Web-related companies and organizations dominate this year's listing. As e-commerce and e-mail–based communication figure increasingly in our lives, the Internet has become the source of both opportunities and potential dangers for consumers. With few exceptions, this year's saints and sinners earn their title for policies, practices, or activities in the online world.

Read on, and then vote for your own saints and sinners at www.pcworld.com/dec99/consumer_watch.

Better Business Bureau Online. This is the BBB's second consecutive year on the saints' list. The reason: its ongoing commitment to safe, responsible e-commerce. Two years after introducing its Online Reliability program, BBB Online took another step and went live last year with its Online Privacy Seal, aimed at providing Web-based businesses with guidelines for responsible collection, storage, and distribution of personal information. Other groups have attempted similar programs, but none carry the clout of the BBB. Consumers who visit a site carrying the seal can rest assured that their personal information will be kept confidential. The BBB has also devised a version of the seal geared specifically for Web sites for children. Good work!

The Cable Industry and AT&T. In the race for high-speed Internet access, cable companies are no friends to consumers—or to competition. Rather than rushing to deliver cheap, fast access to the masses and building a following that way, cable companies are scrambling to retain control over cable lines. Several leading Internet service providers have been urging the Federal Communications Commission to open up access to cable lines, much as was done with phone lines some 30 years ago. Failure to do so, they argue, limits consumers' choices to one company.

Geocities Homesteaders. When Yahoo bought Geocities last summer, it attempted to introduce draconian changes to the Terms of Service agreement for the many thousands of individuals hosting Web sites on the free service. Under the changes, Web site publishers would have been required to grant Yahoo a "royalty-free, perpetual, ▶

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irrevocable, non-exclusive and fully sublicensable right and license to use, reproduce, modify, adapt, publish, translate, create derivative works from, distribute, perform and display such content." In other words, Yahoo wanted rights to publishers' content.

But Geocities members weren't going for it. Practically overnight they launched a very public and very effective Yahoo boycott, demanding that the portal company reconsider the proposed changes. Their cause was helped in no small part by Yahoo-Geocities competitors, which used the blunder as an opportunity to lure away once-loyal members to their Web hosting services. In a little over a week after launching its new site and instituting the new Terms of Service, Yahoo-Geocities rewrote the TOS to address all the homesteaders' demands.

Privacy advocates liken Intel's Processor Serial Number to a "super cookie" that can track consumers' every move online.

IBM. This is Big Blue's first appearance on the list. It earns the distinction for assuming leadership in the area of responsible electronic commerce. As a member of the Online Privacy Alliance, Big Blue has advocated clear, concise, consumer-friendly privacy policies. Last year it took the bold (if largely symbolic) step of refusing to advertise with any site that did not have a posted privacy policy.

InfoNet. InfoNet's professional-looking Web site (complete with a phony *PC World* Best Buy logo), cross-country dial-ups, and low-cost Internet access caught the attention of unsuspecting consumers throughout the country. But the company appears to have been playing a high-tech version of an all-too familiar con game. Consumers reported to *PC World* that they signed up and paid for the service, only to quickly find their Internet connection cut off—and the company at One InfoNet Way (a nonexistent address) was nowhere to be found. InfoNet and its owners are under investigation by the U.S. Postal Inspector's Office in Charlotte, North Carolina. During its own independent inquiry, *PC World* identified two other ISPs with links to InfoNet: the now defunct Western North Carolina Internet, and InTech, based in Frisco, Colorado (see "Web Scam! How One ISP Took the Money and Ran," *Top of the News*, June, www.pcworld.com/jun99/webscam).

Intel. When Intel's Pentium III processor debuted last January, it met with more than the usual round of challenges from competing CPUs. Why the public outcry? Chalk the noise up to the chip's unique Processor Serial Number. Likening the PSN to a "super cookie" that Web masters can use to track consumers' every move online, privacy advocates called upon Intel to disable the feature. Intel refused, claiming the PSN would make e-commerce more secure by enabling Web sites to authenticate consumers' identity. To lessen objections, the company announced it would instead provide a utility to let consumers turn off the ID number and offered to work with Web sites to promote "responsible uses of the new feature." Critics say Intel didn't go far enough to protect consumer privacy. I agree.

Microworkz. When I put out the call to my *PC World* colleagues for saints and sinners nominations, this maker of low-cost PCs was the hands-down winner in the sinner category. The Lynwood, Washington, company was the object of much fanfare when it began taking orders for its ultracheap Webzter computer last spring. Even before the product's official launch, the company had received more than 400,000 orders for the $299 PC, but then it struggled for months to ship units. Along the way, company founder and CEO Rick Latman stepped down to let "more seasoned management" take the helm; the company was sued by (and then countersued) former partner EarthLink; and the Better Business Bureau rated the PC maker as "unsatisfactory." After months of bad press and complaints from angry customers, Microworkz announced it was discontinuing the Webzter. At this writing, the Federal Trade Commission is investigating Microworkz to determine whether the company shipped orders and paid refunds in a timely manner.

Spam Fighters Everywhere. In the seemingly never-ending war against spam, some groups deserve special praise: It's hard to think of a single organization that has done more to draw consumer, media, and political attention to spam than the Coalition Against Unsolicited Commercial E-Mail. CAUCE has been particularly active on the legislative front, working tirelessly to promote responsible, effective legislative solutions to spam. At this writing, the CAUCE-supported Can Spam Act, sponsored by Representative Gary Miller (R-Calif.), is the most promising federal bill. Kudos also go to Brightmail, developer of a unique—and singularly effective—spam-fighting technology (which is now available to consumers directly at www.brightmail.com), and to opt-in e-mail marketing companies like Choose Your Mail and Postmaster Direct that take a responsible approach to e-mail marketing and avoid unsolicited spamming.

SWAN SONG

FINALLY, A PERSONAL NOTE: After a run of nearly ten years and more than 100 issues, this is my last *Consumer Watch* column for *PC World*. Over the years—and with considerable help and encouragement from readers willing to share stories and advice—I've tackled topics ranging from mail-order rip-off artists and rebate scams to the reliability and service of hardware and software companies.

It's been fun, challenging, and one of the best jobs a writer could hope to have. Increasingly, though, my interests have moved to the impact of technology on children. I have decided to focus my attention on this important area, leaving *Consumer Watch* with Christina Wood, who currently writes the *On Your Side* column.

Contributing Editor Roberta Furger is the author of Does Jane Compute? Preserving Our Daughters' Place in the Cyber Revolution *(Warner Books, 1998).* ■

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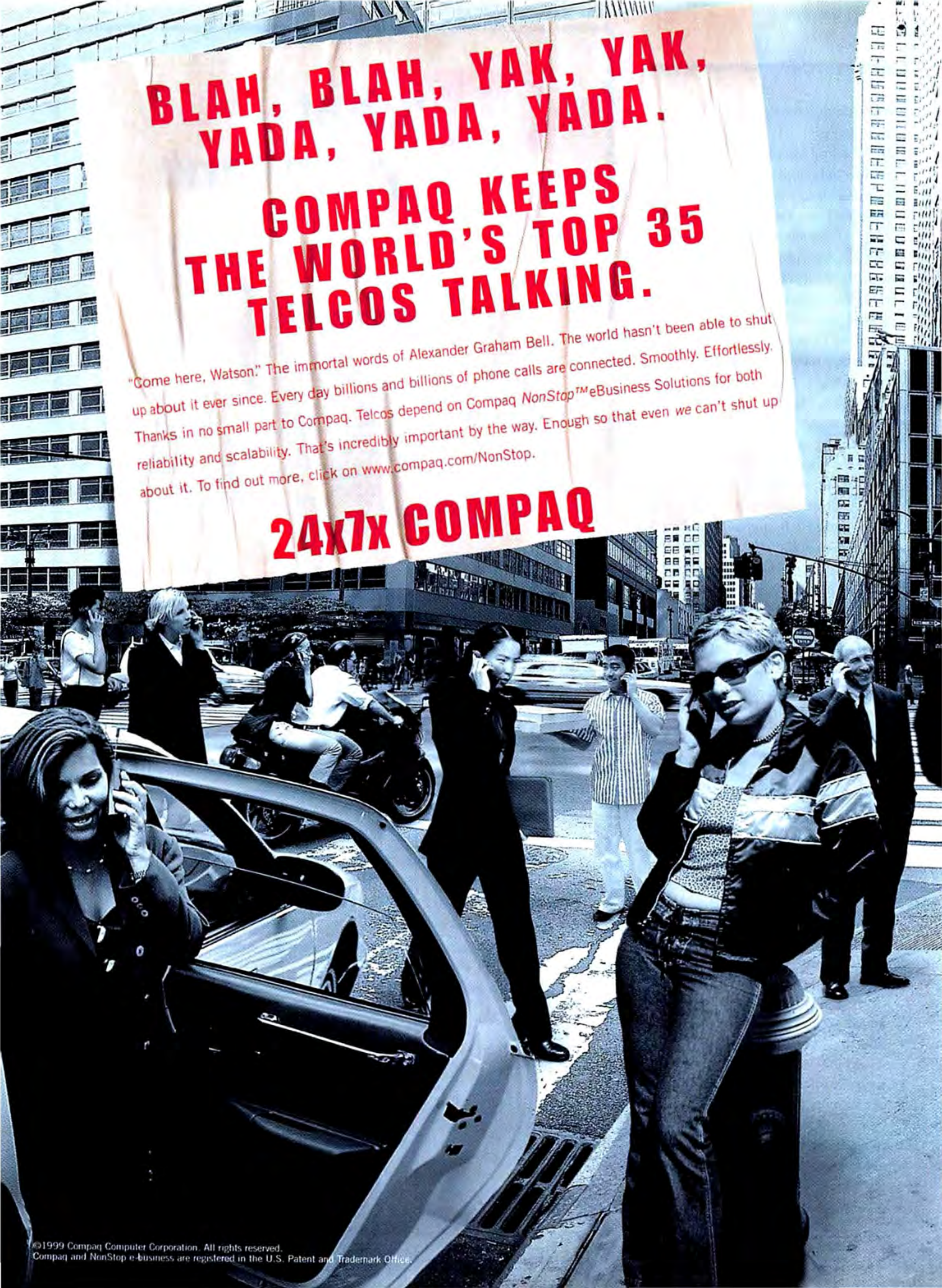

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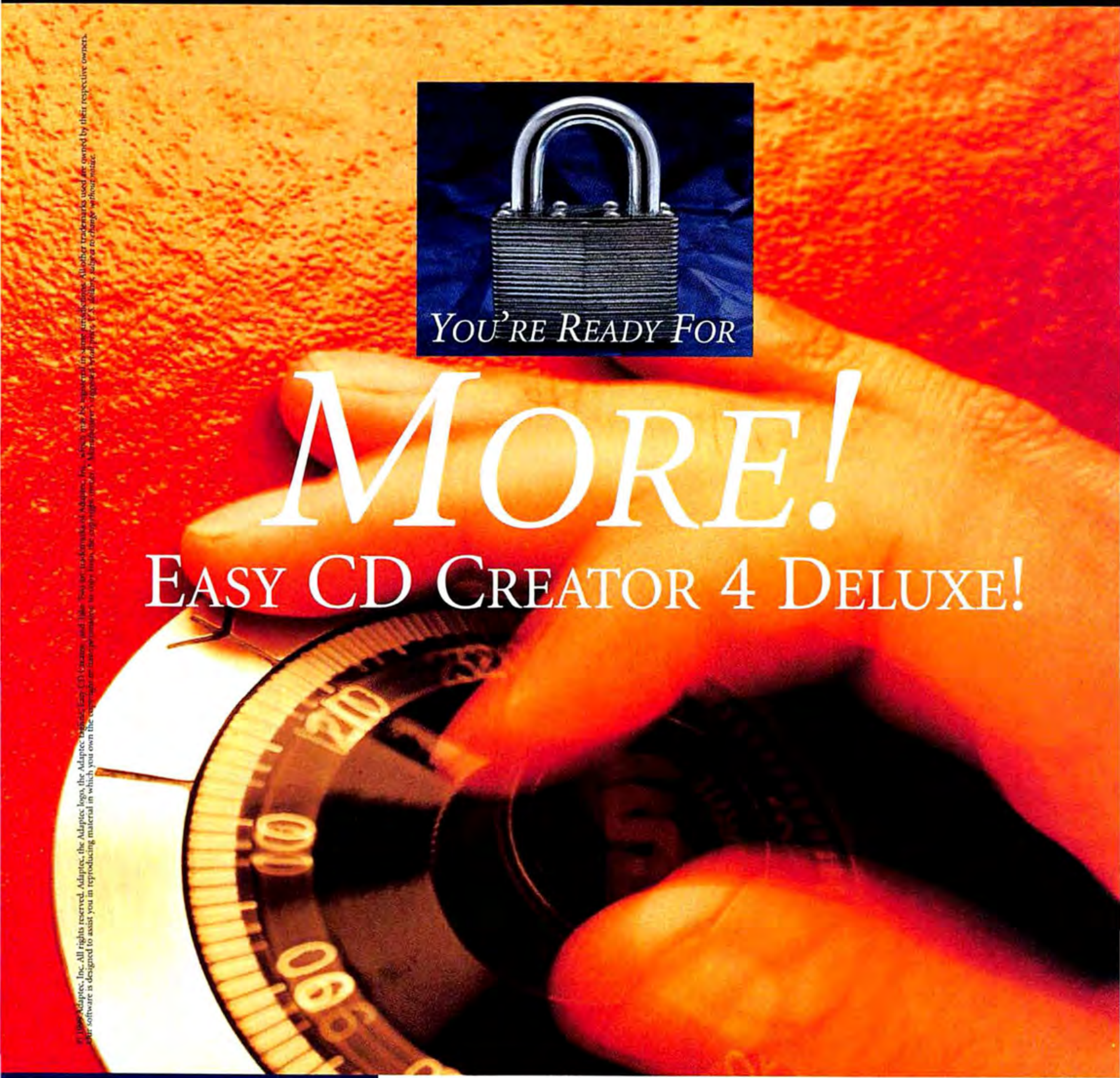

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Get Your Charges Off My Card

JIMMY BOY DIAL of Chesapeake, Virginia, writes describing a problem that I've been hearing a lot lately. He ordered a DVD movie for $14 from a Web site he wasn't familiar with. The risk was low, because the price was low, so he gave it a try. Dial received his shipment, and at first all seemed well. But the next month a charge for $114 appeared on his credit card statement from that Web site, Moviesaver.com. When he tried to contact the company, he noticed that the site was gone.

He'll never know if the charge was an accident or a shrewd mugging, but Dial did the right thing: He immediately contacted his credit card company and disputed the bill.

According to Susan Grant, director of the Internet Fraud Watch (www.fraud.com), "We did a survey on consumers' experiences in e-commerce, and one of the problems people encounter is getting charged [for things] they never authorized or getting overcharged on their credit card bills."

Grant advises Net shoppers to review their statements carefully. If two people use one account, both should study the statement as soon as it arrives. "Fortunately, federal law protects you from responsibility for unauthorized charges," she says. "If you notify your credit card company right away of unauthorized charges, it's unlikely that you'll have to pay them." But it's still up to you to police your statement in a timely fashion. Find details about the law in the Consumer Resource Handbook, available at www.pueblo.gsa.gov.

ILLUSTRATION: HAL MAYFORTH; ICONS: JEFFREY PELO

Heads Up...

F.Y.I
7 3/16 X
PRWB 34 7/8 CPU

NOT FREE, NOT A PC: You see some fantastic deals out there for so-called free PCs. While few are truly free (you usually have to sign up for Internet service), others are outright scams. The Better Business Bureau (www.bbb.org) has issued an alert about one "research firm," for example, that offered free PCs for a $20 enrollment fee. Yep, you got it. You send the money; the company runs with it... **Expensive 800 numbers:** One reader writes complaining that his ISP "robbed" him when he logged on using its 800 access number. He assumed that because it was an 800 number, access was free. But that is rarely—if ever—the case. Typically, 800 access numbers are offered as a convenience for travelers; when you log on from home, however, it's actually expensive. Though you don't pay a toll, your ISP will usually charge you $5 to $6 an hour for access... **Hercules Computer Technology**, maker of graphics cards, filed for voluntary Chapter 7 bankruptcy in Oakland, California, in August. Even so, the company's Web site still appears to be up and selling, and the phones are working.

LETTER OF THE MONTH

I TOO MADE THE Microworkz faux pax. Lured by the opportunity to replace my wife's ancient 386 desktop clone, I jumped at the chance to purchase a Pentium-based minitower for less than $300. I ordered the Webzter Jr. First, like thousands of others, I discovered when I called Microworkz in late April that the order I placed in March had been "misplaced." When I received the system in May, it was useless due to a range of problems, including an inoperable keyboard, an inability to connect to the Internet via EarthLink [an Internet service provider], and a broken CD-ROM drive. After undertaking many attempts over the course of several months to fix the system's problems, I still can't get the machine to work. Can you help me get one that does?

—*L. Duff, Medford, Oregon*

***On Your Side* responds:** I forwarded Duff's letter to Microworkz along with many others I received. The company has been hit hard by bad press, Federal Trade Commission investigations, management reorganization, and other complications. But Michel Smith, director of sales and operations, responded with an offer to upgrade Duff's computer with the newest version of the Microworkz ZPC. He added, "Mr. Duff—as well as other Webzter owners who could not connect with EarthLink's ISP service or were charged for their 'free' service, unbeknownst to them—will be given free Internet service from Microworkz.com when our service is launched by mid-November." At press time, Duff hadn't yet received his new machine or Microworkz's free Internet service, but he was happy with the company's offer to replace his broken system. ■

GOTTEN A RAW DEAL?

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

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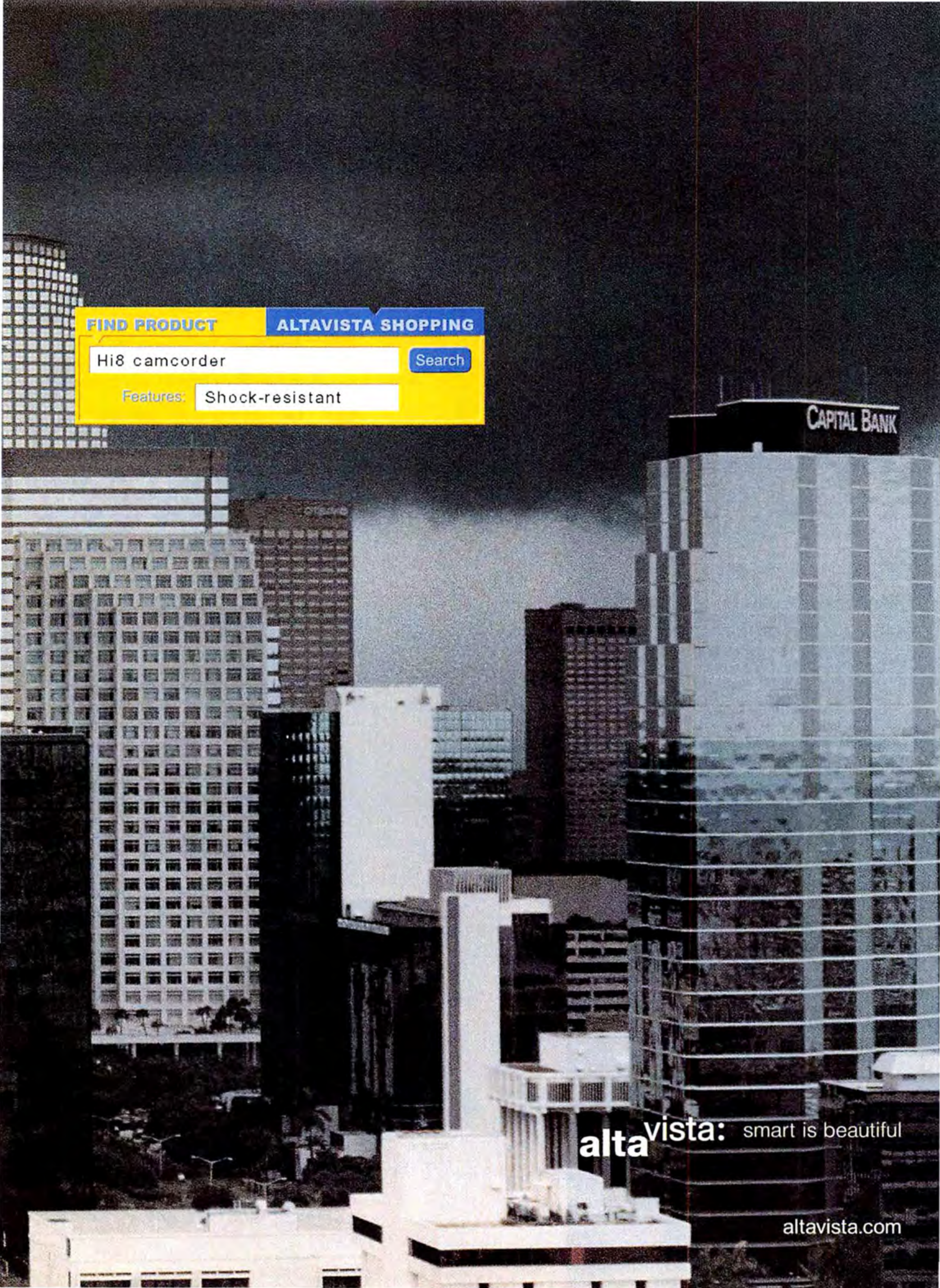
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The Lost Art of PC-Based Faxing

PROBLEM *You want to use your PC to send and receive faxes, but Windows 98 lacks a fax utility.*

SOLUTION *Install the Windows 95 fax applet from the Windows 98 CD, or try a Web-based fax service.*

PHOTOGRAPH: ROBBIE MCCLARAN

BUYING A NEW SYSTEM WAS hardly an impulsive act for Laura Bieber, who sells vintage and used designer clothing over the Internet from her home office in Portland, Oregon. Although Bieber's 386 PC and monochrome monitor met all of her personal word processing needs just fine, once she decided to go into business on her own, she needed a PC that would be more in tune with her home-office tasks. One of Bieber's key requirements was a system with fax capability, to help her avoid the expense and space requirements of a stand-alone fax machine.

"I knew other people with Windows who could fax from their computer, so I thought I would be able to as well," says Bieber. But after buying a new PC with Windows 98 loaded, Bieber searched in vain for the fax capabilities she thought were a given. "My techie friends were telling me what to look for over the phone, and it simply wasn't there," she says.

Bieber fell victim to a Windows 98 shortcoming that affects millions of PC users. Unlike Windows 95, Windows 98 doesn't include fax software as part of its regular installation; nor does it make available a fax module within Windows Setup. But as Bieber discovered, there is still a way to send faxes from within Windows 98; you just have to work a little to find and install it. And if digging around for software modules isn't your forte, you can turn to other options—including some free ones—that will help you send and receive faxes without shelling out money for a separate machine.

MICROSOFT GIVETH

IF YOU SEARCH for "fax" and "Windows 98" on Microsoft's Web site, the site will tell you that Windows 98 includes no fax applet, and that you must purchase fax software to send or receive documents. But as Bieber learned after a little digging, the fax applet that came with Windows 95 works just fine with Windows 98. Furthermore, it's free for the taking on the Windows 98 CD-ROM, if you know where to look.

To install the applet, browse your Windows 98 CD and go to tools\oldwin95\message\us. Double-click on *wms-fax.exe,* which installs the Windows Messaging components that the fax program needs. Reboot your system and return to the same location, then double click on *awfax.exe,* which loads the applet. You'll need to reboot again to make the applet available.

Sending a fax with the applet is a breeze, and you can initiate the process in several ways. To fax a text file, for instance, you can use the Print menu option from within your word processor, and choose Microsoft Fax as your printer. The fax applet will then ask for the recipients' names and fax numbers, allow you to choose a cover page, and even let you schedule the transmission for off-peak hours. You can also configure the software to have your modem receive faxes either temporarily when you're expecting a document to come in, or around the clock. Avoid the latter option if you'll also be using your modem line for voice calls. ▶

The biggest drawback to using the applet is that Microsoft doesn't support the Windows 95 fax module under Windows 98, so you're on your own if you encounter problems with it.

You may not need the Windows module if your system or modem came with a third-party communications package. If that's the case, you may already have a fax module that comes with at least a modicum of support. Or you can opt for a stand-alone fax program, such as Symantec's venerable WinFax Pro.

WinFax Pro 9 lets you send faxes much as you do with the Microsoft applet, but WinFax Pro boasts a slicker interface and adds other features. For instance, you can build a fax from different sources—such as files or open applications—and preview the document before sending it. The program also has features for receiving faxes, such as notification to your pager when a fax comes in. The chief drawback of WinFax Pro is its $120 price.

EFax Free, EFax Plus

Price: EFax Free, free; EFax Plus, one-time $10 activation fee, then $3 per month and 5 cents per 30 seconds of transmission time when sending faxes; EFax.com; 877/332-9266; www.efax.com

PRODUCT INFO NO. 601

WinFax Pro 9

Street price: $120; Symantec; 800/441-7234; www.symantec.com

PRODUCT INFO NO. 602

While fax software is great for sending documents, PC users have always faced problems with receiving faxes. Most users balk at having to leave their PC on 24 hours a day to receive faxes or dedicating a second modem and phone line to that function. Now a growing number of Web-based fax services offer an appealing solution to this dilemma.

One of the best, EFax Free, assigns you a dedicated phone number to which your incoming faxes can be sent, and automatically forwards them to your e-mail address. And, as its name implies, EFax Free won't cost you a cent, though it does subject you to a bit of advertising on its splash screen.

EFax uses a proprietary file format that compresses files and lets you view them with the EFax viewer that you download upon signing up. If you pay $3 a month for EFax Plus, you can choose the area code of your EFax number, and also send faxes for an additional 5 cents per 30 seconds of transmission time.

Like any good entrepreneur, Bieber is keeping an eye on emerging technologies, but for the time being Microsoft Fax gives her the capabilities she needs with minimal fuss and expense. In the end, that's what the best technologies are about.

Mitt Jones is a contributing editor for PC World. *If you have a solution to a PC-related hardware or software problem, send it to got_a_problem@pcworld.com.* ■

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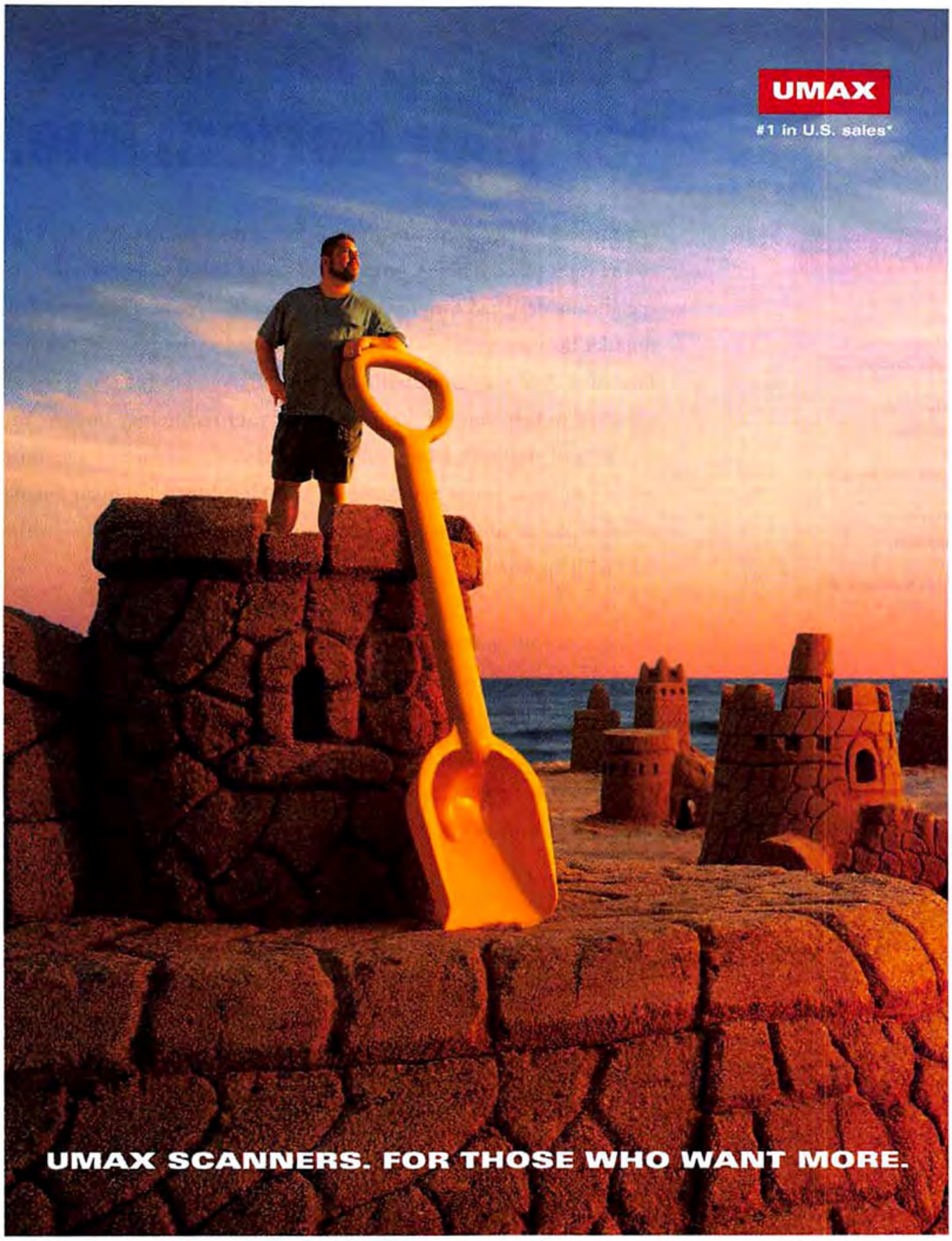
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Stop Hackers Before They Attack

ILLUSTRATION: JORDIN ISIP

LISTEN CAREFULLY: If you use a cable modem or DSL to connect to the Net, someone could be snooping around your hard drive right now. This jerk could get on to your PC, delete files, or reformat your disk—and you won't know you've been hacked until it's too late.

Think it can't happen? Well, I've done it. (Don't worry, no PCs were harmed in the writing of this column.) What scares the dickens out of me is how easy it is to hack someone else's system.

Fortunately, there are steps you can take to safely share your PC and Internet connection with others on your home network. I'll explain how to batten down your PC's hatches to make it an uninviting target.

DIARY OF A MAD HACKER

Security rule numero uno: No matter how paranoid you are, you aren't paranoid enough.

IF YOU HAVE cable modem or DSL service, chances are good that you have a static IP address. Because you use the same IP address every time you log on, you're more vulnerable to attack. Security rule numero uno: No matter how paranoid you are, you aren't paranoid enough.

BlackIce Defender
$40 list; Network Ice; www.netice.com
PRODUCT INFO NO. 603

Internet Splitter
$40 list; StarTech; 800/265-1844; www.startech.com
PRODUCT INFO NO. 604

SOHO2000, Home2000
List prices: SOHO $349, Home $250; BeadleNet; 877/232-3531; www.beadlenet.com
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WinGate Home
$40 list; Deerfield.com; 517/732-8856; www.wingate.com
PRODUCT INFO NO. 606

Using readily available tools, I was able to invisibly log on to a dozen PCs on the Net. I could examine their hard disks, futz with files, even format any drive. No footprint, no detection, no kidding.

Of course, *I* did it with the other users' permission; real hackers won't bother to ask. So before you do anything else, log on to Shields UP, Steve Gibson's Internet security site at grc.com/ShieldsUP. What you see there may scare you bitless.

The site examines the protocol that connects your PC to the Net. If file and printer sharing is enabled, your system's wide open. To secure your PC under Windows 9*x*, you'll need to change your network file and printer sharing settings. Gibson's site has a handy tutorial on how to do it.

But wait, you're not done yet. Every PC has thousands of ports—virtual openings that let you send e-mail, browse the Web, download files, and so on—that hackers can use to gain access to your system. To find out if anyone is snooping around your ports, grab a free copy of Port Detective from www.portdetective.com (it's also available on FileWorld).

SPREADING THE SPEED

BELIEVE ME, you don't want to share your PC with strangers. But you can still split a fast Net connection among all your systems—and keep hackers at bay.

If you have a home network, WinGate Home lets up to three PCs share one Net connection for only $40. Those allergic to LANs can use StarTech's $40 Internet Splitter to share the Web between two stand-alone PCs.

Then spend $40 on BlackIce Defender, the best firewall I've found at that price. The program body-blocks intruders by protocol, IP address, and port. It even skips all the file and printer sharing rigmarole—you can configure this on the fly.

For a higher level of security, you'll need hardware. I tried BeadleNet's SOHO2000, a $349 hub that lets four users share a high-speed connection over a LAN. (Up to 25 users can be added, but not in my office, thanks.) The firewall is fail-safe, and installation took just 10 minutes—no lie. A cheaper, 16-user version called Home2000 should be available by the time you read this.

For more details on how to share a Net connection safely, check out Tim Higgins's terrific site (www.timhiggins.com/ppd/sharing.htm). And for a glimpse into hacking, check out The Guide to Mostly Harmless Hacking at www.happyhacker.org. Just don't tell them I sent you.

online *Find files from this article at www.fileworld.com/magazine. Contributing Editor Steve Bass is a licensed marriage and family therapist and president of the Pasadena IBM Users Group. See page 14 for contact info.* ■

KINGSTON'S
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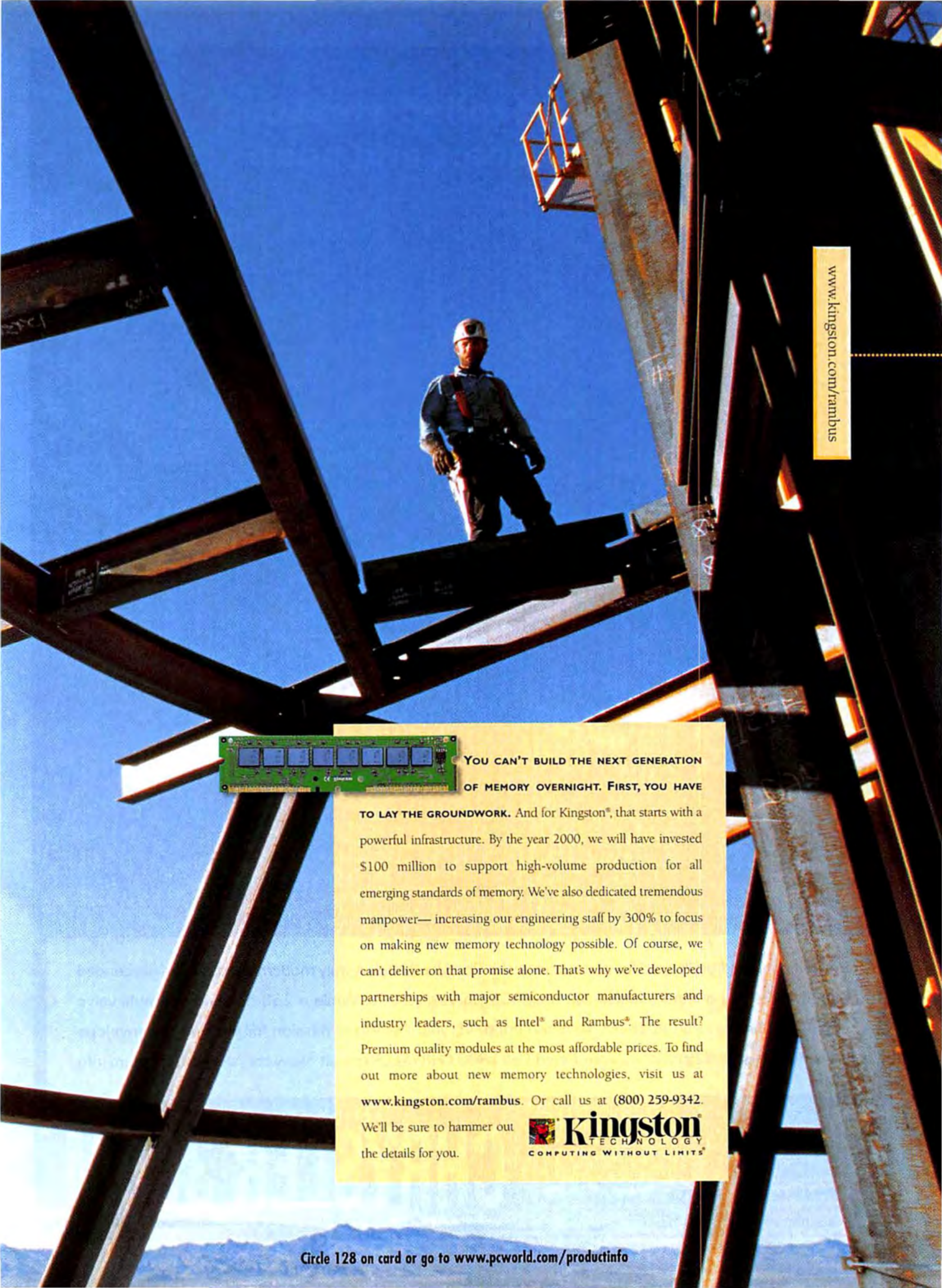

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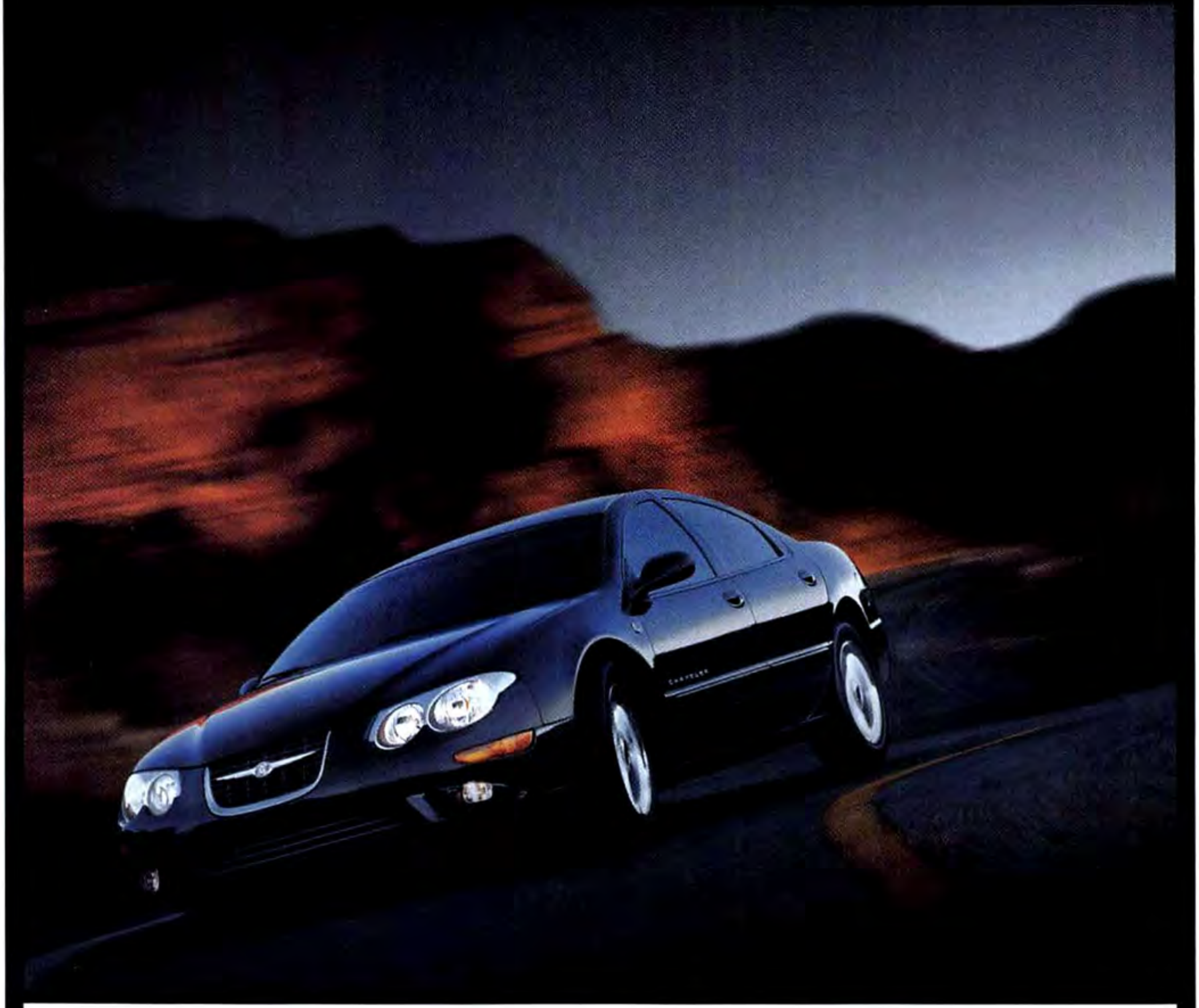

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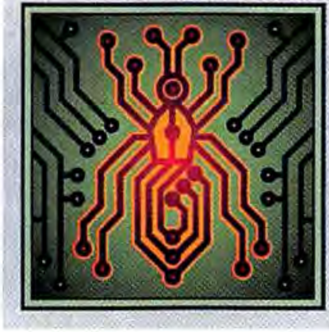
Don't Sweat Y2K Virus Rumors



ICON: JEFFREY PELO

AS THE HOUR OF DOOM approaches, it's starting to look like the big bad Y2K problem will be no big deal after all. As long as we all remain calm, leave our money in the banks, and spend Saturday, January 1, sipping cold beer and watching football, tranquility will undoubtedly prevail on earth. The Dalai Lama has even declared that 1/1/2000 will be a day like any other.

Of course, that hasn't stopped the antivirus software industry from discovering an insidious, and potentially lucrative, new threat: Y2K hoax viruses. Hackers are cooking up viruses that use millennium bug warnings as a ruse to trick users into infecting their systems. A Symantec antivirus researcher stated publicly that as many as 200,000 such viruses could afflict us by the turn of the century. And Network Associates dedicates a Web page to Y2K viruses at www.mcafee.com/centers/y2k/y2k_viruses.asp.

Don't get your knickers in a twist over this one, though. Sure, Y2K hoax viruses and trojan horses will turn up—Microsoft has already reported an e-mail trojan horse at www.microsoft.com/y2k/hoax/hoax2.htm. But these viruses are no different from any others. One antivirus vendor, Sophos, declares its competitors' Y2K virus warnings "scare-mongering" (see www.sophos.com/pressoffice/pressrel/uk/19990917y2k.html). Common sense also prevails at virus curmudgeon Rob Rosenberg's Computer Virus Myths site (kumite.com/myths/myths/myth035.htm).

To avoid infection from Y2K hoax viruses (or any other kind), take the same actions you normally would: Keep your antivirus software up-to-date, avoid sharing floppy disks with others, and don't launch executable files or scriptable documents (like Word or Excel files) until you've scanned them for viruses.

Communicator 128-Bit Update

WHEN IT COMES to online security, strong encryption is the key. Netscape's browser has long lagged behind Internet Explorer, offering only 56-bit encryption while Microsoft offers a 128-bit option. Though neither encryption strength is crackproof, many online commerce sites will only do business with you if your browser sports the larger encryption key. At last, Netscape is offering a 128-bit version of Communicator (still version 4.61, at press time). To update your copy, choose *Help•Software Updates* and select the 12MB browser 128 update in SmartUpdate's Select Software step.

IN BRIEF

Eudora 4.2.1

STILL IN BETA at this writing, Eudora 4.2.1 fixes minor bugs in version 4.2 of Qualcomm's e-mail workhorse. Check eudora.qualcomm.com/pro_email/updaters.html for the final version, which will include free upgrades from versions 4.0 and 4.1, and a file that describes version 4.2's new features.

Windows 9*x* Telnet Client Patch

BOTH WINDOWS 95 AND 98 come with a program called Telnet that enables you to log on to other computers over the Internet. Craftily coded Web pages can exploit a flaw in this program to do just about anything on your computer. Go to www.microsoft.com/security/bulletins/MS99-033.asp for details and links to the Telnet patch for your version of Windows.

IE 5.01? ANY DAY NOW

THE FLURRY OF SECURITY FLAWS reported in last month's column continues. Microsoft has released a patch for what it calls the "ImportExportFavorites" vulnerability. This flaw in IE 4.01 and 5 allows carefully scripted Web pages (and HTML e-mail messages) to "take any action on the machine that the user could take," including creating or destroying files, or even formatting the hard disk. For details visit www.microsoft.com/security/bulletins/MS99-037faq.asp. Microsoft has promised to post the IE 5 patch to windowsupdate.microsoft.com, but if it's not there, get it at ftp.microsoft.com/peropsys/ie/ie-public/fixes/usa/IE50/ImportExportFavorites-fix/x86/q241361.exe. You can find the 115KB IE 4.01 patch at ftp.microsoft.com/peropsys/ie/ie-public/fixes/usa/IE401/ImportExportFavorites-fix/x86/q241361.exe.

Browser security researcher Georgi Guninski has found yet another hole, this time in IE's ActiveX scripting subsystem. The defect allows a Web page or HTML mail message to upload text files from your PC to a remote one. The patch is available for download at windowsupdate.microsoft.com.

If you're having trouble keeping up with all the IE 5 patches, things may get easier soon. Microsoft plans to release an IE 5.01 update by year's end. IE 5.01 will also be the browser that ships in Windows 2000, the company reports.

online *Find files mentioned in this article at www.fileworld.com/magazine. Scott Spanbauer is a contributing editor for* PC World. ■

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Micron Millennia Max PIII-733

PCs Break the 700-MHz Barrier

BY DAVID ESSEX

MORE FOR YOUR MEGAHERTZ: Intel's newest Pentium IIIs make your applications fly.

SEVEN IS THE lucky number for power PC buyers: Intel Pentium III-733 and AMD Athlon-700 processors fuel the fastest systems we've seen. But the megahertz jump tells only half the story.

In recent months, Intel has rolled out some PIII speed increases that looked good in the advertisements but didn't make productivity apps work much better. Case in point: PIII-550 systems ran those apps just 5 percent faster than the average PIII-500 machine, while PIII-600 systems ran them just 4 percent faster than a typical PIII-550 PC. Neither gain was noticeable. Thanks to a design improvement, however, the newest PIII chips give everyday apps a potent shot of adrenaline. In addition, the new PIIIs recapture the speed crown from AMD's Athlon processors.

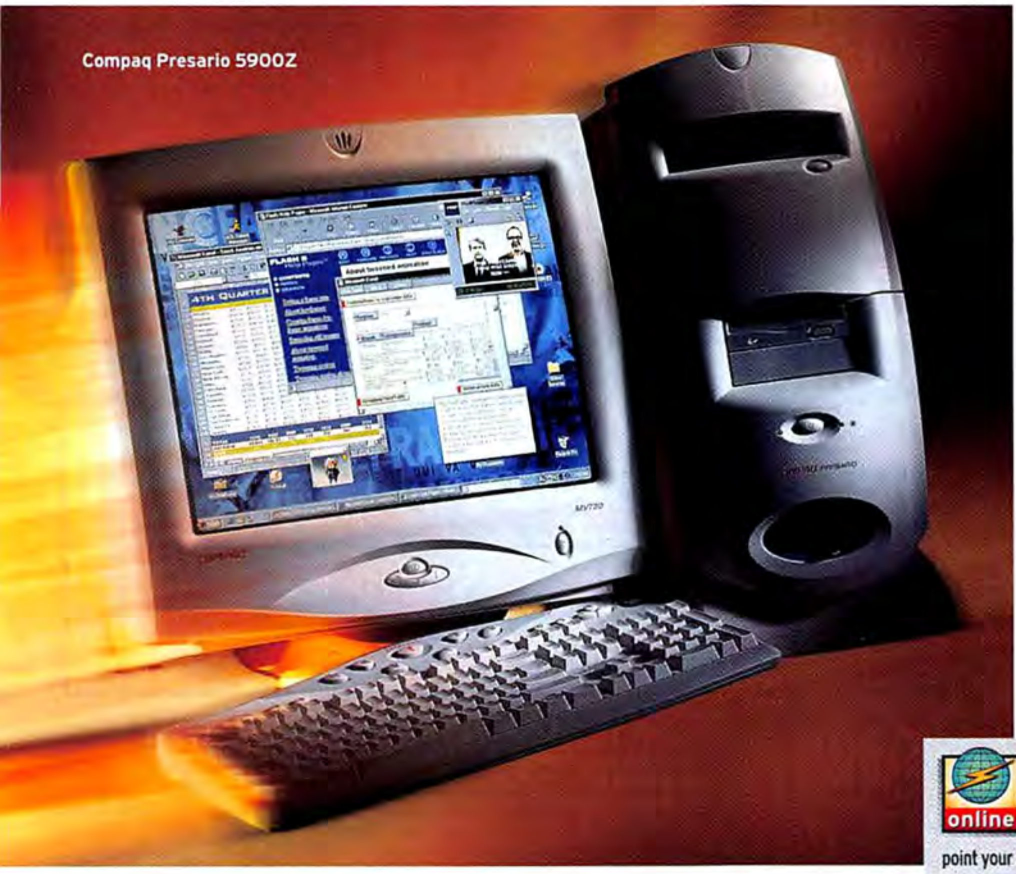
The new PIII processors, which are code-named Coppermine, come in a confusing variety of mix-and-match options, from 733 to 500 MHz, with 133- or 100-MHz system buses and several main memory options. We tested a Micron PIII-733 home machine with 133-MHz virtual channel SDRAM, and an HP PIII-667 corporate desktop with PC-800 RDRAM. For a peek at AMD's best, we evaluated a Compaq home system carrying the 700-MHz Athlon and PC-100 SDRAM.

We saw some eye-popping performance gains. What's more, Micron's and HP's new power machines are surprisingly good values. The loaded Micron speed champ costs just $2377—a price we'd call lucky even if it didn't end in sevens.

A NEW GAME

WHAT DISTINGUISHES the new Coppermine PIII chips from their Pentium III predecessors? With Coppermine PIIIs, Intel uses a .18-micron manufacturing process that squeezes more chips out of each silicon wafer. The engineers do it by using smaller, closer circuit lines and transistors. The smaller chips run faster and throw off less heat. The process also lets Intel put a 256KB level-2 memory cache on the chip to pump up your most-used software.

L2 cache plays a key role: A processor uses it to avoid sending requests via the slower system bus to main memo- ▶



Compaq Presario 5900Z

PHOTOGRAPHS: ERIC BUTLER; ICONS: JEFFREY PELO

New Palms, Lower Prices

GOOD NEWS for Palm PDA shoppers: 3Com has added new models and slashed prices. The Palm VII, with built-in wireless Internet access, is now available nationwide for $499—$100 less than it cost during a limited rollout last spring. The new $449 Palm Vx Special Edition resembles the sleek Palm V ($369) but has 8MB of memory instead of 2MB. The Palm IIIx now sells for $299, down from $369. And the entry-level Palm IIIe, available in either a translucent case or the traditional gray one, has an updated price of $179—the same as the Handspring Visor, Palm's hot new rival.

Easier E-Purchases?

MICROSOFT'S PASSPORT service already lets you create a single password and profile for signing into MSN sites like Hotmail and MoneyCentral. By November or December, Passport's e-wallet feature will add a similar convenience for online purchases. Once you've entered information such as credit card data and shipping address in your e-wallet, you won't have to retype it during purchases at participating sites. Microsoft has recruited about 50 partners—barnesandnoble.com, dell.com, and omahasteaks.com among them. We expect many of ▶

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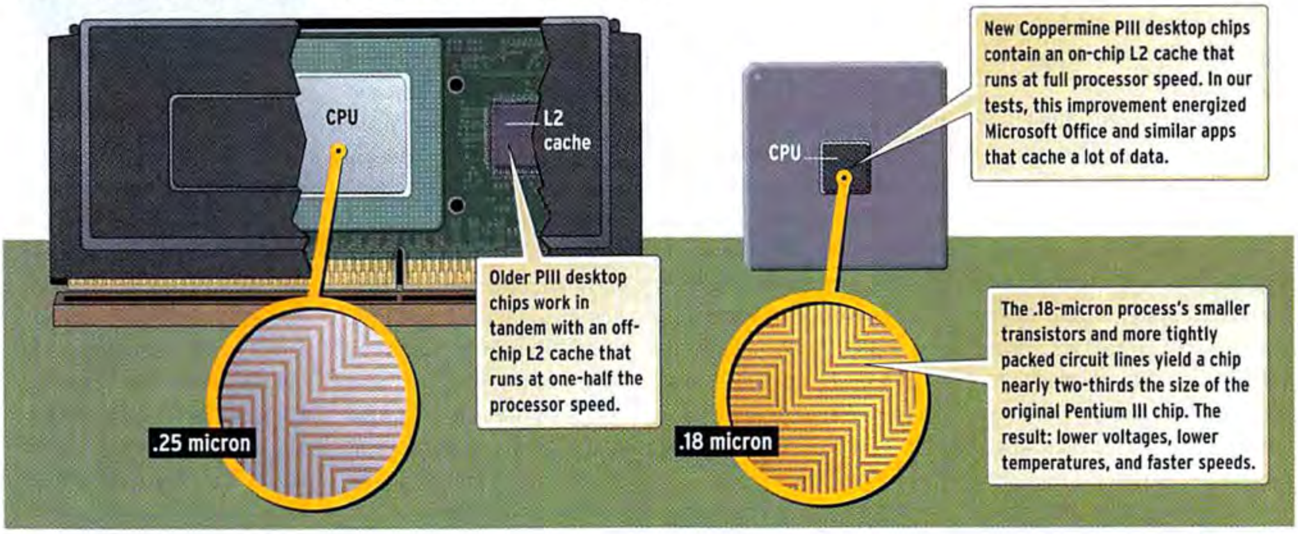
How Intel Added Oomph to Its New Pentium IIIs

Intel's .18-micron manufacturing process, used to produce the new Coppermine Pentium III chips, paves the way for substantial performance gains. An optional 370-pin, socket-style chip package (right) for the Coppermine units also gives desktop PC vendors more design flexibility than the traditional cartridge-style package.



New Coppermine PIII desktop chips contain an on-chip L2 cache that runs at full processor speed. In our tests, this improvement energized Microsoft Office and similar apps that cache a lot of data.

Older PIII desktop chips work in tandem with an off-chip L2 cache that runs at one-half the processor speed.

The .18-micron process's smaller transistors and more tightly packed circuit lines yield a chip nearly two-thirds the size of the original Pentium III chip. The result: lower voltages, lower temperatures, and faster speeds.

ry. Level 2 cache guesses what data an application will need and keeps it on hand, near the CPU. A Coppermine PIII's on-chip L2 cache (or Advanced Tranfer Cache, as Intel terms it) works at full speed—which today means as fast as 733 MHz. Older PIII chips rely on off-chip Level 2 caches that run at only half the processor's speed. The fast cache especially boosts Microsoft Office and similar apps that stash many pieces of information there.

Some new PIII machines also use a 133-MHz system bus, though our tests indicate it doesn't offer much benefit yet, compared to the standard 100-MHz bus. (Intel plans to push processor speeds past 800 MHz next year, at which point a 100-MHz bus won't be able to keep up.) Intel upped the Coppermine PIII's efficiency, too, with a technology called advanced system buffering. This lets the CPU send a few more requests through the system bus at a time.

The PIII-600EB, -667, and -733 desktops use a 133-MHz bus; PIII-600E, -650 and -700 machines use a standard 100-MHz bus. (An E suffix means an on-chip L2 cache, while B indicates 133-MHz bus support. These names distinguish 600-MHz Coppermine chips

DESKTOP PCs: GRAPHICS AND MULTITASKING TEST REPORT

HP's Vectra VL600 Tops the Multitasking Test...

NOTEBOOK	CPU	RAM	Multitasking test (seconds)	AutoCAD 2000 (seconds)	Adobe Photoshop (seconds)	Rage Expendable (frames per second)	Caligari TrueSpace 4.1 (frames per second)	3DMark	CPUMark
Compaq Presario 5900Z	Athlon-700	128MB PC-100 SDRAM	323	859	8.90	64	[1]	5904	11204
HP Vectra VL600	Pentium III-667	128MB PC-800 RDRAM	229	841	7.06	59	56	[1]	[1]
Micron Millennia Max PIII-733	Pentium III-733	128MB 133-MHz VC SDRAM	276	741	6.89	[1]	35	7182	11371
AMD Athlon-650[2]	Athlon-650	128MB SDRAM	[3]	929	[3]	68	33	6268	11031
Average of two systems	Athlon-600	128MB SDRAM	282	988	9.59	65[4]	33	5962	10402
Average of three systems	Pentium III-600	[5]	319[5]	1195[4]	8.95	59	26	5364	8920

TEST PC WORLD CENTER **HOW WE TEST** The multitasking test times tasks in Microsoft Word, Norton Antivirus, and Adobe Photoshop as the PC extracts a file in the background; for most of the test, two apps are active and a third is open but idle. The AutoCAD 2000 test times Autodesk User Group International's AUGIGauge benchmark, which runs computer-aided drafting tasks. In Adobe Photoshop 5, we time a sequence of graphics file manipulations. In Rage Expendable, we measure a self-running demo frame rate. In Caligari TrueSpace 4.1, we measure the frame rate of a tutorial using AGP textures. The 3DMark test uses Futuremark's 3DMark 99 Max benchmark to generate a composite score based on image quality, image rendering, and CPU capability. Tested apps do not use the AGP 4X bus. Data based on testing conducted by the PC World Test Center. All rights reserved. Numbers highlighted in red represent best scores on each test. [1]Test failed to run. [2]Demonstration PC made by AMD. [3]Data not available. [4]One PC failed to run test. [5]These PCs used different chip sets and memory types, and produced multitasking results from 243 to 388 seconds.

from the original PIII-600.) AMD Athlon systems like our Compaq Presario boast a 200-MHz bus. But they won't fully capitalize on the bus speed until faster memory arrives.

Pentium IIIs at a Glance

CPU	Level 2 cache	System bus speed
PIII-733, -667, -600EB, and -533EB	256KB, on-chip, full CPU speed	133 MHz
PIII-700, -650, -600E, -550E, and -500E	256KB, on-chip, full CPU speed	100 MHz
PIII-600, -550, and -500	512KB, off-chip, half CPU speed	100 MHz

ACE IN THE HOLE

SO IF YOU want the fastest system on the block, what's the new standard? Micron's Millennia Max PIII-733 tore through our PC WorldBench 98 suite of business apps. With a score of 309, it's the speediest Windows 98 system we've seen—23 percent faster than the average PIII-600 PC. HP's 667-MHz Vectra VL600 earned a score of 281.

Compaq's 700-MHz Athlon system, the Presario 5900Z, checked in at 284—not appreciably faster than the 650-MHz Athlons, which average 283. However, other Athlon-700 machines might deliver more zip. Diagnostic and keyboard utilities slow the Presarios down a bit. (We hoped to review a PIII-700 machine, but none were ready in time. Look for testing in later issues. Also watch for AMD's next move: Athlon chips will pass 700 MHz early next year.)

In our graphics tests, the Micron posted the best score we've recorded on AutoCAD 2000, while the HP zoomed through modeling tasks in Caligari TrueSpace 4.1. Both did well with Adobe Photoshop. (Both support the 4X AGP graphics standard, but optimized apps won't arrive in large numbers for months.)

Of course, graphics cards affect these scores. HP uses Matrox's fine 32MB G400. Micron and Compaq use the 32MB Creative Labs NV10 CT6940, with NVidia's powerful GeForce 256 chip.

HP's Vectra handily won the multitasking test; we attribute this to its RDRAM (Rambus) memory. This memory type, which debuted in September, is designed to transfer information through the memory bus at up to twice the rate of PC-100 SDRAM. For business users, this PC's multitasking speed is a big plus.

But one caution: At press time in mid-October, Intel was still addressing a glitch that delayed shipment of systems with RDRAM and the 820 chip set, like our HP Vectra (see "Motherboard Foul-Up Delays PIII Systems").

LOADED CONFIGS

ANYONE WHO'S shopped for a power desktop knows that outstanding speed doesn't come cheap. But the HP ▶

DESKTOP PCs: BUSINESS APPS TEST REPORT

...But on Office Apps, Micron's PIII-733 Dominates

SYSTEM	CPU	RAM	PC WorldBench 98 score (Faster)
Compaq Presario 5900Z	Athlon-700	128MB PC-100 SDRAM	284
HP Vectra VL600	Pentium III-667	128MB PC-800 RDRAM	281
Micron Millennia Max PIII-733	Pentium III-733	128MB 133-MHz VC SDRAM	309
Average of 3 systems	Athlon-650	128MB SDRAM	283
Average of 4 systems	Athlon-600	128MB SDRAM	274
Average of 10 systems	Pentium III-600	128MB SDRAM	251
Average of 12 systems	Pentium III-550	128MB SDRAM	241

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

these sites to offer e-wallet purchasing in time for the holiday shopping season. For details see www.passport.com.

ISP Makeovers

EARTHLINK AND CompuServe are putting on fresh faces for the new millennium. EarthLink 5, debuting in late November or December, will give its e-mail, browsing, and Web site creation capabilities a more integrated look. Version 5 will also include detailed wizards and tips for novices. CompuServe 2000, available now, adds more content channels, integrated IE 5 browsing, enhanced e-mail functions that let you restore previously deleted mail, and improved search and shopping features. CompuServe plans to offer Web-based e-mail later this fall.

Tidbytes

DSL Goes Retail: 3Com and Bell Atlantic will offer DSL modems and service through retail stores such as CompUSA starting in November. The modems should cost about $229; Bell Atlantic will offer a $130 rebate if you order its DSL and Web services. Service prices will range from $50 to $190 a month. **Track UPS Packages Online:** You can now track parcels, deliver electronic documents, and use other UPS Web services for free. UPS OnLine World Link service provides limited dial-up Internet service and a special version of Internet Explorer that allows access just to UPS Web sites. See www.ups.com for details.

and Micron systems manage to offer plenty of overall value.

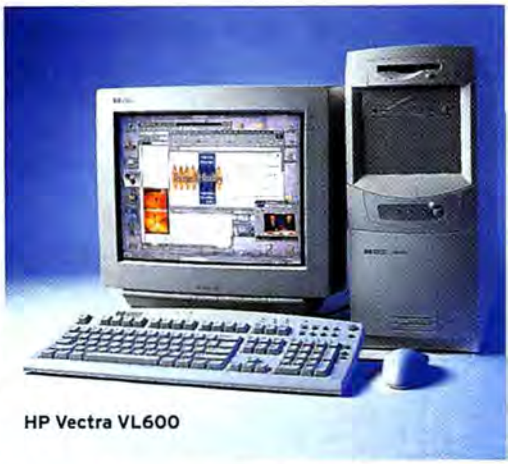
HP describes the $2648 Vectra as strong on manageability—but its multitasking abilities seem equally impressive. The configuration, priced only about $200 more than similar Pentium III-600 systems (mostly because RDRAM costs more than SDRAM), includes a 17-inch monitor, a 27GB hard drive, and a CD-Rewritable drive. Given its advantages, this machine is well worth the extra cost.

The difference between the two home systems is striking: Compaq's Presario 5900Z costs $3300—almost $1000 more than the $2377 Micron. Granted, our Presario came with nearly every connectivity and storage option that a home user could need or want: a 20GB hard drive, a 10X DVD-ROM drive, a CD-RW drive, a combination DSL/56-kbps modem, and a cable-modem–ready ethernet card. (If you later buy a cable modem, you'll need one of these cards.) Two other features to note: The Presario has front- and rear-mounted IEEE 1394 and USB ports for easy hookup to compliant devices such as digital cameras and scanners. It also includes a 17-inch monitor.

The Micron comes with a 19-inch monitor, a 20GB hard drive, an 8X DVD-ROM drive, a 56-kbps modem, and two USB ports. Though you could lower the Compaq's price by skipping some options, the Micron's blistering speed, solid configuration, and fair price give it the winning hand.

PLACING YOUR BETS

EVERY NEW PC generation has "sweet spots" that offer the best combination of price and performance. Typically, these systems don't include the absolute fastest processor. As a result, it's often wisest to pick a power desktop that has the second- or third-fastest chip, which is still quite zippy, and save a few hundred dollars.


HP Vectra VL600

However, the 733-MHz Micron Millennia will be hard to pass up. You'll probably see many other PIII-733 systems that cost about $2800. Micron continues to offer extremely aggressive pricing, trying to win market share. The company also saves a bit by using the Via Apollo Pro133A chip set, which is much like the Intel 820 but doesn't support Rambus memory.

For corporate users, HP's Vectra VL600 proves that you don't have to pay $3000 to get a great business PC.

Conservative shoppers will find even lower prices on PIII-650 and PIII-600EB desktops, which also deliver the new on-chip L2 cache. All in all, this seems a fine time for power desktop buyers to roll the dice on a new system.

Compaq Presario 5900Z
List price: $3300; **Compaq;** 800/345-1518; www.compaq.com
PRODUCT INFO NO. 727

HP Vectra VL600
List price: $2648; **Hewlett-Packard;** 800/752-0900; www.hp.com/desktops
PRODUCT INFO NO. 728

Micron Millennia Max PIII-733
List price: $2377; **Micron;** 800/642-7667; www.micronpc.com
PRODUCT INFO NO. 729

PHOTOGRAPH: (TOP) ERIC BUTLER

Motherboard Foul-Up Delays PIII Systems

THE ADVERTISEMENTS HAD been mailed. The first systems were built. But on September 23—four days before a scheduled product launch—Intel told PC vendors to hold off shipping PIII systems with its 820 chip set and Rambus DRAM (RDRAM). A problem causing application and system crashes could not be resolved. For the first time in years, Intel scrubbed a major product introduction.

The problem has delayed ship dates for hot new PCs that vendors had planned to ship in late October. PIII-733s? You won't see many of those until the 820 delay ends. That's because the 820 and 810e are the only Intel chip sets that support a 133-MHz system bus, but the 810e's integrated graphics won't suit many power desktop buyers. Micron, however, avoided the problem with its Millennia systems by using Via Technologies' Apollo Pro133A chip set.

MOTHERBOARDS with three slots for RDRAM (Rambus) memory, as shown above, can crash 820 systems.

At press time, Intel intended to announce the PIII-733 and the other new Coppermine PIII processors on October 25. But industry sources told *PC World* that systems with the 820 chip set and RDRAM would not ship before mid-November.

THROW OUT THE BOARDS

THE GLITCH AFFECTS 820 systems with motherboards holding three slots for RDRAM modules, called RIMMs. The simplest solution: Ditch the three-slot motherboards and use boards with two RIMM slots, says analyst Peter Glaskowsky of MicroDesign Resources. (Today's Rambus systems support a maximum of 512MB of memory, regardless of the number of slots. Future memory technology will allow more.)

Glaskowsky estimates that at most, 100,000 three-slot boards were built, some by Intel, others by PC and component makers. PC vendors will probably refuse to pay for the Intel motherboards they received. Given that each board is worth perhaps $100, the error could cost Intel several million dollars. But Intel earned about $1.7 billion last quarter alone. "It's hours of Intel's profit," Glaskowsky says.

Bottom Line: Because the 820 is running late, you'll see a confusing array of PIII PC choices in October and November. Read the advertising fine print, and time your purchase carefully. —Laurianne McLaughlin

Pentium III Notebooks: Speed, Power to Spare

INTEL'S NEWEST PIII processors are great news for notebook users as well as for the desktop crowd. The first mobile Pentium IIIs, running at 400 MHz to 500 MHz, drive the best-performing notebooks we've seen to date.

We looked at three of the first PIII notebooks: Dell's Inspiron 7500 R500VT and HP's OmniBook 4150 (with Pentium III-500s), and a Pentium III-450–based Gateway Solo 9300. Although they still trail the top desktop CPUs (see page 58), these muscular though rather heavy portables are more than ready to replace your desktop. And battery life doesn't suffer, nor do these machines run hotter: The .18-micron process used to make these chips lets them deliver better performance at the same voltage used by their predecessors.

The new process has also allowed the chips to get smaller and thinner, so even ultraportables can take advantage of them. In fact, PIII-400s are intended primarily for ultraportables, but none were available in time for our review.

HP OmniBook 4150

Dell Inspiron 7500 R500VT

PHOTOGRAPH: ERIC BUTLER

The new mobile CPUs benefit from the 100-MHz system bus, which replaces the old 66-MHz bus and supports the same PC-100 memory used in most of today's desktops. AGP speed has remained at 2X versus the 4X of new desktops, but most business users won't notice the difference.

The notebooks we looked at are feature-packed desktop replacement units: Traveling weights range from 6.9 to 9.4 pounds, and prices go from $2799 to $4209. All three units turned in outstanding performance on our PC WorldBench 98 suite of business applications, with the two PIII-500 units—each also carrying 128MB of RAM—finishing neck and neck: The Inspiron 7500 R500VT scored 236, while the OmniBook 4150 racked up a 235. That tramples the 202 set by the previous notebook champ, an Inspiron 7500 with a Celeron-466 CPU and 64MB of RAM. And the PIII-500 marks are nearly 20 percent better than the average of 197 for the nine Pentium II-400 notebooks we've tested. The Solo 9300, with a PIII-450 and 96MB of RAM, also broke the old record with a WorldBench score of 216.

These units don't just sprint and die, either. The shortest-lived of the bunch, the HP OmniBook, lasted 3 hours and 50 minutes on its 9-cell battery. The Dell, with a 12-cell lithium ion battery, ran about half an hour more. And the Gateway's 12-cell battery kept the power going for a whopping 5 hours and 13 minutes.

FEATURE SET

FOR TOP POWER in a desktop alternative, Dell's $4209 Inspiron is hard to beat, starting with a huge 25GB disk. A crisp, vibrant 15-inch 1400-by-1050 screen makes DVD movie viewing a pleasure (though we noted some pixelation in full-screen mode). In addition to the combination DVD-ROM and floppy drive, the unit had a 100MB Iomega Zip drive module and a built-in 56-kbps modem. But hauling the 9.4-pound Inspiron around will give you a real workout.

Frequent flyers will prefer the $4149 OmniBook 4150's 6.9-pound traveling weight and 1.5-inch profile. The OmniBook 4150 sports an ample 12GB disk and a sharp, 14.1-inch, 1024-by-768 display. Jarringly, however, color depth automatically bumped down when we opened more than one window with the display set to 256 colors. DVD playback was smooth. HP supplies both a pointing stick and a ▶

NOTEBOOK PCs: BUSINESS APPS TEST REPORT

PIII Portables Race Past the Competition

NOTEBOOK	CPU	RAM	L2 cache (KB)	PC WorldBench 98 score (Faster ▶)
Dell Inspiron 7500	Pentium III-500	128	256	236
Gateway Solo 9300	Pentium III-450	96	256	216
HP OmniBook 4150	Pentium III-500	128	256	235
Dell Inspiron 7500	Celeron-466	64	128	202
Average of nine PII-400s	Pentium II-400	128	256	197

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

NOTEBOOK PCs: BATTERY LIFE TEST REPORT

New-Generation Laptops Keep the Power On Longer

NOTEBOOK	CPU	RAM	L2 cache (KB)	Battery life test times (hr:min) Better
Dell Inspiron 7500	Pentium III-500	128	256	4:22
Gateway Solo 9300	Pentium III-450	96	256	5:13
HP OmniBook 4150	Pentium III-500	128	256	3:50

TEST PC WORLD CENTER **HOW WE TEST** We drain and fully recharge the battery twice and set power-saving options to match a consistent profile where possible. Office workers use Windows 9x applications, periodically saving and allowing regular idle time. Notebooks are rotated among workers. We report the time elapsed when the notebook shuts itself off. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

touchpad, which operate concurrently. Bay drives on both notebooks are hot-swappable.

The $2799 price tag of Gateway's Solo 9300 will attract more budget-minded powerseekers. You get a brilliant 15-inch, 1024-by-768 screen, and at a minimum 7.7 pounds the unit is fairly portable. The 6.4GB hard disk is a bit small, but you get more bay module options, including a CD-RW drive. Other nice touches include front-mounted CD-ROM controls, four one-touch launch buttons for tasks like e-mail and Web browsing, and easy-to-see battery gauge lights. We didn't get a DVD-ROM drive, but the IEEE 1394 port should come in handy for new peripherals supporting this fast connection.

COMING UP

WHAT'S NEXT for notebooks? Intel's SpeedStep technology, due to appear by mid-2000, will allow mobile CPUs to operate at lower clock speeds when running on battery power and at higher clock speeds when using AC power. The first SpeedStep systems will probably run at 600 MHz when plugged in. But if you're buying now and portability isn't a prime concern, the Dell Inspiron 7500 is the most robust choice. Frequent flyers should give the more mobile OmniBook a close look. And the Gateway Solo is a real bargain, especially if you don't need to have a top-of-the-line machine. Desktop power has never been more mobile.

—Anush Yegyazarian

Dell Inspiron 7500 R500VT
Street price: $4209; **Dell;**
800/388-8542; www.dell.com

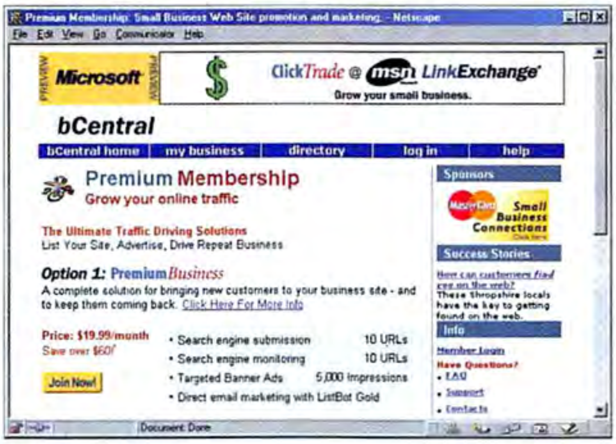
Gateway Solo 9300
Street price: $2799; **Gateway;**
800/846-2000; www.gateway.com
PRODUCT INFO NO. 720

HP OmniBook 4150
Street price: $4149; **Hewlett-Packard;** 800/752-0900;
www.hp.com/omnibook
PRODUCT INFO NO. 721

BCentral.com Puts Your Business on the Web

PREVIEW

ON THE NET, small businesses have become big news. Now a really big business, Microsoft, wants a piece of the action. The company's new BCentral Web portal (www.bcentral.com) is the latest in a flurry of sites offering advice and services for small businesses moving online. Most features, whether free or paid, are what you'd expect: lots of links and information along the lines established by Excite's Work.com. BCentral, however, stands out for its affordable advertising and marketing services. And with online versions of such apps as Office in the works, the site should become increasingly useful.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MARKETING 101: Microsoft's BCentral portal helps small businesses get going on the Web with low-cost advertising and marketing deals.

But the advertising services are worth visiting now. One program allows you to put banner ads on other sites in exchange for commissions from click-throughs and sales. As on other sites, a banner ad exchange program lets you place one ad on a member site in exchange for displaying two ads on your own. (BCentral debuts with more members than most—450,000 sites.) Finally, for as little as $20 a month, you can buy a marketing package that includes ads on sites such as Yahoo and Excite, and get help with direct e-mail campaigns. You can track all activities on your personal 'my business' page.

BCentral also addresses such basics as finding an ISP (MSN Access being the first option) and registering your domain name. Unlike Bigstep.com, ECongo, and other competitors, BCentral doesn't offer automated e-commerce site creation; these and other services are slated to appear later on. For now, BCentral is worth a browse if you want some help marketing your business.

—Anush Yegyazarian ▶

[1]Actual weight/thinness may vary due to vendor components, manufacturing process and options. Weight includes battery. [2]Supports NT; not preloaded. [3]Estimated reseller price for model 24021U. Actual prices may vary. mhz denotes microprocessor internal clock speed only; other factors may affect application performance. PCs referred to in this ad include an operating system. IBM product names are trademarks of International Business Machines Corporation. Microsoft, Windows and Windows NT are trademarks of Microsoft Corporation in the United States and/or other countries. Intel and the Intel Inside logo are registered trademarks and Celeron is a trademark of Intel Corporation. © 1999 IBM Corporation. All rights reserved.

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Suites for Rent: Office Apps Move Online

ILLUSTRATION: MARY ANN SMITH

ANALYSIS

OFFICE SUITES are bloated, costly, and a pain to support and upgrade. But we can't live without them. Within the next six months, however, we'll see a new way to live with them as vendors introduce online versions with fewer hassles and, maybe, lower costs than their shrink-wrapped counterparts.

Many minor and midsize vendors already offer small apps via the Internet, either for rent or for free. But now some very big names are getting into the act. Most notably, Microsoft says it's working on a rental version of Office that could be available in 12 to 18 months. Sun Microsystems expects to offer its recently acquired StarOffice suite online within the next six months. And Corel's WordPerfect Suite should be available about the same time.

Being able to run spreadsheets, word processors, and other basic business applications over the Internet will change the way we buy and use software. But many key details (including pricing) remain undecided. Here's where things stood at press time: You'll run Web-based suites with a standard browser, a browser equipped with a special plug-in, or a small program such as Citrix's Program Neighborhood. Some suites will probably be offered by Web portals: Microsoft has already identified its new BCentral small business portal (see page 64) as a likely source of Office apps online. Other suites may be offered by ISPs, telephone companies, cable TV companies, or a new type of Internet company called an application service provider, such as FutureLink, based in Irvine, California.

THE GOOD, THE BAD

ONLINE VERSIONS of office suites will offer users several advantages over the shrink-wrapped behemoths of today. In the first place, you'll escape tedious and at times demanding installation and maintenance chores. Upgrades and bug fixes will be handled on the provider's server.

Using an online product should also free up hundreds of megabytes of disk space formerly devoted to suite applications. Don't want to buy a notebook? Online suites will be accessible through any PC that's connected to the Internet. You'll probably be able to store your documents on the vendor's server, where analysts say they'll be more secure than on your desktop. But some providers may give you the option of saving files to your hard disk if you prefer.

On the other hand, Web-based apps will have some drawbacks. To obtain performance approaching that of a boxed package, you'll want a high-bandwidth Internet connection. I tried FutureLink's demo versions of Microsoft Word, Outlook, and Corel WordPerfect in a Citrix window over a 56-kbps modem. Typing was fine, but frequent screen refreshes made using features that involved graphics—such as a wizard for creating a document—tedious. You'll want at least a 56-kbps hookup and preferably a cable or DSL connection. Of course, if your connection is unavailable—because you're on an airplane, say, or your ISP is down—you're out of luck.

The Inside Scoop on Online Suites

Minimal system requirements: Runs in browser or small client; accesses apps from any PC. Good for people who have older PCs or don't want to carry a notebook.

Fewer hassles: Installation, maintenance, and upgrades performed by providers. Good for nontechnical users and companies with minimal IS staff.

Sluggish performance: Slow on standard modems or overloaded networks. Bad for people who use suites constantly and expect speedy desktop performance.

Inaccessibility: Suites are accessible only when you're online. Bad for travelers accustomed to working away from Internet access.

Rental pricing: Monthly rental or fees based on usage. Good for casual users or those wishing to limit up-front expenses, but could cost more over time.

SACRED CASH COW

THE KEY unanswered question involves pricing. Some portals and ISPs will probably offer basic office applications for free. But analysts say that Microsoft derives more than a third of its revenues from Office and is unlikely to be overly generous with its cash cow. Best guess: You'll have to pay monthly or as-you-go fees, or a combination of the two. Eventually, you could spend more on monthly rentals than the $200 to $300-plus cost of today's shrink-wrapped Office.

But you might be able save money other ways. For example, you might be offered different application bundles, much as you get to choose levels of cable TV service. A low-cost bundle might have word processing and personal finance apps, while a premium bundle might throw in presentation packages and spreadsheets. Occasional users could be offered the option of paying only by the day or minute. And in workgroup situations, people who now have their own copies of a desktop ▶

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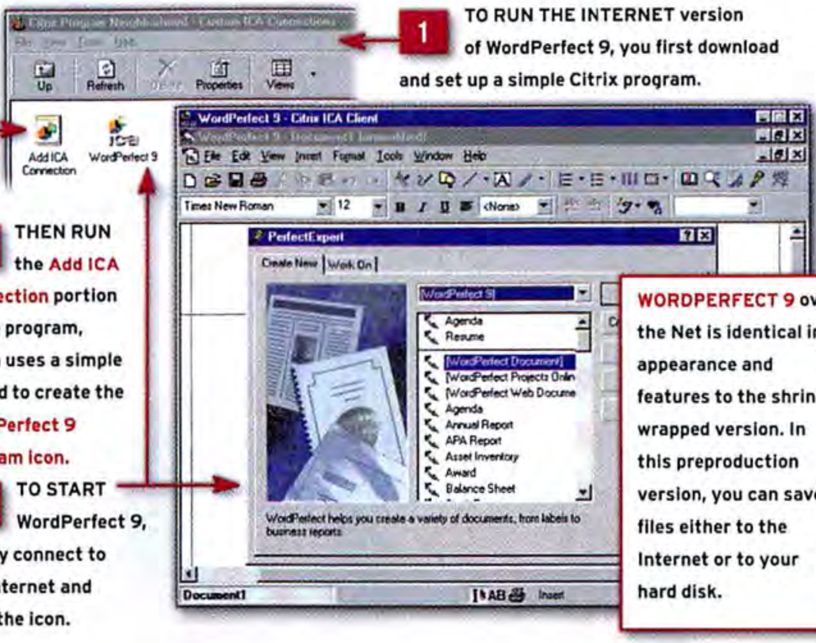
suite may be able to share fewer rental accounts.

Office suites bring up the rear in a long parade of applications headed online. Web-based e-mail came first, and more recently we've seen Web-based utilities, calendars, and contact managers. Still, traditional shrink-wrapped packages won't disappear anytime soon. Online software savings probably won't suffice to discourage larger businesses from purchasing packaged software. Corporate IT departments already handle upgrade and administrative hassles. Meanwhile, smaller businesses and individuals with low-bandwidth connections won't tolerate the performance hit.

But occasional users will want to consider online alternatives. Internet-based suites also make sense for owners of older PCs who want to run current software without buying new hardware. And if the price is right, budget-conscious businesses will find the online option appealing. Even people who don't use online business apps will have reason to cheer: A proliferation of online suites should give Microsoft Office competition it hasn't seen in years.

—Yardena Arar

Your Rent-an-App Could Look Like This



WordPerfect helps you create a variety of documents, from labels to business reports

1 **TO RUN THE INTERNET version of WordPerfect 9, you first download and set up a simple Citrix program.**

2 **THEN RUN the Add ICA Connection portion of the program, which uses a simple wizard to create the WordPerfect 9 program icon.**

3 **TO START WordPerfect 9, simply connect to the Internet and click the icon.**

WORDPERFECT 9 over the Net is identical in appearance and features to the shrink-wrapped version. In this preproduction version, you can save files either to the Internet or to your hard disk.

Free and Easy Online Storage

FIRST LOOK

A NEW CLASS of free, Web-based services lets you store files, retrieve them from any PC with a browser, and allow others to view or edit them. The services offer online storage space (around 25MB, typically) at no charge, giving you a cheap, easy way to shuttle big files between PCs or share files with others.

THE OPTIONS

INTERNET-BASED document storage services resemble Net-based e-mail: You sign up for a free account and then access your online documents with a browser and a password. Services may also include security features like file encryption.

Two types of services are offered. Virtual hard drives like FreeDrive (www.freedrive.com, 20MB free storage), I-drive (www.idrive.com, 25MB free) and Free Disk Space (www.freediskspace.com, 25MB free) are designed for ease of use. They're aimed at students or traveling businesspeople who need access to files and don't want to hassle with (or pay for) floppy disks or other types of removable storage.

More ambitious services include group editing and document sharing options, making them useful for small work groups. NetDocuments (www.netdocuments.com), one of our favorites of this type, lets you create an address book of people to be notified automatically by e-mail anytime a particular document is modified. NetDocuments' synchronization system lets you alter online documents without downloading them to your PC, saving time and disk space. So if you edit a Word document stored on NetDocuments, the service will store your changes to the version of the file it keeps on the Web site. The new JustOn Files (www.juston.com) has similar sharing options and offers 50MB of free storage.

THE CAVEATS

THE SERVICES do have drawbacks. Uploading large files over a dial-up connection takes a lot longer than saving to, say, an Iomega Zip disk. And free online storage sites demand registration info, so you may become a target for spammers. Finally, no one guarantees your files will be safe in the event of a system snafu.

Online document storage is a developing arena, with more options likely in the future. Next year, NetDocuments plans to expand its service to include remote printing and shipping of hard copies.

—Glenn McDonald ▶

ILLUSTRATION: DAVID FLAHERTY

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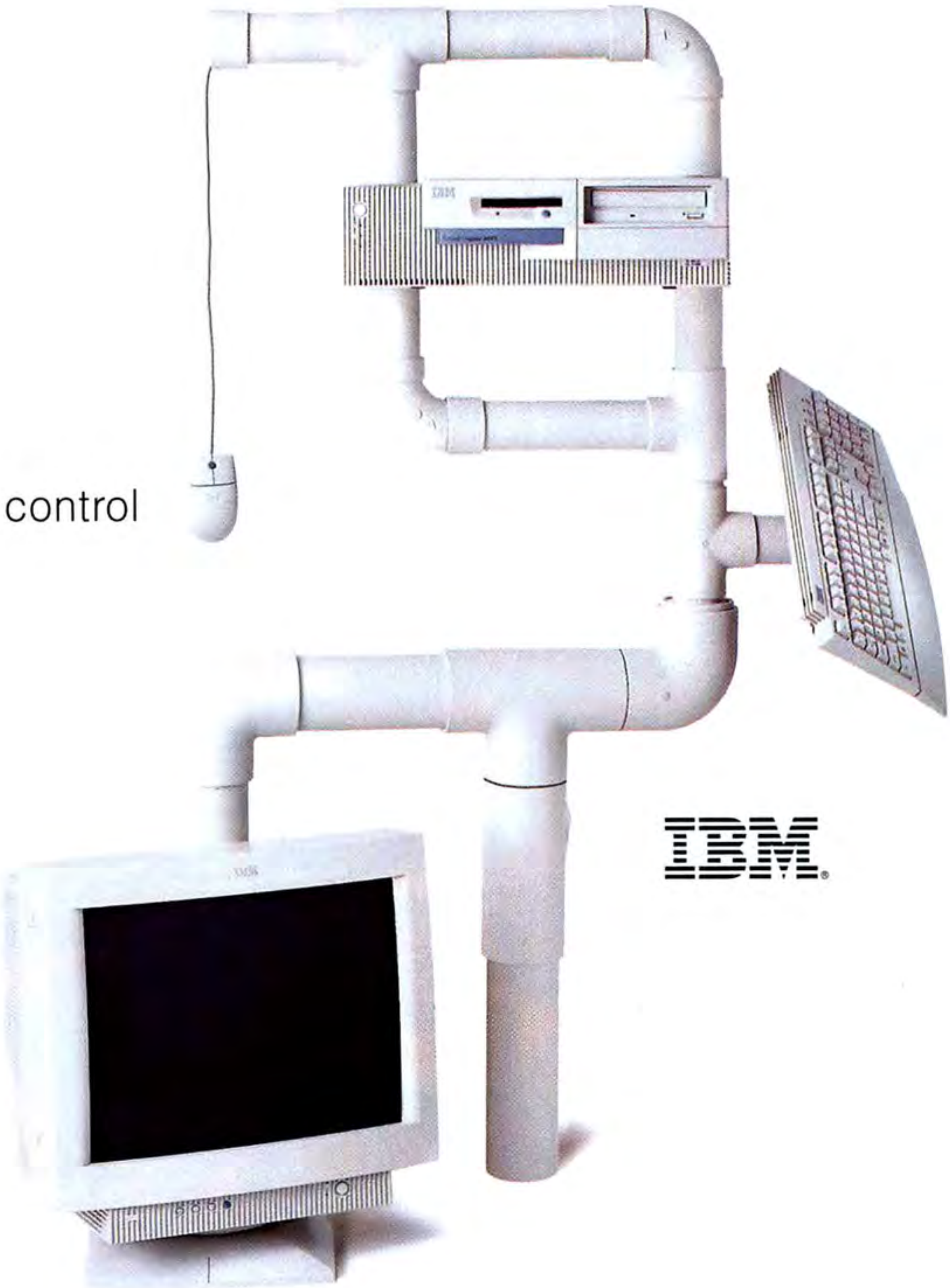
remote control



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Corel Makes Linux Almost Nice With Quick Install and a Familiar Face

IS LINUX READY for the masses? Until recently the answer was a resounding no. No matter how fervently consumers wished for a Windows alternative, Linux was simply too difficult for the average user to get up and running.

But at long last, a new version of the operating system is changing all that. Unlike competing versions—and despite its unfinished state—the beta version of Corel Linux installs nearly hands-free. And if the features Corel promises for the final product (due in mid-November) come true, this new flavor of Linux may be nearly as easy to install and configure as Windows 98.

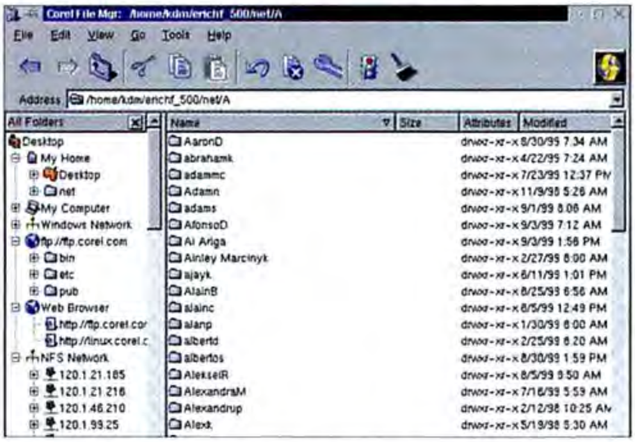
Unlike most other Linux products, Corel's version does not require you to test and tweak video settings for the graphical interface. You don't need to plumb the depths of drive partitioning either, and poring over the numbing catalog of installation options is strictly optional.

You can progress from a bare hard disk to a graphical Linux desktop in four easy steps: Type in a user name, choose a default installation, decide where to install it, and click an *Install* button. In minutes, you're nearly ready to thumb your nose at Bill Gates.

NOT SO FAST

BUT FIRST YOU have to configure things like printers, dial-up connections, and networking—just as you would when installing Windows. Getting these essentials working under Red Hat Linux or almost any other competing version means using Linux's collection of arcane command-line utilities and configuration files, a task that has driven more than one Linux newbie back into Microsoft's arms. Corel says its Control Center utility will consolidate most of these tasks in a centralized, Control Panel–like interface. Despite some glitches , Control Center let me configure Samba, Linux's Windows networking clone, in only a few clicks.

Like many other flavors of Linux, Corel Linux is based on the 2.2.10 Linux kernel (a kernel is an operating system's core), and installs the Windows-like KDE graphical interface by default. But Corel has made many small improvements to KDE that will make it even more familiar to Windows aficionados. Besides making the Control Center changes, Corel has replaced the KDE file manager with Corel File Manager, a utility that displays drives, desktops, and network resources much as Windows Explorer does.



Name	Size	Attributes	Modified
AaronD		drwxr-xr-x	8/30/99 7:34 AM
abrahamk		drwxr-xr-x	4/22/99 7:24 AM
adammc		drwxr-xr-x	7/23/99 12:37 P
Adamn		drwxr-xr-x	11/9/98 5:26 AM
adams		drwxr-xr-x	9/1/99 8:06 AM
AfonsoD		drwxr-xr-x	9/3/99 7:12 AM
Al Ariga		drwxr-xr-x	9/3/99 1:56 PM
Ainley Marcinyk		drwxr-xr-x	2/27/99 8:00 AM
ajayk		drwxr-xr-x	6/11/99 1:01 PM
AlainB		drwxr-xr-x	8/25/99 6:56 AM
alainc		drwxr-xr-x	8/5/99 12:49 PM
alanp		drwxr-xr-x	1/30/99 6:00 AM
albertd		drwxr-xr-x	2/25/99 6:20 AM
albertos		drwxr-xr-x	8/30/99 1:59 PM
AlekseiR		drwxr-xr-x	8/5/99 9:50 AM
AlexandraM		drwxr-xr-x	7/16/99 5:59 AM
Alexandrup		drwxr-xr-x	2/12/98 10:25 A
Alexk		drwxr-xr-x	5/19/98 5:30 AM

NOT WINDOWS: This looks a lot like the familiar Windows Explorer, but it isn't. You're looking at the file manager in Corel's version of Linux.

But while Corel is doing its best to smooth the move from Windows to Linux, it can't work miracles. The Linux kernel still lacks support for such common PC devices as USB, DVD, internal ISDN cards, and Winmodems. USB support is likely to arrive sometime next year; there's no timeline for the other devices.

FREE STUFF

COREL LINUX has the usual free applications, including Netscape Navigator and Corel's WordPerfect 8 for Linux. But it will ship sans Sun's free StarOffice 5.1, the office suite bundled with most shrink-wrapped Linux products. Corel plans to release its own office suite for Linux next year, but that one won't be free, and it won't be included in Corel Linux. In a unique role reversal, the suite will come with a free copy of Corel Linux.

What neophyte Linux users need is tech support while installing and configuring their software. Corel, like competitors Red Hat and Caldera, will bundle limited technical support. But even if that support is stellar, customers who pick up a copy at the local computer mart should be prepared to sweat before they say goodbye to Windows.

—Scott Spanbauer ▶

Lots o' Linux—And Not Just for Geeks

PRODUCT [1]	Price	Features	Product info number
Caldera OpenLinux 2.3 www.calderasystems.com	$50	KDE interface, 90 days free installation tech support, WordPerfect 8 for Linux, Netscape Navigator, StarOffice 5.1	723
Corel Linux linux.corel.com	$49 [2]	Streamlined installation, installation tech support, WordPerfect 8 for Linux, Netscape Navigator	724
Linux-Mandrake 6.1 www.linux-mandrake.com	$55	KDE and GNOME interfaces, 100 days free e-mail support, WordPerfect 8 for Linux, Netscape Navigator, StarOffice 5.1	725
Red Hat Linux 6.1 www.redhat.com	$30	GNOME and KDE interfaces, 90 days free installation tech support, WordPerfect 8 for Linux, Netscape Navigator, StarOffice 5.1	726

[1] All producers of Linux versions, by license, are required to make the OS available for free downloading; commercial versions may include additional applications, utilities, and source code. [2] $79 deluxe version includes fuller edition of WordPerfect and more tools.

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- GCS-200 Speakers by Cambridge SoundWorks®
- 56K[2] Internet/Fax Modem
- Micro-Tower Case
- MultiFunction Keyboard, Mouse
- Microsoft® Windows® 98 Second Edition
- MS® Works Suite 99 Software
- 1-Year Limited Warranty w/On-site Service*
- Year 2000 Compliance[4]
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- 40X max/17X min CD-ROM Drive
- 3.5" Diskette Drive
- SoundBlaster AudioPCI 128D Card
- GCS-200 Speakers by Cambridge SoundWorks
- 56K[2] Internet/Fax Modem
- Mid-Tower Case
- MultiFunction Keyboard, Mouse
- Microsoft Windows 98 Second Edition
- MS Works Suite 99 Software
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- 8X DVD-ROM Drive & MPEG-2 Decoder
- **SoundBlaster Live!Value Card** with Digital Audio Output
- **Boston Acoustics** BA735 Digital Speakers w/Subwoofer
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- **SoundBlaster Live!Value Card** with Digital Audio Output
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- 8-Bay Mid-Tower Case
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- VX900 .26 Screen Pitch 19" Monitor (18" viewable)
- 32MB NVIDIA RIVA TNT2 **Ultra** AGP Graphics Card
- TV/FM Tuner Card
- 27.3GB **Ultra ATA 66 7200 RPM** Hard Drive
- 8X DVD-ROM Drive & MPEG-2 Decoder
- Philips® 4X/4X/24X CD-RW (CD-Rewritable) Drive w/Media
- **SoundBlaster Live!Value Card** with Digital Audio Output
- **Boston Acoustics** Digital Media Theater™ Speakers w/ Dolby® Digital
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- Intel AnyPoint™ Home Network Card
- 10-Bay Tower Case
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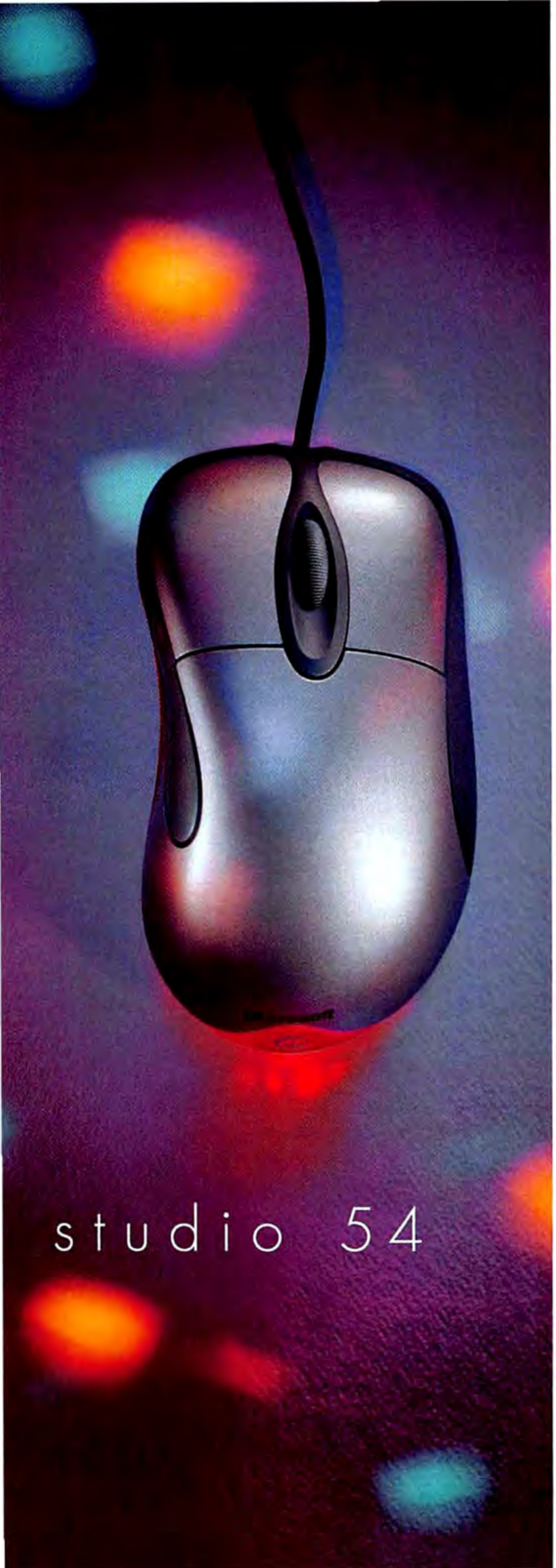


Home LANs: Faster, Easier, and Cheaper Than Ever

HOME networking isn't just for turbogeeks. Some 17 million households in the U.S. now have multiple PCs. And network kits that enable users to share printers, files, and (most important) Internet connections without first having to acquire a degree in network administration have been on store shelves for more than a year.

But few people are buying those kits. One reason: They are slow. With a maximum throughput of 1 megabit per second, the first home LAN products were pokier than their office counterparts. Buyers savvy enough to want a home network are likely to look askance at 1 mbps.

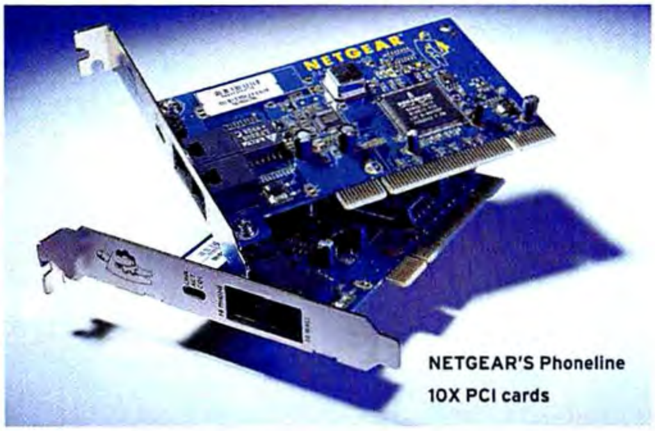
For these skeptics, the new 10-mbps home networking kits warrant a look. NetGear's Phoneline10X PCI Adapter is the first to hit the market. Like their 1-mbps predecessors, these products transmit data over existing phone lines in the walls of your home.

If you want a 10-mbps home LAN but don't have a phone jack near every PC, you'll soon have other options. By year's end, expect to see a new generation of 10-mbps wireless networks that use radio frequencies instead of wires and carry family-friendly prices.

HOME LAN HANDS-ON

WE INSTALLED a Phoneline10X card in each of two old Pentium-75s and found that the resulting network functioned as advertised. Like the first generation of home networking kits, NetGear's comes with software intended to let networking neophytes set up a LAN without worrying about IP addresses, gateways, or other arcana. After installing the cards, we simply popped in the accompanying CD-ROM, clicked *OK* a few times, and voilà, we had a network.

Once both Phoneline10X cards were up and running, we could open Windows' Network Neighborhood on one of the PCs, locate the other system, and start transferring files. Sending a 30MB image file from one machine to the other took about 50 seconds,



NETGEAR'S Phoneline 10X PCI cards

PHOTOGRAPH: ERIC BUTLER

versus 10 minutes with a first-generation 1-mbps product and 10 seconds using an up-to-date office LAN (which uses a mix of 10- and 100-mbps hardware). And you can still use your phones when the phone lines are sending data.

Sharing a printer is nearly as easy: In the preproduction version we tested, we used the Add Printer Wizard (from the Control Panel) to handle this task; NetGear says a desktop icon in the shipping version will automate the process. To share an Internet connection, you just tell the NetGear app which PC has the modem (the product supports standard dial-up connections as well as DSL and cable). Thereafter, the modem automatically dials when you fire up your browser from any PC on the LAN.

Phoneline10X PCI Adapter

Street price: $80; **NetGear;** 800/638-4327; www.netgearinc.com

PRODUCT INFO NO. 719

NetGear plans to sell the Phoneline10X kit, consisting of one PCI card and the necessary software, for $99 list (about $80 on the street).

As noted, NetGear is not alone. 3Com, Diamond Multimedia, D-Link, and Intel are introducing 10-mbps kits of their own; expect their pricing to be similar to Netgear's. Dell plans to offer a $69 10-mbps phone-line networking option on its Dimension desktops in time for the holiday season.

BETTER HOME LANs

THESE NEW phone-line products are part of a miniboom in faster home and small-office networking. The next big development will be fast, cheap wireless LANs. Compaq and 3Com plan to offer 11-mbps wireless networking cards by the middle of next year. While 11-mbps wireless networking is nothing new, the prices of these next-generation wireless cards (roughly $200 per node) should be about half those of wireless options today. Meantime, 3Com and Microsoft offer the HomeConnect Ethernet kit, designed to make setting up a 10-mbps LAN with traditional ethernet cabling feasible for home users.

As home networks, broadband connections, and intelligent devices proliferate in homes nationwide, even 10 mbps is likely to fall short. That's why Broadcom (a coauthor of the 10-mbps phone-line spec and a key chip supplier) is at work on a 100-mbps chip set. Products should begin appearing in 2001.

Do you need more than a 1-mbps network? If you want your home PCs to share a high-speed DSL or cable connection, the answer is yes. Ditto if you want to network more than three PCs in your house, or if you plan to shuttle huge files between computers. Otherwise, 1-mbps products should suffice—especially at the lower prices they're likely to have after their 10-mbps counterparts hit the market. Several vendors—Intel among them—say 1 mbps will remain the standard, and 10 mbps will be pitched as the premium. If you're among the holdouts who snubbed wimpy 1-mbps home networking products, you may want to consider the new 10-mbps offerings that deliver more muscle, albeit at a higher price.

—Dan Miller ■

area 51

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> The **beauty** of digital photography **lies in** what can be done with your work **after** the picture is taken

Chances are that every product, conviction, or strategy that's part of your personal or professional life started as basic concept and improved over time. Digital imaging, following that same course, has likewise matured. Over the past three years, prices have declined while ease of use, resolution, and image quality have improved so dramatically, you may no longer need to own a film camera.

"Now is a reasonable time to get involved with digital photography; it has come of age," says Michelle Lampmann, a market research analyst with InfoTrends in Boston. Citing statistics, InfoTrends predicts that vendors will sell 1.8 million cameras in 1999 worth $1.1 billion. "By 2003, unit sales will reach 7 million units annually, worth $2.6

The Kodak DC290 Zoom Digital Camera has two-megapixel resolution.

billion," says Lampmann, who predicts a 38% average annual growth rate for the entire digital imaging industry.

As do all successful new technologies, digital photography retains the best attributes of its predecessor, film-based photography, and minimizes the limitations. Digital photography captures photos using a solid-state image sensor. Images are held in memory instead of flashed onto silver halide film as with traditional cameras. Once you capture images digitally, you have many more options on how to show and share them. You can transfer them to a computer, view them on a television, post them on a Web site, or e-mail them to individual friends and family members anywhere in the world.

"In today's society, families and friends are spread out; they want ways to help them stay connected," says Lampmann. "With digital cameras they can see their pictures instantly. That allows people to share them over the Internet just minutes later."

If your family and friends, or business associates, are usually in the same room, even if the room is the size of a football field, cameras with a video out port make good sense. This output connector, sometimes called an "NTSC" port, is convenient for showing your photos to a larger group of people than can comfortably gather around a monitor or a photo album. Video out ports enable you to display images on a television, VCR, or certain kinds of powerful projectors without a computer.

> **"Now is a reasonable time to get involved with digital photography; it has come of age."**
>
> *—Michelle Lampmann, market research analyst, InfoTrends, Boston*

INSTANT QUALITY

Most people will agree that instant gratification is one of digital imaging's most attractive benefits. Others prefer to make an ecological statement and seek to avoid the cost and impact of chemical processing—without compromising the print's quality.

The CD-300 dye-sublimation digital printer from Canon U.S.A. Inc., Lake Success, N.Y., delivers high printing speed, performance, and image quality. Dye-sublimation photo printers, say analysts, best approximate the original subject's true colors, more so than any other color photo printing method. The CD-300 supports the new industry standard, the Digital Print Order Format (DPOF), enabling it to work with or without a PC. This newly developed standard allows a camera's (such as Canon's PowerShot S10) built-in LCD display to be used for tagging images with printing instructions, such as quantity and size. Other advanced features of the S10 include a dual interface that allows users to connect the camera directly to a PC's USB or RS-232C serial port, and five picture-taking modes.

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Combine instant gratification with high-quality output and a way to avoid chemical photo processing, and you have several other persuasive reasons to "go digital." Likewise, you can also say good-bye to buying rolls of film and waiting to expose the entire roll before processing it. Say good-bye, too, to any hesitancy about taking pictures that you're unsure about.

Consider the agony of indecision that plagued the famous photographer William Henry Jackson when he took a photo-

continued on page 8

Canon
PowerShot A50
DC215 ZOOM
HEWLETT PACKARD

SHUTTERBUGS BEHOLD. Canon's PowerShot A50 (left) and new PowerShot S10 offer shirt-pocket convenience. The 2.1 megapixel, 2X zoom S10 has a USB Interface and Type II CompactFlash compatibility. Kodak's DC215 (center) offers 2X optical zoom, a 1.8" color LCD, and a 4 MB Picture Card. Hewlett-Packard's HP PhotoSmart Digital Camera C200 (right) with 2X digital zoom has an 8 MB CompactFlash card.

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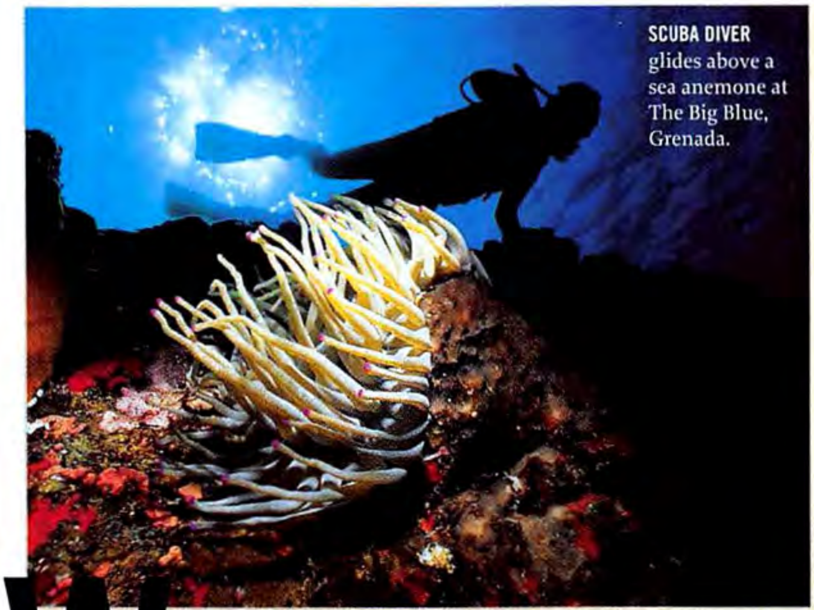
Ivy Halls, Coral Walls



SCUBA DIVER glides above a sea anemone at The Big Blue, Grenada.

JASON BUCHHEIM

WHEN ODYSSEY Expeditions rigs one of their 50-foot catamarans for an ocean cruise, they dedicate themselves to satisfying their guests' appetites for food and fun on the three-week voyages. They also pack laptops and digital cameras to satisfy their guests' intellectual appetites.

Operating out of the island of Tortola in the British Virgin Islands, the five-year-old Odyssey Expeditions offers a marine science program that includes college-level research of reef ecology, wreck exploration, and marine life studies.

Part of the curriculum includes digital photography. The school uses D-340 cameras from Olympus America Inc., headquartered in Melville, N.Y., outfitted with custom-made waterproof housings.

Program Director Captain Jason Buchheim says they migrated to digital imaging for some very practical reasons. "As part of our marine science program we have digital cameras on board the yachts to allow students to take underwater photographs. Following a dive, they just plug the camera into the on-board laptops and view their photographs immediately. They get instant feedback."

In addition to the underwater photography and an emphasis on marine science, the program teaches the mostly college-age students the finer points of sailing as well as scuba diving. Many students receive college-level credits for the research done at sea. "The students who are completing specific research projects in marine biology often incorporate the pictures into reports or presentations that they deliver when they return to school," notes Buchheim.

HOPE FLOATS

Even when the underlying reason is primarily educational, floating around the Caribbean on a catamaran constitutes an eclectic combination of research and pleasure. The all-inclusive cost for the voyage, including food and the educational programs, is $3,580. Students live aboard the catamarans for the length of the voyage.

"Students will make about 35 dives each over the three weeks," says Buchheim, "ranging in depth from 15 to 110 feet." Each of Odyssey's catamarans comfortably accommodates 10 students. Odyssey offers three voyages each summer.

Most underwater photographers use film cameras. Odyssey's technical staff successfully resolved some unusual challenges when adapting digital cameras for marine use. "Flash illumination was a problem," admits Buchheim. "We had to adapt the camera's housing to reflect the flash upwards, instead of forward, to eliminate light diffusion and reflections. The camera's flash triggers an external secondary strobe which actually lights the subject." Other specialized techniques include adapting special color correction filters to compensate for the water's bluish hue.

The thorniest technology resulted from the camera's helpfulness. "The first digital camera we tried powered itself off after a couple of minutes of non-use," says Buchheim. "Since we

A FLAMINGO TONGUE cowry (a mollusk) eats the tissue of a soft coral.

JASON BUCHHEIM

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A NURSE SHARK rests under a coral ledge at Blonde Rock, British Virgin Islands.

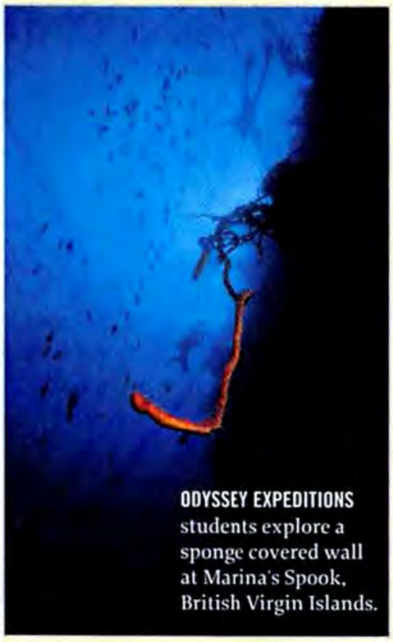
MARLOWE KULLEY

could not open the case underwater, we had to surface. The 340R doesn't have that problem. If it goes into sleep mode, we push a button remotely and it wakes up immediately."

Buchheim says they plan to upgrade the cameras but their problem is in finding the waterproof housings. Unlike film cameras where designs are fairly static, the shape of digital cameras changes often, and the companies that make the housings are reluctant to introduce new models. That's unfortunate, considering how the advances in digital imaging technology, especially in automating the shutter speeds and lighting, could help all photographers above and below sea level.

An example is Olympus' upgrade from the 300 series, the 9.5 ounce point-and-shoot D-450 Zoom. Olympus offers a special edition Millennium model recognizable by its stylish champagne-colored metallic body. The D-450's 3X optical-quality zoom lens, through-the-lens-focusing, combined with a high-contrast, wide-angle LCD display that's easier to see even in brightly lit areas, help ensure that you get the picture you want. At one million pixel resolution (1152 x 864), the D-450 generates sharply defined 5" x 7" pictures and can print directly to the Olympus P-330 Instant Photo Printer.

> **"We use digital photography on-board for two reasons. First, it provides immediate feedback for the students. Second, there are no one-hour photo stores on the ocean."**
>
> *—Captain Jason Buchheim, Odyssey Expeditions Program Director*



ODYSSEY EXPEDITIONS students explore a sponge covered wall at Marina's Spook, British Virgin Islands.

JASON BUCHHEIM

Because of limited space and power aboard the catamarans, students store the images. At the end of the voyages, Odyssey's staff transfers all the underwater photographs taken by the students onto a CD-ROM as a permanent reminder of tropical days, serene seas and, no doubt, good times.

And students who use film-based cameras can share the memories of the summer seafaring with friends. Kodak Picture CD service bridges the traditional gap that existed between film and digital cameras. The service from Rochester, N.Y.-based Kodak enables consumers to request that processors transfer their film-based pictures onto a CD-ROM. It's as easy as checking a special box on the film deposit envelope. The service typically costs about $10.00.

Consumers and professional photographers who do not own a computer can still take advantage of the added benefits of digital imaging. For example, they can transform Picture CD images into greeting cards by using special editing kiosks Kodak is placing in retail locations nationwide. Through services provided by NextCard, consumers can create personalized Visa credit cards with their pictures on them. So much the better to pay for that next Odyssey voyage. ★

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IMATION

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continued from page 2

graph. Jackson, astride his mule Donna, captured the earliest black and white images of majestic Rocky Mountain landscapes and the harsh reality of life throughout the American West during the late 1800s. Every photo he took required exposing a specially coated two-foot square glass plate that he laboriously lugged through sage and sand. Yes, it's a fair guess he carefully planned each scene.

You have no such indecision inhibiting your creativity. Experiment with lighting, framing, angles, and filters. Then evaluate the results immediately in the LCD screen and decide if it's a keeper or a discard.

Combine instant gratification with high-quality output and a way to avoid chemical photo processing, and you have several persuasive reasons to "go digital."

While entry- and mid-level snapshooters have embraced digital imaging, its adoption by professional photographers is more leisurely. That, despite the image quality of digital cameras exceeding two megapixel (optical) and three megapixel (interpolated). According to InfoTrends' Lampmann, professional photographers are still hesitant to adopt digital technology and migrate from a century-old technology.

Depending on their current familiarity with computers and digital technology, expert and professional photographers may face a somewhat steeper learning curve than beginners. Ironically, before they can achieve the time and cost savings benefits available to help them, they need to learn how to use a digital camera's advanced features. Once they learn how to maximize these new features, they will reduce their costs, save time, and potentially open up new revenue streams such as image enhancement.

THE WORLD AS YOU SEE IT

Just as the world of photography is no longer black and white, neither are you locked into an either/or choice. Once you've captured your image, photo editing software easily allows you to correct all-too-common imperfections, such as the demonic-looking "red-eye" (which is actually a photograph of the capillaries inside of the subject's eye). Photo editing programs enable you to cleverly crop the images, change someone's hair color (or give someone hair), modify brightness, and change the contrast. Add special effects and transform your Clark Kent into Superman with a few clicks and helpful image manipulation tools.

A good place to begin sampling the full range of digital photography's many benefits is with Photo Easy from IXLA USA Inc., Danbury, Conn. For an amazingly low price of $100, Photo Easy provides an all-in-one-box solution that contains a 640 x 480 digital camera plus a suite of editing, delivery, and image manipulation software.

Photo Easy is designed and priced to meet the specific needs of entry-level photographers. Experienced photographers seeking more professional features have an ever-wider choice of cameras with features that rival those once found only in top-of-the-line 35mm cameras.

Leading the charge to displace 35mm cameras are the megapixel cameras from Melville, N.Y.-based Nikon. The company's 2.1 million pixel Coolpix 950 and Coolpix 700 cameras create superior, sharp, and sassy images that can satisfy professional as well as serious amateurs. Both models feature Nikon's 256-element matrix metering system and high-precision auto focus. Of special interest to sports photographers are the cameras' two-second boot time and a continuous high-

continued on page 18

LEXAR
CAMEDIA
D-340R
OLYMPUS
Jasc Paint Shop Pro

CREATIVITY TOOLS. Lexar Media's "Digital Film" CompactFlash (left) is available in capacities from 16 to 80 MB. The 1.3 megapixel Olympus D-340R (center) features 3.3V SmartMedia 4 MB, Olympus aspherical glass lens, and f2.8/f5.6/f11 aperture. And Jasc Software's new Paint Shop Pro 6, which includes Animation Shop 2, offers a complete solution for creating Web graphics and enhancing digital images.

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Super Capacity Storage in Super Colors

ANALYSTS PREDICT that media vendors will sell more than four billion 1.44 MB diskettes this year. Perhaps if those diskettes held more data, consumers would not have to buy so many! The data storage problem is especially acute for owners of the newer digital cameras whose higher-resolution images can gobble up disk real estate. For example, a single 800 x 600 uncompressed image can consume 1/2 GB, far too much to fit on a 1.44 MB floppy disk.

The solution is to offload the images and free up the limited space on your PC's hard drive. One of the more popular products for extending the storage capacity of your laptop or desktop is the LS-120 SuperDisk. Imation Corp., based in Oakdale, Minn., offers both the SuperDisk drive and the high-capacity diskettes. The diskettes are likewise available from Maxell Corp. of America, based in Fair Lawn, N.J., with a special distinction—they come in the same "fruit colors" as do the Apple computers. Both Maxell's and Imation's diskettes each hold 120 MB, the equivalent of 83 floppy diskettes, enough to store dozens of JPEG or GIF images.

SuperDisks have an added advantage when compared to other removable media drives—compatibility. The SuperDisk drive can read and write to standard floppy diskettes. As an added bonus, it reads and writes data up to five times faster than the snail-paced floppy.

IMATION
SUPER DISK
120MB

SUPER OFFERING. Imation Corp. sells both the SuperDisk drive and diskettes, which hold the contents of 83 floppy diskettes.

maxell
SUPER DISK
120MB
maxell
SUPER DISK
120MB

COLOR CODING. Maxell's "Rainbow 10 Pack" of SuperDisk diskettes, which match the iMac case colors, can help catalog your work.

Bob Amatruda, an analyst with Framingham, Mass.-based International Data Corp. (IDC), particularly values this backward compatibility. "If you have a closet full of floppies, the SuperDisk is a clear winner for you," he says. As testimony to the increasing popularity and utility of removable media drives, IDC predicts that shipments of all drives will rise from 15 million units in 1998 to 36 million by 2000, and 75 million by 2002.

> **"If you have a closet full of floppies, the SuperDisk is a clear winner for you."**
> *—Bob Amatruda, analyst, IDC, Framingham, Mass.*

MULTIPLE MEGABYTES, MULTIPLE CHOICES

Imation's SuperDisk drives are available in four primary models. For fast external hookup, the parallel port and Universal Serial Bus (USB) models can't be beat. The parallel port design shares the PC's printer port with the printer. Imation's special drivers set up the link in moments. If your PC has a USB port, take advantage of this model's higher data transfer rate and even simpler setup. Laptop owners have even more choices. They can use the parallel port or USB versions, or connect via their machine's PC Card slot. Purchasers of new PCs, or handy upgraders, can gain the benefits of extra storage with the internal model. All models provide convenient, safe and fast extended storage, and ease the process of exchanging images between machines or colleagues.

Imitation has announced a special hardware bundle for Mac users, many of whom prize the Mac for its exceptional graphics handling ability. Hot-pluggable USB SuperDisk drives, which have proved popular among iMac users who purchase external drives, are now available to Mac users as well. The bundle includes a USB Card that allows users to add two standard USB ports to any PCI-based Macintosh running Mac OS 8.1 or above. Although the drives may be beige, the disks are not. Maxell's "Rainbow 10 Pack" diskettes match the Apple iMac's case colors. Aside from the aesthetic implications, colors can ease the task of cataloging your growing image collection.★

IT'S ALL IN THE CARD

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Photograph taken with an Olympus C-2500L digital camera on Lexar Media USB enabled 8x digital film.

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Digital Camera Resources

▸ WWW.DIGICAMPAGE.COM

This independently operated, consumer resource Web site is dedicated solely to providing the latest news and information about digital cameras and software. This highly recommended site offers a wealth of information about a comprehensive variety of digital cameras. Buyers will appreciate links to competitively priced sellers and advice on determining the best camera selection to fit your needs. You will also find easy reading information about peripheral hardware and add-ons, such as memory cards. Finally, when you're ready to trade up, the site offers a classified section where you can buy or sell used equipment.

▸ WWW.DBUSCH.COM

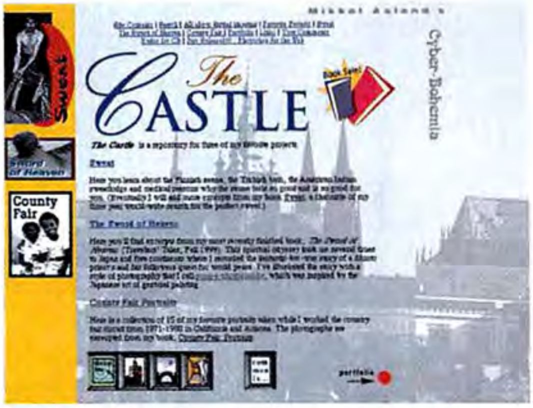
This site opens with a tongue-in-cheek parody of *The Blair Witch Project* Web site. In fact, humor and self-deprecating parody permeate the site. Beginning on the main page, you will find helpful hints and suggestions for using digital cameras, software, scanners, and other related hardware and software to create top-of-the-line digital images. If you, like Dave, have a particular fondness for using Kai's Power Tools and Photoshop, click into his Astonishing Web Graphics page for some tips to create dazzling special effects. Searching for stock digital images? Check out the free clip art, much of it a cut above the ordinary.

▸ WWW.CYBERBOHEMIA.COM

What do digital photography, Shinto, county fairs, and saunas have in common? Well, at one time or another they have all caught the attention of Mikkel Aaland, whose Cyber-Bohemia Web site seems to be a testament to these noble (and occasionally unusual) pursuits. This is an author who has written about digital photography (his books are available at his site), and completes digital photographic projects which are updated at Cyber-Bohemia. For examples of the wide breadth, click into his latest imaging efforts, which he calls Sumi-e photography. Odd and interesting.

▸ WWW.DAVIDTAYLOR.FREESERVE.CO.UK

David Taylor is not the owner, CEO, or president of a company, just your average digital imaging aficionado who seems occasionally obsessed with digital photography. While his technical skills at creating Web pages are extremely modest (by his own admission), Taylor does seem to know a lot about digital cameras and related products, and is quite willing to share his insights. He offers detailed descriptions of the hardware he uses, along with a sampling of vacation photos that illustrate his specific techniques. Taylor also provides a selection of free software for use with digital cameras.



CLICK THE CASTLE for three favorite projects of Cyber-Bohemia's Mikkel Aaland, including his search for a perfect sweat. *www.cyberbohemia.com*

▸ WWW.MEMBERS.HOME.NET/JONESPM/PJDIGPHOT.HTM?1START

Web site-meisters, operators, and wannabes take note: "This site is about how to select, understand and use digital cameras, image editors, printers, and scanners, and use the result to build Web sites," states the Digital Photography Reference site. And they deliver on the promise. Here you'll find scads of information on hardware and software—including an easy test to calibrate your monitor's color and brightness settings. But what's more, this Web site offers an encyclopedic selection of tips, suggestions, and strategies to integrate all of the products and ideas to create attractive and technically fascinating Web sites.

▸ WWW.JASC.COM

Jasc Software offers insights and tutorials on how to maximize the use of their top-notch image editing and manipulation software, Animation Shop 2 and Paint Shop Pro 6. In addition, the Jasc home page has some extra goodies, such as a chat arena where users can exchange tips, insights, get help, or even air gripes, plus you can advise them on features you would like included in future releases. The Jasc Digital Studio page whisks you to a virtual gallery where you can view artwork, ranging from beautiful to bizarre, created with Jasc's software—and submit your own for all the world to admire! ★

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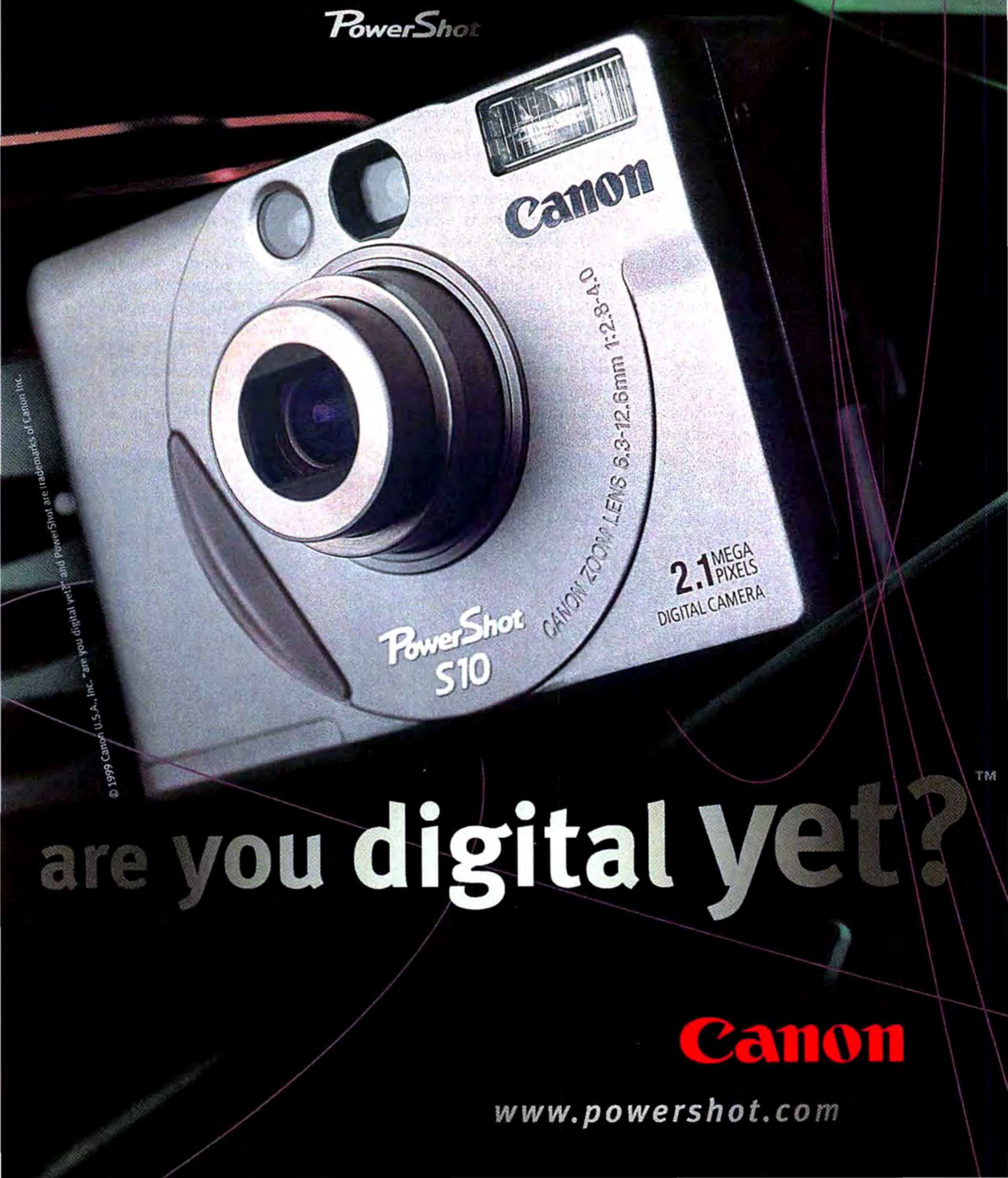
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Harry Potter Meets Digital Cameras

IT IS COMMON TO see digital technology in various forms in the classrooms of American schools today, including digital cameras. They have become particularly useful in science classes, where the cameras are used to record and study nature and in-class experiments.

But what about using digital cameras in a middle school language arts setting? Could there be any real use for them beyond keeping kids entertained with what is an inherently "fun" medium?

The answer is a resounding yes, and the reason is simply this: Everyone is familiar with the old maxim, "A picture is worth a thousand words." The fact is, research has shown that when children use visual aids when preparing writing assignments, such as essays or other written class projects, the pictures stimulate and motivate the creative part of the brain we usually associate with endeavors like art and music. That is, pictures can arouse that creative sense, and out pop the words. And words are what language arts are all about.

In a suburb west of Boston, one teacher is finding digital cameras to be an exciting addition to her language arts curriculum. As one recent visit to her classroom showed, her sixth-grade students are embracing the use of digital cameras with enthusiasm and zeal.

"No matter what you're teaching, you have to appeal to the kids' visual sense today, that's just the way it is," notes Fran Ashe, who has taught in the Holliston, Mass., school system for 14 years. "You need to find ways to hook kids in and get them excited about writing. That's what digital cameras can do."

Ashe got her own start using digital cameras last summer when, as a Fullbright Memorial Fund recipient, she spent several weeks in Japan. There, using the Sony Mavica digital camera from Sony Electronics, Park Ridge, N.J., given to her by a parents group, Ashe took some 850 digital images, far more than she would have

KURT STIER

SMILING FOR THE CAMERA. It's much ado about learning in Fran Ashe's sixth grade class as students get their first lesson in using digital cameras. They will be used throughout the year to enhance the language arts curriculum.

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taken with a conventional camera.

She immediately began e-mailing images to her class and also created a Web page where the other 200 teachers she joined in Japan were invited to view and download the images.

"I was surprised how easy it all is," says Ashe. "You see your work immediately and can retake the shot until you get it the way you want it. You can't do that with a regular camera."

Back in the classroom this fall, Ashe began exploring the digital camera as a language arts development tool. Her fifth grade class has established a pen-pals relationship with a school in Australia and will begin sending digital images of their classroom, their town, and themselves. The sixth grade class will do so with a school in New Zealand.

Ashe notes that the children will be far more motivated and excited to write when they are charged with describing the very photos they took and which they are transmitting.

Other uses of digital cameras in Ashe's class will include having the children take pictures to illustrate books they create; the photos can also be used as the visual basis for writing poetry, and for writing about nature. The students will be able to display their work on monitors or print it on the Hewlett-Packard color printer.

A FIVE-MINUTE EXERCISE

Meanwhile, teaching the children how to use the camera was a five-minute exercise, not one minute more. With this minimal instruction, Ashe had her class taking a variety of shots of one another, as each group of kids tried to "ham up" their poses more than the previous group.

Then it was back to the classroom where they displayed their images and began printing out their work. The thrill of their activity was all too apparent.

When children use visual aids with writing assignments, pictures stimulate the creative part of the brain usually associated with art and music.

"It's great seeing your picture right away and being able to take another one if you don't like the first one," says Meredith Stone, one of Ashe's sixth grade students. "It's really easy."

"I want to be able to play with the pictures on the screen and change them, maybe put my dog's head on top of my friend's shoulders," says Perry Laberis, thinking ahead to doing some photo manipulation.

With Ashe, it's a lot more than fun and games, though she is not averse to having fun in the classroom either.

"I've shown the digital camera to other teachers and at first they are just like the kids," Ashe says. "But they quickly grasp the benefits in whatever teaching setting they are in, whether it's science or math or whatever. I feel we are just scratching the surface." ★

KURT STIER

INSTANT GRATIFICATION. Kids thrive on the instant results they obtain with digital cameras, rushing back to class to display and print their work. Photos from this Holliston, Mass., classroom will be e-mailed to their pen-pals class in New Zealand.

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continued from page 8

speed two-frames-per-second capture mode. Images captured in the new models can be saved in an uncompressed TIF format plus a choice of three JPEG compression formats that will maximize the storage capacity of the camera's 8 MB CompactFlash storage card. Other cards are available in capacities up to 64 MB—capacities that will appeal to photographers who prefer not to compress their images.

Strictly speaking, compression and image format are not camera features. Most of the time they're decisions the photographer makes. The equation is a simple one. The greater the degree of compression, the smaller the file's footprint—but image quality suffers. The reverse also holds true.

> **"CompactFlash will become the standard [among today's many storage options] for storing images in digital cameras and data in handheld devices."**
>
> *—Gerry Purdy, analyst, Mobile Insights, Mountain View, Calif.*

JPEG, along with GIF, are two of the most popular image formats because they can reduce an image file's footprint by as much as 90%.

If preserving image detail is paramount to you, use the Tagged Image Format (TIFF or TIF). The downside of using TIF is that it will only reduce a file's footprint by about 15%, and in some cases, not at all. An uncompressed megapixel image can consume between 3 to 5 MB. Compressed, it will shrink to a mere shadow of its former self, as little as 400 KB. As a result, experts suggest that you store only those images that you intend to enlarge beyond 5 x 7 inches or plan to publish in a print medium. Generally, JPEG and GIF compression can reduce an image's footprint to as little as 5% of its original size.

Removable storage options such as CompactFlash, SmartMedia1, plus several other emerging solid state memory card formats can competently solve the storage problem by offering what amounts to infinite capacity.

Gerry Purdy, an analyst with Mobile Insights, Mountain View, Calif., understands the confusion the many storage options can create in the minds of consumers and has a simple answer. "CompactFlash will become the standard for storing images in digital cameras and data in handheld devices," he says.

Not all CompactFlash is created equal. Look for cards with high-speed transfer capability. Fremont, Calif.-based Lexar Media Corp.'s "Digital Film" CompactFlash delivers a blazing host-to-card data transfer rate of about 1 Mbps. Available in capacities ranging from 16 to 80 MB, the cards fit into Lexar's JumpSHOT Universal Serial Bus to create a high-speed connection to a PC or a Mac. Lexar's USB-enabled CompactFlash cards adhere to industry standards, enabling you to use them in any compatible device such as cellular phones and MP3 players. Another primary appeal of CompactFlash, aside from its featherweight and ultra-compact size, is the elimination of moving parts. It is also inherently shock-resistant.

If your primary interest is casual snapshooting, you may not need a top-of-the-line camera like Nikon's Coolpix models. For you, Hewlett-Packard Co., Cupertino, Calif., offers an attractive alternative designed for entry-level photographers. HP's next-generation PhotoSmart C200 digital cameras and printers enable cost-conscious consumers to capture and print high-quality digital photos directly from their cameras, eliminating the need for a computer. The printer generates richly colored images in resolutions up to 2400 x 1200 dots per inch. It accepts input from an infrared signal generated by HP's C200 and higher-resolution C500 cameras, as well as from data stored in Compact Flash and SmartMedia removable memory storage cards. ★

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DIGITAL ON DISPLAY. Photo Easy (left) from IXLA is an all-in-one-box solution that contains a 640 x 480 digital camera plus editing, delivery, and image manipulation software. The HP PhotoSmart C500 digital camera (center) is a 2 megapixel (1600 x 1200 pixels) solution that features 3x optical and 2x digital zoom (6x total zoom). And Nikon's Coolpix 950 offers Nikon's 256-element matrix metering system and high-precision auto focus.

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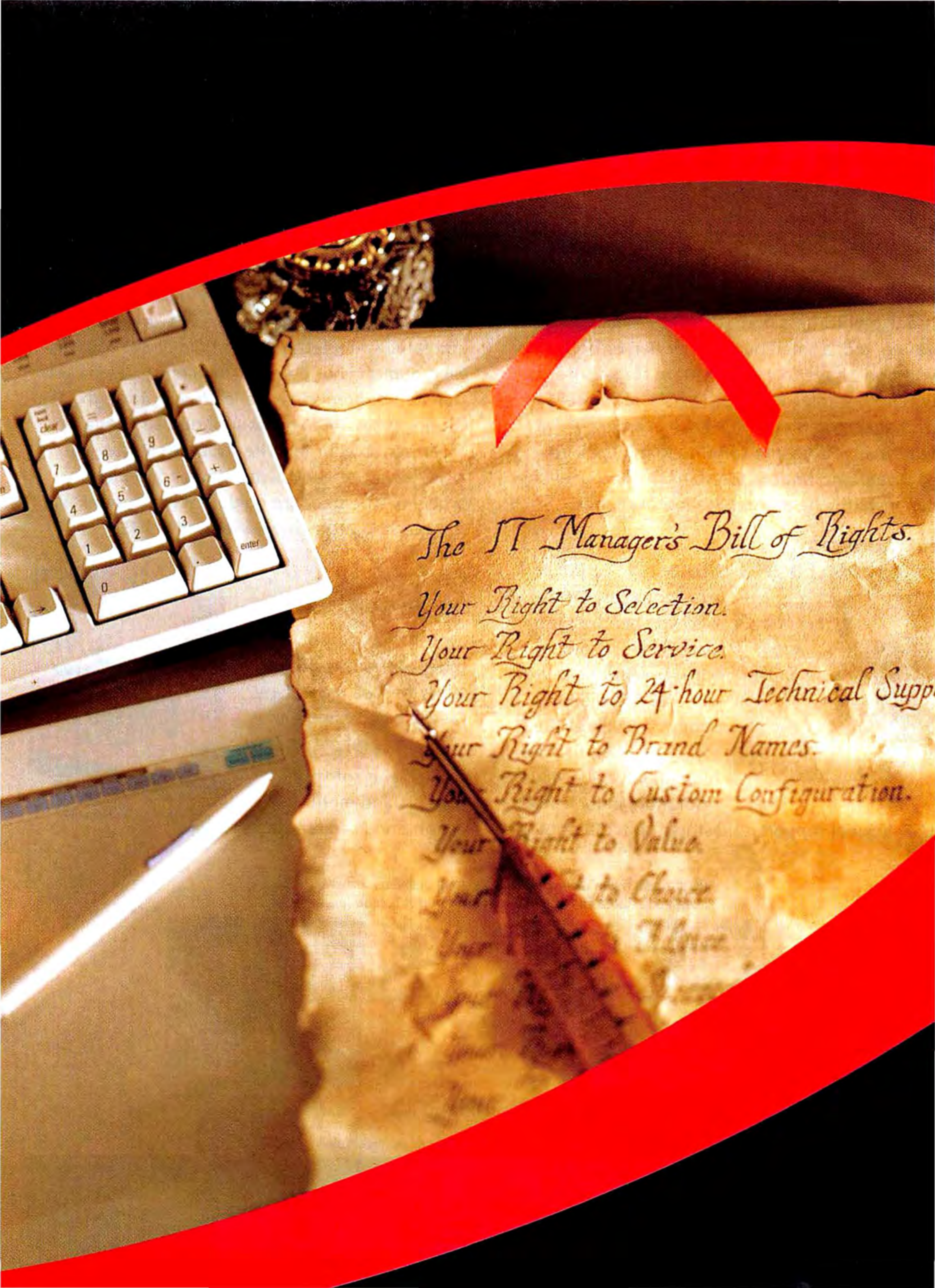
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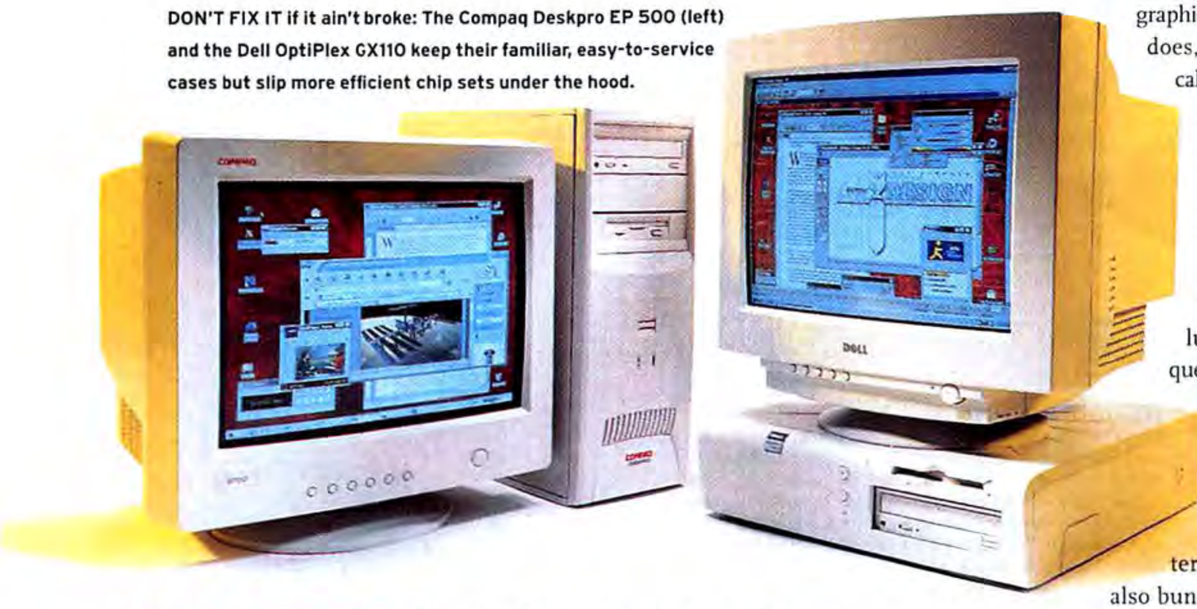
NEW PRODUCTS

Intel's 810e Gives Business PCs Multitasking Muscle

DON'T FIX IT if it ain't broke: The Compaq Deskpro EP 500 (left) and the Dell OptiPlex GX110 keep their familiar, easy-to-service cases but slip more efficient chip sets under the hood.



DESKTOPS

EXTRA PERFORMANCE in a solid, well-known package—at no extra cost. Sound too good to be true? In the case of the latest versions of Compaq's **Deskpro EP 500** and Dell's **OptiPlex GX110**, it's not. These tried-and-true corporate systems are among the first PCs to use Intel's new 810e system chip set, which boosts multitasking performance. But each PC's price remains unchanged at slightly less than $1450, which gets you a Pentium III-500 CPU, 128MB of RAM, and Windows 98 Second Edition. Both units are terrific values—you may get a bit more hardware for your money from other vendors, but the manageability and stability these systems provide makes their cost worthwhile.

WHAT'S NEW

SHIPPING UNITS of the two systems performed almost identically in our PC WorldBench 98 tests: the Compaq scored 223, the Dell 231. Those marks, about average for this processor class, indicate beyond-adequate speed for standard business tasks. But both PCs truly aced our new multitasking test, in which systems do file extraction in the background while performing tasks in several popular applications. The Compaq earned a score of 311, and the Dell posted a 301 (lower figures are better)—both about 20 percent superior to the scores of Pentium III-600 PCs using either the old 440BX chip set or the new VIA chip set.

The 810e chip set is the simpler and cheaper sibling of the troubled 820. Designed for mainstream business systems such as these, the 810e does not support RDRAM, a fast new flavor of memory that created problems for the 820. But like the 820, the 810e supports individual controller hubs for memory and input/output; these separate controllers contribute to its multitasking muscle. A 133-MHz pipe between the chip set and the processor—replacing the old 100-MHz bus—helps, too. Finally, the 810e integrates graphics as the budget 810 does, in a scheme Intel calls Direct AGP. This setup helps vendors reduce costs, but it means that you'll need to add a PCI card if you want to upgrade your graphics, a solution that delivers questionable performance benefit.

Both systems' cases come off without tools, revealing uncluttered interiors. Both also bundle ethernet cards, 17-inch monitors, and Web-based management software suited for workgroups of up to 500 people. As you'd expect with corporate systems, both are DMI 2.0-compliant.

Our OptiPlex's low-profile chassis had three free PCI slots but no ISA support, and its three bays were all occupied. Dell does provide a 13.5GB hard disk, and cables are color-coded.

The Deskpro EP 500's minitower offers more expansion room and has a couple of ISA slots. If you'd rather have a desktop, you don't have to change cases: Simply slide out the drives, rotate them 90 de-

PHOTOGRAPH: MARC SIMON

102 Compaq Deskpro EP 500, Dell OptiPlex GX110

103 Jasc Paint Shop Pro 6

104 Compaq Presario 305; Corex CardScan 500

106 Epson Stylus Scan 2500, Xerox WorkCentre XK35c; SmartOnline.com

108 Gateway Astro; Matrox Marvel G400-TV

112 Microsoft Encarta Reference Suite 2000, Year 2000 Grolier Multimedia Encyclopedia; Wow Thing, Labtec LCS-2514 4.1

119 L&H Voice XPress Personal Finance; Compaq Aero 1500

122 DoughNet, iCanBuy, RocketCash; Acer WarpLink Communicator Card

126 Deneba Canvas 7, Microsoft PhotoDraw 2000

Deskpro EP 500

PRO: Flexible, easy-to-service case.

CON: Slightly slower performance than the Dell, small hard drive.

VALUE: Solid manageable PC for mainstream business use.

Street price: $1449

Compaq

800/345-1518

www.compaq.com

PRODUCT INFO NO. 714

OptiPlex GX110

PRO: Good performance, compact, easy to service.

CON: No free bays and no ISA slots, less versatile than the Compaq.

VALUE: Bargain for offices with limited desk space and no legacy cards.

Street price: $1430

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grees, and lay the unit on its side. The process is easy and quick, with bright green tabs to help you find most key parts and levers (but not the drives' power connectors). Compaq color-codes all external cables and ports to make hookups painless. The system's 6.4GB hard disk is skimpy, but an extra $104 buys a 13.5GB drive.

Both systems fulfill their intended roles as business workhorses. The Deskpro is the more versatile of the two, offering several components that can be scaled to fit the size of your business, while the OptiPlex is best suited for a smaller office or department and gives you a bit more hardware for your money. Buying an 810e-refreshed PC in either of these lines is a no-brainer: You get more, but you don't pay extra for it.

—*Anush Yegyazarian*

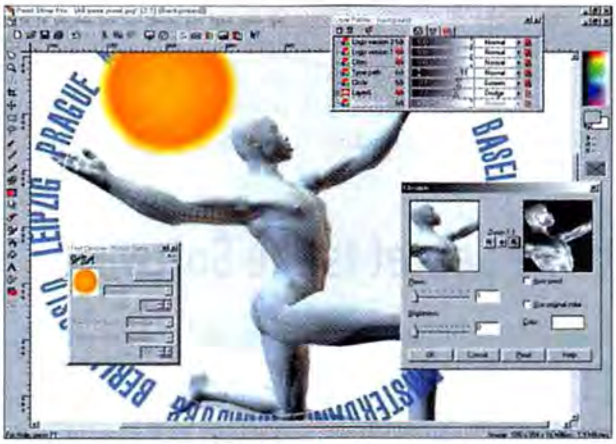
Paint Shop Pro 6 Goes Beyond the Basics

IMAGE EDITOR

TWEAKING PICTURES is fun, but novice-oriented image editors can grow stale. For a more capable program, consider Jasc Software's **Paint Shop Pro 6**. At $99, it packs some of the same powerful tools found in Adobe Photoshop but at a sixth of the price.

I installed the full 75MB shipping version. Once shareware, Paint Shop Pro now boasts more than 15 million users, and has piled on features such as image layers and automated special effects. Paint Shop Pro would be a maze of options if not for two clearly worded manuals, free technical support, and a Web site with tips and tutorials.

With version 6, I could optimize JPEG and GIF graphics for the Web; embed or read watermarks on documents; and work with more file types, scanners, and digital cameras than in previous versions. I maintained a clear view of my work because idle tool palettes now roll up to the title bar automatically. And with the new vector tools, I drew objects, typed along their paths, and resized them freely on screen, something you can't do even in Photoshop. Also new: character-level text formatting, a multicolor gradient tool, and more special effects options.



PAINT SHOP PRO 6 sports more Web tools and typographical tricks and a better-integrated animation tool, but it remains easy to use.

For Web sites and presentations, the bundled Animation Shop, now in version 2, is more integrated—when I retooled a graphic in Paint Shop Pro, corresponding images in my Web animation files also updated. From a single frame, I could crop an entire movie's dimensions or display registration marks so I could place elements precisely.

Graphics pros will want finer color controls, vertical type, and the ability to record steps taken to create an effect (for replay on other projects). But for most novices, Paint Shop Pro 6 is a smart step up. Before forking out big bucks for another image editor, check out Jasc's trial version.

—*John Goddard* ▶

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

Paint Shop Pro 6

PRO: Affordable, optimizes Web graphics, more tools and effects than earlier versions.

CON: No vertical type tool, can't record editing sessions.

VALUE: Powerful picture editing for a low price.

List price: $99, upgrade $39

Jasc Software

800/622-2793

www.jasc.com

PRODUCT INFO NO. 716

Versatile New Presario Lightens Your Load

NOTEBOOK

WHEN YOU'RE hustling to make a flight or hauling yourself from class to the library, more than a few choice curses spring to mind—you feel every last one of your clunky portable's 9 pounds. But ultralights are either too expensive or lack features you need. Enter the new Compaq **Presario 305**. Adapting an Armada design, the Presario 305 can be configured to 0.9 inches thick and an amazing 3 pounds 5 ounces—yet it costs just $2199. This is no scaled-down Windows CE device or bare-bones corporate system. It's a full-function Windows 98 notebook, powered by a Celeron-333 CPU and sporting a bright, rich 11.3-inch active-matrix screen. And it's available now at a store near you.

COMPAQ'S PRESARIO 305 slims down to slightly over 3 pounds without its "media slice."

The Presario 305 balances features and portability by letting you configure it for your needs. To play a CD game or install software, just attach the multimedia expansion unit, or *slice*, which contains the floppy and CD-ROM drives. The slice fits neatly under the main body; with it, the svelte 305 gains just 2.5 pounds and becomes 0.85 inches thicker, for a total of 1.75 inches. Leave the slice at home when you don't need the CD-ROM drive; you can detach and use the floppy drive externally with the included parallel port cable.

The Presario 305 has two USB ports (one is on the slice), an infrared port, and one PC Card slot. It also comes with Works Suite 99.

You don't sacrifice speed for the low weight. The Presario delivered a PC WorldBench 98 score of 167, par for its chip class. The 4.8GB hard drive should suit most, and our shipping unit had 64MB of RAM. We found the extensive documentation helpful.

The Presario 305's touchpad is particularly responsive, but some of its keys are tiny. The directional arrow keys and the programmable ones for accessing the Internet will be irksome for those with large hands—I had to push the programmable keys with a pen. Nevertheless, that seems a small price to pay for such portability.

—*Cameron Heffernan*

Presario 305

PRO: Ultralightweight notebook doesn't skimp on features.

CON: Undersize keys may take some getting used to.

VALUE: Great price for those who need maximum portability.

Street price: $2199

Compaq

800/282-6672

www.compaq.com

PRODUCT INFO NO. 717

TEST PC WORLD CENTER THIS PRODUCT has been evaluated using tests designed by the PC World Test Center.

CardScan 500: The Secret Is the Software

CARD SCANNER

UNLESS YOU are obsessively organized, that collection of business cards you've amassed over the years is about as useful as an 8-track tape. A card scanner can turn a sloppy pile into orderly information. One of the better models on the market, Corex's CardScan, just got better still, thanks to a couple of hardware tweaks and a software update that adds several useful features.

The scanner itself does not exactly display blazing technology, but the software does. Clean, simple, and quick, the **CardScan 500** turns paper-based business cards into an on-screen digital card file. Version 5 adds a number of improvements, two of which are particularly helpful. The first lets you scan both sides of a card—especially handy if you used the card as a notepad. CardScan can't convert your scribbles into text, but you can dredge them up at any time by looking at the card's image view. (Unfortunately, the images aren't stored in a format that you can convert into text with other applications.)

The second boon: better updates between my PIM and CardScan. The application now automatically synchronizes your CardScan with most PIM databases, including Lotus Notes, which typically doesn't like to talk to anything. Scanning accuracy is still imperfect, but it passes the to-hell-with-it test: Making corrections is nearly effortless compared to typing the information in by hand.

The CardScan has evolved from a frumpy, rounded gray box to a more stylish, sculpted black box. Its best new hardware feature is a USB port that joins the standard parallel port. The USB port makes it much easier to connect the unit and doesn't require daisy-chaining your printer. Corex has also added a simple, effective card catcher, but I'd still rather not have to feed cards in one by one. Maybe next time.

—*Tracey Capen* ▶

CardScan 500

PRO: Easy, accurate, and fast business-card scanning.

CON: Not cheap, and you have to feed cards one at a time.

VALUE: A must for anyone who collects boatloads of business cards and wants to actually use them for something.

Street price: $299

Corex Technologies

800/942-6739

www.cardscan.com

PRODUCT INFO NO. 718

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Epson and Xerox Pack More for Less

MULTIFUNCTION DEVICES

MULTIFUNCTION devices combine a printer and a scanner (and sometimes a fax) in one box, but you pay for the convenience. Two new MFDs, Epson's **Stylus Scan 2500** and Xerox's **WorkCentre XK35c**, are the first to provide platen-based—not sheet-fed—scanning at a reasonable cost. Both also offer color ink-jet printing but with trade-offs.

At $449, the Epson costs $100 more than the Xerox, but it's more complete. The preproduction unit I tested included a faxing mechanism as well as the new Epson Smart Panel software. The innovative Smart Panel acts as an on-screen control center from which you can begin any process—a compelling plus for beginners. (The separate controls other devices use for each function are rarely intuitive.) However, setting up my unit was confusing; a forthcoming guide will help. The Stylus Scan 2500 is based on an engine from a mediocre printer, so its output is a bit fuzzy. For important correspondence or résumés, invest in ink jet paper. The unit is also rather loud.

XEROX'S WORKCENTRE XK35c has great print quality but can't fax.

At $349, the Xerox WorkCentre XK35c is the cheapest platen-based MFD around. This shipping model is also quieter, shorter, and slightly slimmer than the Epson. And because it uses the same engine as a recent Best Buy printer, it delivers top-notch output. The downside: It has no fax mechanism. Its control panel, designed for international use (read: it has no words), is utterly baffling. And its software isn't integrated.

Epson's fax capability and Smart Panel weigh in its favor, but for top print quality, choose the Xerox. Although the perfect MFD remains elusive, Epson and Xerox have made progress.

—Karen Silver

Stylus Scan 2500

PRO: Handy one-stop software control, includes fax.

CON: Complicated setup, middling output quality, noisy.

VALUE: If you need to fax, handy integrated software makes the cost worthwhile.

Street price: $449

Epson America

800/463-7766

www.epson.com

WorkCentre XK35c

PRO: Strong output quality, least expensive platen-based MFD, quiet.

CON: Does not include fax; confusing control panel.

VALUE: A steal for those who don't need to fax–and who demand top-notch output.

Street price: $349

Xerox

800/832-6979

www.xerox.com

PRODUCT INFO NO. 697

SmartOnline.com: Small-Business Resource

WEB SITE

WHEN STARTING a small business, you need all the help you can get. Creating a business plan, figuring out a marketing strategy, and incorporating can be daunting tasks. **SmartOnline.com** is an online business center that can help guide a start-up company in each of these areas. The site can be a bit tricky to navigate and isn't as fast as a hard-disk-based application, but it is inexpensive and you pay only for what you use.

You can select from some 500 customizable business letters, covering everything from hiring a new employee to apologizing to a supplier for a late payment. Simply enter details such as your name and address into the template; Smart Online generates the complete letter, which you can download to your computer and print on your letterhead.

The business letters are free to registered Smart Online members (registration is free), but you'll pay up to $25 for other SmartOnline.com services, such as the business and marketing plan generators and the Smart Incorporator, which guides you through the steps required to incorporate your business in any state.

Navigating Smart Online's applications can be tricky. If you deviate from their normal progression of steps (to search online help, for instance), they don't always return to exactly where you left off.

You can buy programs that will operate faster off your drive and do many of the same things as SmartOnline.com. However, SmartOnline.com is updated to stay current and is available any time you need it, at a relatively modest charge. It's one way for a small business to stay competitive with the big guys.

—Richard Morochove ▶

SmartOnline.com

PRO: Small-business marketing and administrative help available on call.

CON: Navigation is a little awkward.

VALUE: A real bargain for occasional use.

Price: Services range from free to $25

Smart Online

919/765-5000

www.smartonline.com

PRODUCT INFO NO. 698

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Gateway Launches All-in-One PC

HOME PC

GATEWAY'S NEW ASTRO won't win any racing trophies, but first-time buyers will appreciate its ease of use and low price.

GATEWAY'S **Astro** is the latest in a fledgling flock of all-in-one PCs (yet another trend to lay at iMac's feet). It should appeal to Windows junkies who can live without designer colors, or first-time computer users looking for a no-hassle way to connect to the Internet or use a word processor. The beige Astro, boasting a sleek, curvy shell that encases a 15-inch CRT monitor, a 56-kbps modem, speakers, and a 400-MHz Celeron CPU, sells for $799 ($400 less than a similarly configured iMac).

A sturdy built-in handle makes the Astro a snap to lift out of the box. The company includes an illustrated setup poster, as well as icons on the desktop for easy access to a system tour, sound and video controls, and help menus. Four USB ports, two on the side and two in the back, simplify hookup. The USB scroll mouse, which accommodates either right- or left-handers, fits into the keyboard's USB port, leaving three USB ports free for adding a printer or digital camera. However, there are no serial or parallel ports, so if you want to use older peripherals, you'll have to buy an adapter. Gateway sells a USB-to-parallel adapter for $45.

Performance and multimedia are not the Astro's strong suits. It integrates Intel 810 graphics that draw upon the PC's 64MB of system memory. Our preproduction system lagged at some tasks like playing 3D games. Forget about DVD movies—the unit comes with a 17X–40X CD-ROM drive and has no DVD option. The Astro's integrated sound and speakers produce a tinny, clock-radio sound with precious little bass. And the 4.3GB hard drive is small by today's standards; you can swap it out yourself, but Gateway expects most users will get help for this upgrade.

Gamers and multimedia buffs should stay away, but novices or those seeking an inexpensive second PC are likely to be satisfied.

—*Michelle Campanale-Surkan*

Astro

PRO: Low price, easy setup, lots of USB ports.

CON: Tinny sound, limited graphics, small hard drive.

VALUE: Best for PC novices who won't be playing the latest games or listening to loud music.

Street price: $799

Gateway

800/428-3929

www.gateway.com

PRODUCT INFO NO. 699

Many Graphics Functions, One Marvel Card

GRAPHICS CARD

MATROX'S **Marvel G400-TV** is an excellent value for users who want to do more with their graphics card than pump signals to a PC display. The G400-based Marvel comes with 16MB of RAM plus a connector box that you can hook up to a VCR or a camcorder to capture video. You get a built-in TV tuner and the expected 3D acceleration for the latest games, all for just $299—considerably less than you'd pay to buy a separate card for each of these functions.

The Marvel is the only all-in-one AGP card, and the *only* card in this price range, to provide high-quality Motion JPEG hardware video compression. Our shipping card captured 704-by-480-resolution video at 30 frames per second with no dropped frames and excellent image quality. Unfortunately, the resulting 2.5-minute video took up 268MB. An included app converts JPEG files to more compact MPEG-2 files.

The card's dual-head design lets you edit video clips on a monitor and watch the result on a connected television at the same time. But you can't attach two monitors for one big tiled display.

In our 3D-game testing, the Marvel produced acceptable results. We saw minor banding and blockiness in Turok, and slightly chalky contrast in Quake II's darkest scenes. However, the card shows good 3D textures, and it should please all but fanatical gamers.

This card's multiple capabilities and good performance make it a genuine bargain.

—*Alan Stafford* ▶

Marvel G400-TV

PRO: Excellent hardware compression, ultrahigh resolution.

CON: You can't connect two displays.

VALUE: Saves money if you perform multiple graphics and video tasks.

Street price: $299

Matrox Graphics

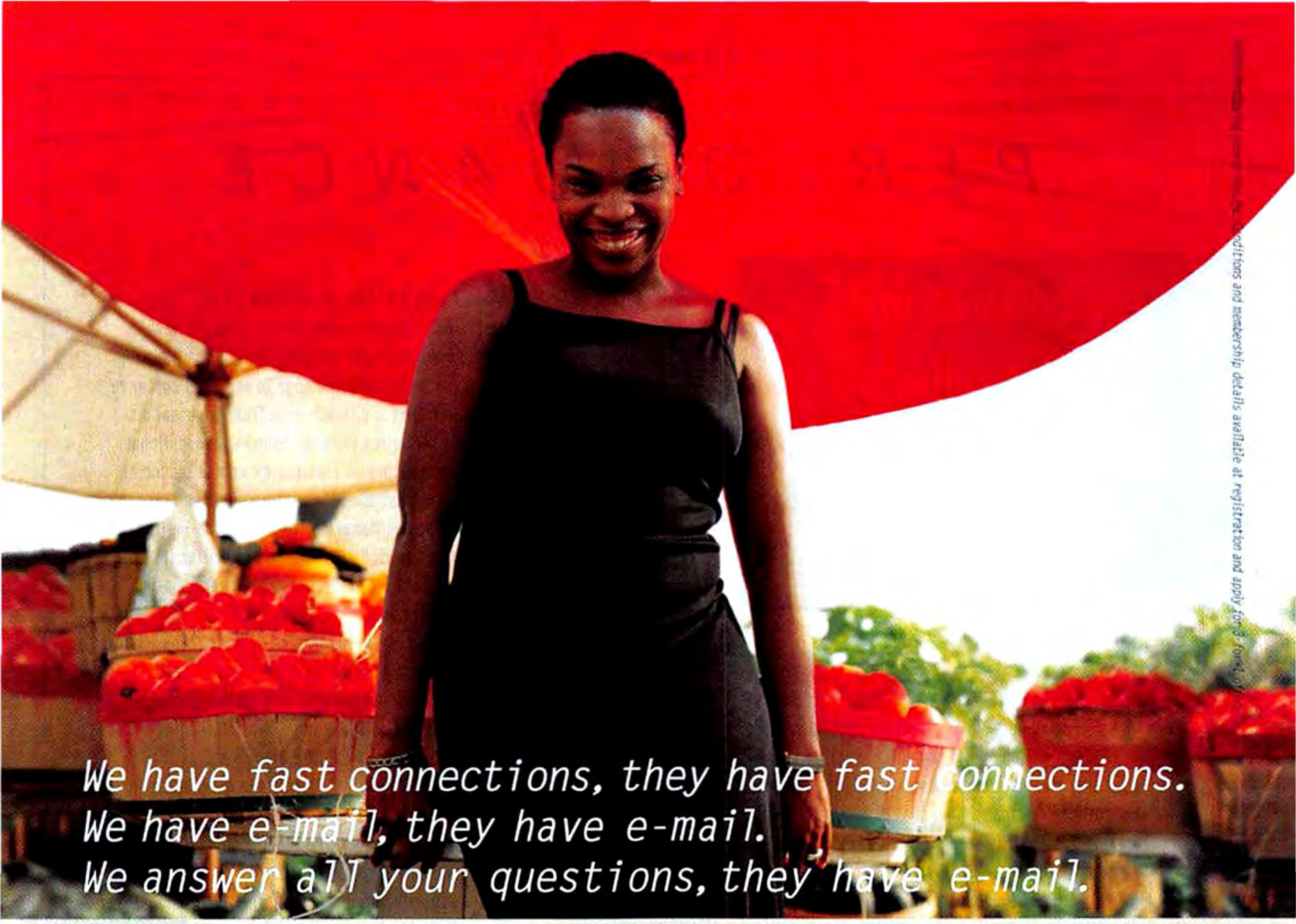
800/361-1408

www.matrox.com\mga

PRODUCT INFO NO. 700

TEST PC WORLD CENTER

THIS PRODUCT has been evaluated using tests designed by the PC World Test Center.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PERFORMANCE LEADER

The brilliance of its monitors reflects the greater genius within LG Electronics

THE INTERNET AND WORLD WIDE WEB HAVE opened up a highly graphical world of images and multimedia to computer users. As users today are often very demanding, it stands to reason that nothing less than a high-quality, accurate, and pleasing display is as essential to today's systems as any other peripheral.

The quality of the display reflects the design, engineering, and manufacturing excellence that go into producing it. That's why when tens of millions of computer users worldwide boot their systems, they are starting their day with monitor technology from LG Electronics.

That's right, even if your monitor doesn't say "LG Electronics" on it, there's a good chance that the monitor was built with LG Electronics technology, right down to the display's tube. That's because LG Electronics manufactures monitors for some of the biggest names in the business.

There are good reasons why users and manufacturers alike have flocked to LG Electronics for monitors. LG Electronics' top-line Studioworks 995E garnered *PC Magazine*'s coveted Editor's Choice recently. According to the editors there, "The jury gave the 995E near-perfect marks for both general business and graphics applications... It represents an excellent bargain."

LG Electronics' monitors also took Top 10 honors twice in recent months in *PC World* magazine, while *PC Computing* awarded LG Electronics' 910SC monitor the prized 4-Star rating.

INNOVATIVE HEIGHTS

LG Electronics' monitor expertise has reached new heights in innovation and design with its line of Flatron monitors. Perfectly flat from edge to edge and corner to corner, the Flatron is virtually free from the usual distortions and reflection typically found in conventional curved screens. Using LG Electronics' unique technology, the Flatron eliminates the subtle gray lines that run across many conventional monitors. And, the Flatron screen has an unmatched brilliance and clarity. It is the ideal monitor both for professional designers and for serious Internet users.

The expertise of LG Electronics extends across many different products. That CD ROM drive you've come to depend on? It may well have been manufactured by LG Electronics, as the company is the world's leading maker of high-performance CD ROM drives.

LG Electronics' new DVD drives take multimedia performance to an entirely new level. These drives meet the demands of end users who require drives offering maximum performance and the flexibility for use with various media formats.

How is it that one company can produce so many technological advances and innovative products? Part of the answer lies in the fact that LG Electronics is a part of LG, the giant Korean conglomerate with more than $80 billion in revenues. This means that LG Electronics is well-supported in all its continuing research and development efforts.

As a truly global manufacturer, LG Electronics taps into its deep pool of human resources—some 35,000 strong—for world-class designers, microelectronics engineers, and technology innovators. And LG Electronics is no newcomer to the computer technology party, having been in business for 41 years now.

It's true, that light coming from the LG Electronics monitor really does reflect the genius, tremendous resources, and dedication of a company that is a global technology leader.

LG

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June 1999 August 1999

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COMDEX BOOTH #L5846

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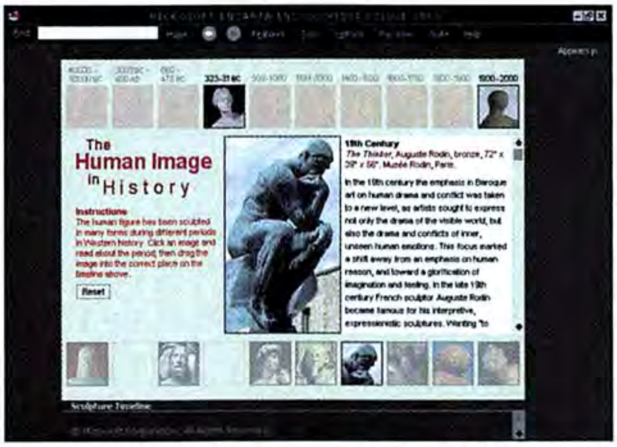
Encarta Ready for the New Millennium

ENCYCLOPEDIA

NO CONTEST this year: Microsoft's **Encarta Reference Suite 2000** is the best all-around multimedia encyclopedia on the market. Even at a pricey $100 (for five CD-ROMs or a single DVD-ROM), it's a smart choice for first-time buyers or anyone who's looking to upgrade.

The suite contains Encarta Encyclopedia Deluxe 2000, as well as the Encarta Interactive World Atlas 2000 and new Encarta World English Dictionary. I tested an advance copy of the new suite on DVD-ROM and heartily recommend that format. DVD-ROM provides more and better multimedia than CD-ROM, eliminates disk-swapping, and lets you perform a single search across all three products.



MICROSOFT'S ENCARTA ENCYCLOPEDIA DELUXE 2000 is packed with pictures and has a graphical timeline to help find related info.

The encyclopedia is the centerpiece of the reference suite, featuring 42,000-plus articles with a generous assortment of multimedia supplements. Encarta's superb design offers a variety of navigation tools, including interactive timelines and research organizers. The atlas is much improved over last year's version, letting you zoom from a virtual spinning globe all the way down to street grids of major world cities. And the dictionary is actually an integrated set of reference works, including a thesaurus, an almanac, and a style guide.

If you're looking for a less expensive alternative (and one that is especially good for younger students), consider the $49 **Year 2000 Grolier Multimedia Encyclopedia 2-CD Deluxe Edition**. This two-CD set is aimed squarely at junior-high and younger high-school students and features a less complex design, with friendly homework helpers. The Research Starters section is nicely revamped, grouping content into seven overarching subject fields likely to be relevant to the secondary-school student—geography, social studies, U.S. history, and so forth. This year's de rigueur Millennium timeline feature in the shipping version we reviewed provides another engaging "front door" for students seeking information.

Grolier lacks the depth of Encarta—it has fewer articles (around 37,000) and substantially less multimedia fireworks. However, Grolier is preparing a bulked-up $99 DVD-ROM release with 50 percent more video content than the CD version and that will include AC3 sound support. The DVD version should appear in stores before the end of the year.

If you need a first-class encyclopedia now, opt for Encarta 2000. For those with tighter budgets or who don't have a DVD-ROM drive, Grolier is a good choice.

—Glenn McDonald ▶

Encarta Reference Suite 2000

PRO: Superior design and content, DVD-ROM offers better multimedia.

CON: Expensive.

VALUE: The best all-around reference title on the market, for all age groups.

Street price: $100
Microsoft
800/426-9400
www.encarta.com

PRODUCT INFO NO. 701

Year 2000 Grolier Multimedia Encyclopedia 2-CD Deluxe Edition

PRO: Less expensive; simpler interface; great homework helpers.

CON: Lacks the depth of Encarta.

VALUE: A good option for younger students.

Street price: $49
Grolier Interactive
203/797-3530
gi.grolier.com

PRODUCT INFO NO. 702

QUICK TAKES

Sound Effects

A NEW sound-enhancement product based on audio powerhouse SRS Labs' new 3D technology makes wimpy, muddled-sounding PC speakers sound like the big boys' blasters. The hardware version of **Wow Thing** costs $30 and works with your PC's speakers or headphones, or with your portable stereo, compact disc, or MP3 player. It plugs into your sound card, but you'll need to purchase a separate cable to plug it into your speakers. If you're planning to use Wow Thing just with your PC, opt for the $10 shareware software version, which sounds just as good. It currently works only through the WinAmp player, but the company plans to add support for the Windows Media Player by the time you read this. Though we heard some distortion at high volumes, Wow Thing is a good alternative to new speakers. SRS Labs; 800/243-2733; www.wowthing.com

PRODUCT INFO NO. 711

—Cameron Heffernan

High-End Labtec?

BEST-KNOWN for basic, inexpensive PC speakers, Labtec aims a notch higher with the **LCS-2514 4.1** speaker system while keeping the price low—the four speakers and subwoofer cost just $79. But Labtec skips some details, such as hardware bass-level control and AC3 support (it uses its own 3D emulator). We endured boomy bass and distorted sound at high volumes on a shipping unit. Audiophiles won't be impressed, but less picky users will like the Surround Sound feel and low price. Labtec; 360/896-2000; www.labtec.com

PRODUCT INFO NO. 710.

—Michelle Campanale-Surkan

GUESS WHO BEAT GATEWAY AND COMPAQ IN SERVICE AND RELIABILITY?

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  - Gateway
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  - Toshiba
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  - Compaq
  - MidWest Micro

And we did it by engineering you a better PC from the ground up.

intel inside
pentium® III

"In the desktop category...Quantex, continuing its impressive improvement since debuting in our survey three years ago, breaks into the "A" category." *PC Magazine*, July 1999.

In *PC Magazine's* 1999 Desktops & Notebooks Service and Reliability Survey[1], Quantex was one of only three vendors to earn an "A" rating in the Desktop Category. Scoring significantly better than average in all 5 test categories—units needing repair over the past 12 months, satisfaction with reliability, satisfaction with repair, satisfaction with technical support, and buy again—*PC Magazine* praised, "Its technical scores are first-class."

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[1] Results based on a PC Magazine (July 99) "Desktops and Notebooks Service and Reliability" survey in which Quantex received an "A" rating in the desktops—Overall Use category, beating out Gateway and Compaq which received ratings of "C" and "D" respectively. Quantex received an "A" rating by scoring significantly higher than average in all 5 test categories. See PC Magazine July 99 for details.

[2] $30 BJC-1000 printer rebate available directly from Canon. Offer expires 1/29/00. [3] $80 BJC-2000 printer rebate available directly from Canon. Offer expires 1/29/00.

Quantex desktops give you cutting-edge performance and the power to tackle advanced 2D & 3D graphics, power-hungry multimedia applications, ever-evolving Internet technology, DVD movies and games. Designed for the savvy professional, these desktops combine leading technologies with Quantex's award-winning service and reliability at prices that fit well within your budget.

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New 8x Max Variable Speed DVD-ROM Drive
Aureal Vortex2 Sound, A3D 2.0 Technology
Altec ADA-305 Dolby Surround Sound Speakers, Sub
Microsoft Office 2000 SBE
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Business lease starting at:$91/Mo., 36 Mos.
Q-QUOTE NUMBER: pcw12s34

NEW QUANTEX SM667

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20GB-27GB 7200rpm Ultra ATA Hard Drive
19" Monitor w/Diamondtron NF CRT (18" vis)
3Dfx Voodoo3 3000 AGP Graphics w/16MB, TV-Out
New 8x Max Variable Speed DVD-ROM Drive
Aureal Vortex2 Sound, A3D 2.0 Technology
New Altec Lansing ACS-33 PowerCube Speakers, Subwoofer
Corel WordPerfect Office 2000
New Software Essentials Titles Included!
Intel® AnyPoint™ Home Networking Kit, add $119

Starting at $1899
Business lease starting at:$69/Mo., 36 Mos.
Q-QUOTE NUMBER: pcw12s32

QUANTEX SM650

New Intel® Pentium® III Processor 600MHz-650MHz
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13GB-20GB 7200rpm Ultra ATA Hard Drive
17" Monitor (16" vis, .25dp, 1600x1200 max res.)
nVidia Riva TNT AGP Graphics w/16MB
Internal 100MB Zip Drive
New 8x Max Variable Speed DVD-ROM Drive
Aureal Vortex2 Sound, A3D 2.0 Technology
New Altec Lansing ACS-21W Speakers
Corel WordPerfect Office 2000
New Software Essentials Titles Included!

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Business lease starting at:$62/Mo., 36 Mos.
Q-QUOTE NUMBER: pcw12s29

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13GB-20GB 7200rpm Ultra ATA Hard Drive
17" Monitor (16" vis, .25dp, 1600x1200 max res.)
nVidia Riva TNT AGP Graphics w/16MB
New 8x Max Variable Speed DVD-ROM Drive
Aureal Vortex2 Sound, A3D 2.0 Technology
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Corel WordPerfect Office 2000
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Q-QUOTE NUMBER: pcw12s16
WINNER! Computer Buyer's Guide & Handbook Best Buy, 11/99

VALUE DESKTOPS

Common Features: ✓ 3.5" 1.44MB Floppy Drive ✓ 56K V.90 Fax/Modem ✓ 2 USB ports ✓ MS Windows 98 Second Edition ✓ Corel WordPerfect Office 2000 ✓ *New* Quantex ATX Mid Tower Case ✓ 104-Key Keyboard ✓ Microsoft Mouse ✓ 3-Year Limited Warranty ✓ 24/7 Toll-Free Technical Support

QUANTEX M600

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3rd Generation DVD-ROM Drive
Dynamic Wavetable Stereo Sound, Speakers w/subwoofer
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Starting at $1499
Business lease starting at:$54/Mo., 36 Mos.
Q-QUOTE NUMBER: pcw12m17

QUANTEX M500

$1219 after $80 Canon Printer mail-in rebate!

Intel® Pentium® III Processor 500MHz
64MB SDRAM Memory
13GB Ultra ATA Hard Drive
17" Monitor w/on-screen display (15.8" vis)
Intel 2D/3D Graphics Accelerator
3rd Generation DVD-ROM Drive
Dynamic Wavetable Stereo Sound, Speakers w/subwoofer
Canon BJC-2000 Color Printer w/IS22 Scanner Included!
New Software Essentials Titles Included!

$1299
Business lease:$47/Mo., 36 Mos.
Q-QUOTE NUMBER: pcw12m08

QUANTEX M450

Intel® Pentium® III Processor 450MHz
32MB-64MB SDRAM Memory
8GB-13GB Ultra ATA Hard Drive
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Intel 2D/3D Graphics Accelerator
3rd Generation DVD-ROM Drive
Dynamic Wavetable Stereo Sound, Speakers
New Software Essentials Titles Included!
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Starting at $999
Q-QUOTE NUMBER: pcw12m06

QUANTEX M466c

$869 after $30 Canon Printer mail-in rebate!

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32MB SDRAM Memory
8GB Ultra ATA Hard Drive
15" Digital Monitor (13.8" vis)
Intel 2D/3D Graphics Accelerator
48x Max Variable Speed CD-ROM Drive
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Canon CanoScan FB 620P Scanner, add $99

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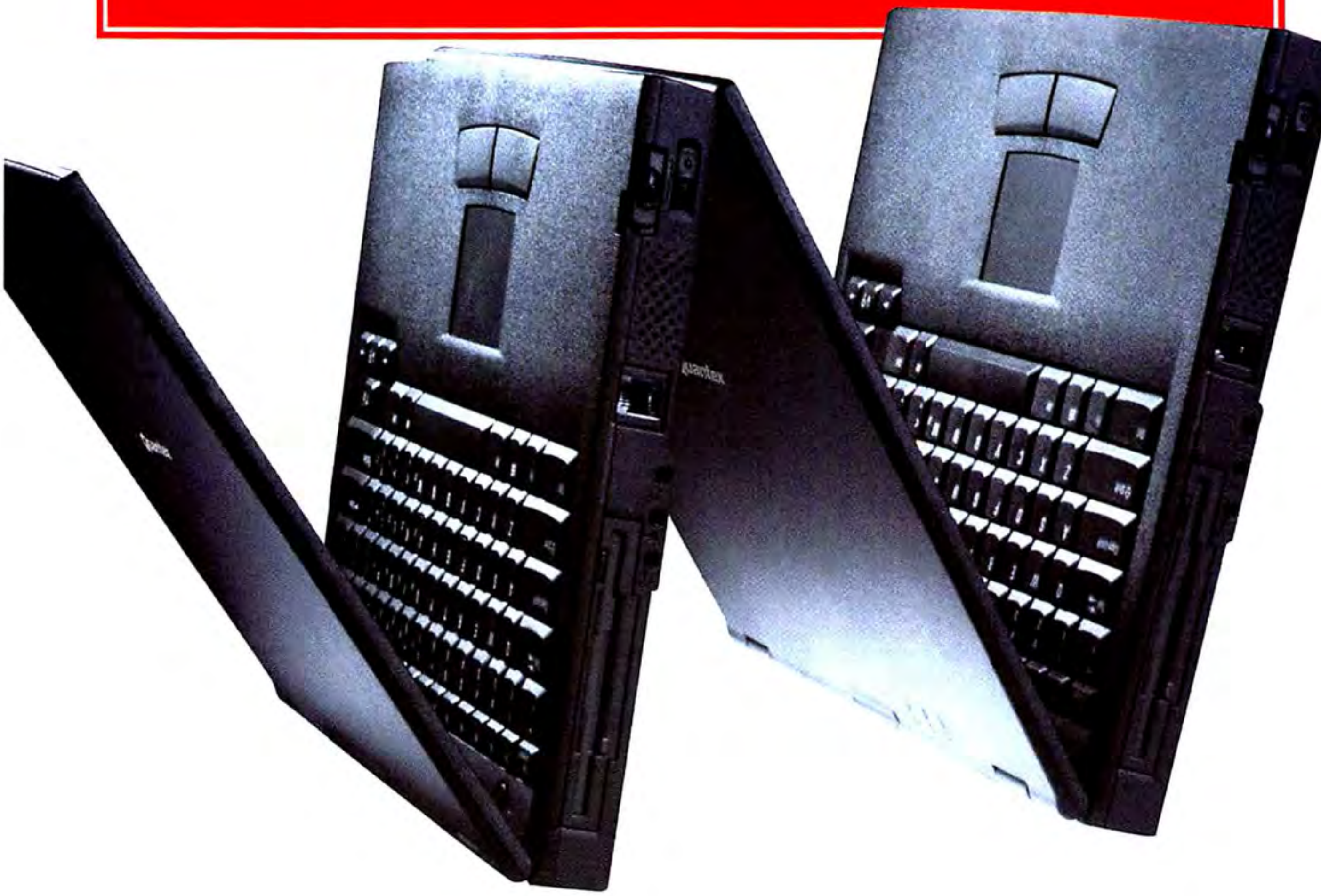

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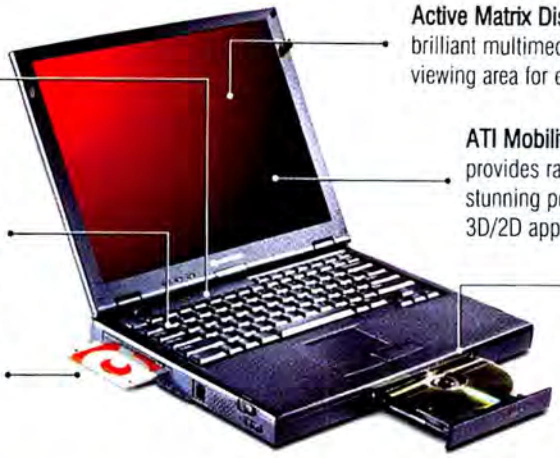

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Common Features: ✔ 256K Enhanced On-Die Cache ✔ Integrated 3.5" Floppy Drive ✔ Built-in Stereo Sound and Speakers ✔ Smart Lithium Ion Battery ✔ Integrated Personal Touchpad ✔ USB, Fast IR Ports ✔ **TV-Out** ✔ 3-Year Limited Warranty on CPU & Memory ✔ 1-Year Parts and Labor Limited Warranty on all other components ✔ 24/7 Toll-Free Technical Support

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Q-QUOTE NUMBER: pcw12w03

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10GB Ultra ATA Hard Drive
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Q-QUOTE NUMBER: pcw12w02

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Q-QUOTE NUMBER: pcw12w01

QUANTEX W-1400

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32MB SDRAM Memory
6GB Ultra ATA Hard Drive
Integrated Modular 24x Max Variable Speed CD-ROM Drive
New Mini-PCI 56K Fax/Modem²
***New* ATI Mobility P Graphics w/8MB**
MS Windows 98 2nd Ed., Corel WordPerfect Office 2000
Quantex Carrying Case

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Business lease:$73/Mo., 36 Mos.

Q-QUOTE NUMBER: pcw12w04

T-SERIES NOTEBOOKS

Common Features: ✔ 256K Enhanced On-Die Cache ✔ Modular 3.5" Floppy Drive ✔ Built-in Stereo Sound and Speakers ✔ Smart Lithium Ion Battery ✔ Integrated Personal Touchpad ✔ USB, Fast IR Ports ✔ Quantex Carrying Case ✔ 3-Year Limited Warranty on CPU & Memory ✔ 1-Year Parts and Labor Limited Warranty on all other components ✔ 24/7 Toll Free Technical Support

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56K V.90 Fax/Modem²
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Q-QUOTE NUMBER: pcw12t25

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64MB SDRAM Memory
6GB Ultra ATA Hard Drive
Modular 4x Max Variable Speed DVD-ROM Drive
56K V.90 Fax/Modem²
***New* ATI Mobility M Graphics w/4MB**
MS Windows 98 2nd Ed., Corel WordPerfect Office 2000

$2299

Business lease:$83/Mo., 36 Mos.

Q-QUOTE NUMBER: pcw12t24

QUANTEX T-1401

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14.1" XGA TFT Active Matrix Display
64MB SDRAM Memory
6GB Ultra ATA Hard Drive
Modular 24x Max Variable Speed CD-ROM Drive
56K V.90 Fax/Modem²
***New* ATI Mobility M Graphics w/4MB**
MS Windows 98 Second Edition

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Business lease:$73/Mo., 36 Mos.

Q-QUOTE NUMBER: pcw12t28

QUANTEX T-1300

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only 1.37" thick

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32MB SDRAM Memory
4GB Ultra ATA Hard Drive
Modular 24x Max Variable Speed CD-ROM Drive
56K V.90 Fax/Modem² Included!
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Chassis-Intrusion Switch; Drive Bay Lock

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Upgrade to Rack-mount kit, add $99

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-QUOTE NUMBER: pcw12q25

QUANTEX QX5000R

New Intel® Pentium® III Processor 500MHz-700MHz
Dual Processor Upgradeable
Intel L440GX+ Server Board
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Dual Channel Ultra2/LVD SCSI Controller
Dual Peer PCI Buses; 6 PCI, 1 ISA Slots
5 Hot-Swap Drive Bays; 4 Fans
Intel® EtherExpress™ Pro 100 Ethernet Adapter
Chassis-Intrusion Switch; Drive Bay Lock
Optional 12/24GB SCSI DAT Backup, add $749

Starting at $3599
Business lease starting at:$124/Mo., 36 Mos.
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Dual Channel Ultra2/LVD SCSI Controller
Dual Peer PCI Buses, 6 PCI, 1 ISA Slots
5 Hot-Swap Drive Bays, 4 Fans
Intel® EtherExpress™ Pro 100 Ethernet Adapter
Chassis-Intrusion Switch; Drive Bay Lock
Optional AMI MegaRAID 466WS, add $399
Windows NT Server 4.0, 10-Client Access, add $799

Starting at $2399
Business lease starting at:$87/Mo., 36 Mos.
-QUOTE NUMBER: pcw12q29

QUANTEX QX3000

Intel® Pentium® III Processor 500MHz-600MHz
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4.5GB Ultra-Wide SCSI Hard Drive
Integrated Ultra-Wide SCSI Controller
3 PCI Slots, 1 ISA Slot, 1 Shared PCI/ISA
Mid Tower Server Case: 4 Internal 3.5" Bays;
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Intel® EtherExpress™ Pro 100 Ethernet Adapter
Optional APC SmartUPS 700VA, add $349
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Voice Xpress Lets You Talk to Your Money

SPEECH RECOGNITION

MANAGING your money won't ever be as much fun as, say, a Quake II tournament, but personal finance software such as Intuit Quicken and Microsoft Money have helped make it considerably easier. A new speech recognition package from Lernout & Hauspie goes one step further.

The package—the first specially made to work with personal finance software—lets users of Quicken and Money employ voice commands to navigate around either software product and convey information to it. As a bonus, the application lets you command and control Windows with your voice as well as dictate text into most Windows applications. However, it's slow.

I test-drove a shipping version of **L&H Voice Xpress Personal Finance** with Quicken 2000 on a PC with 128MB of RAM and an AMD K6-2-400 processor. (A Pentium MMX-200 is the minimum; the app gets a boost from CPUs with Intel's SSE and AMD's 3D-Now extensions.) The product let me fill in Quicken's check register and other tasks with nary a mistake. But it was slow to recognize commands, such as "pay my bills" or "go to banking center," and when it did recognize them, it took its time digesting them. At one point, my wife, who observed me talking to my computer, said that I sounded as if I were speaking to our dog, who requires a command to be repeated a minimum of three times before deciding whether or not she will obey.

If you are a new user, want an inexpensive voice navigation and dictation tool just for Windows, or *really* don't want to continue typing all of your checking information into your finance application, Voice Xpress is a good buy at $30. The rest of us are better off waiting for the next—hopefully speedier—version.

—John P. Mello Jr.

L&H Voice Xpress Personal Finance

PRO: Voice command and control of Windows, dictation within most Windows applications.

CON: Sluggish performance, inconsistent recognition of commands.

VALUE: A good price for a speech recognition program.

Street price: $30

Lernout & Hauspie

781/203-5000

www.lhsl.com

PRODUCT INFO NO. 703

Aero 1500 Aims Straight for Palm V

PDA

COMPAQ LIKES to compare its half-inch-thick palmtop PC, the **Aero 1500**, to Palm Computing's best-selling Palm V. While the two look remarkably alike, appearances, as they say, can be deceiving. Still, Compaq has made the right compromises, and though its feature-packed Aero 1500 is no match for the Palm, it is the best Windows CE–based palm device we've seen.

The $349 Aero does match or surpass the $369 Palm V in several respects. It is as sleek as the Palm V, and it packs much more RAM—16MB versus the Palm V's 2MB. The Aero has a crisp 240-by-320-resolution screen with 16 gray scales, compared to the Palm's bright, 160 by 160, 2-gray-scale screen. I have used earlier generations of Windows CE handhelds and Palms and was delighted by the extended battery life of my shipping Aero 1500. Previous Windows CE palmtops—especially the heavier, resource-hungry color devices—pooped out after 6 hours or less. The Aero 1500's rechargeable lithium ion battery lasted 12 to 14 hours. (The Palm V still beats it in this category, logging up to 20 hours.)

COMPAQ
Windows CE
Aero
COMPAQ

THE SVELTE Aero 1500 packs features and a good battery life.

The Aero offers other advantages. Unlike the Palm V, it can handle e-mail with attachments and can function as both an MP3 player and a voice recorder. And it's more expandable, thanks to its CompactFlash Card slot.

Now for the negatives: That familiar Windows 9x-like interface means you're dealing with Windows CE, and Compaq's enhancing it is still like putting earrings on a pig. The new QUtilities and QMenu do help you quickly find, close, and toggle between applications. Previously, to close an app in Windows CE, you had to click five times (and know where in the Start menu to do that). With a Palm, one click takes care of the same task.

Compaq's introduction of the sleek Aero means that you can now have a Windows CE palm-size device that, like a Palm, actually fits in your pocket. Battery life is conveniently lengthy, too. But is the Aero 1500 a better bet than the Palm V? That all depends on how simple you prefer a PDA to be. The Palm beats the Aero hands down on ease of use, but the Win CE–based Aero has more features. If you want a Palm V, accept no substitutes. If you want a Windows CE machine, this is the best of the lot.

—Michael S. Lasky ▶

Aero 1500

PRO: Sleek PDA with efficient battery and robust features.

CON: Saddled with Windows CE, which is still too complex for palm-size handhelds.

VALUE: If you want a Win CE palm-size device, this one's the best yet.

List price: $349

Compaq Computer

800/345-1518

www.compaq.com

PRODUCT INFO. NO. 704

Meet the first carry-on desktop.

Introducing the revolutionary Sony VAIO® XG9 notebook computer, the first system to offer the raw power of a desktop computer within an amazingly sleek design. Only 6 lbs.[3] and 1.75 inches thin, the Sony VAIO XG9 fits in a standard carrying case. Yet it offers many innovative and powerful features. The hot-swappable multi-bay includes DVD, floppy and weight saver capabilities plus options such as a second hard drive, an extra battery and a CD-RW drive. The convenient jog dial provides customized access to your files and programs. And the Sony VAIO XG9 has a robust Intel® Pentium® III processor 500 MHz[1], a roomy 18.1 GB[2] hard drive and a unique intercooler system design. There's even an optional multimedia docking station that offers full port replication, digital optical out, Control A1, NTSC video out and more. So carry on your work with this carry-on desktop. Order it from Sony VAIO Direct today.

XG9 Features

- Modular design with hot-swappable multi-bay for DVD-ROM drive, CD-RW drive, additional hard drive, floppy drive or additional battery
- Intel Pentium III processor 500 MHz[1]
- 18.1 GB[2] fixed hard drive
- 6 lbs.,[3] 1.75" thin
- 128 MB SDRAM (expandable to 256 MB max.)
- 13.3" XGA TFT screen
- 4X max. DVD-ROM drive
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8 FREE DVD rentals from Netflix.com with the purchase of a VAIO XG9 notebook.[5]

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SN-1299-PW8

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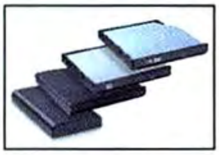
SONY

VAIO



The hot-swappable multi-bay is perfect for DVDs, floppies and an optional CD-RW, a second hard drive and extra battery capabilities.

The convenient jog dial offers easy customized access to the files and programs you use the most.

Swap the standard screen for an optional privacy screen with a 48° field of view to shield confidential documents from strangers.

An optional multimedia docking station offers full port replication, digital optical out, Control A1, NTSC video out, additional type III PC Card slot and much more.

Sony VAIO Direct℠

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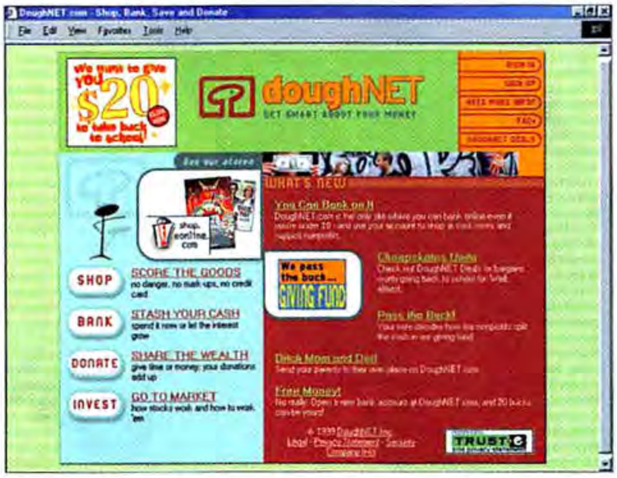
E-Wallets: Safe Online Shopping for Kids

WEB SITES

LAST DECEMBER, hundreds of thousands of shoppers bought their holiday gifts online using credit cards. This year, scores of teenagers are expected to join in the shopping frenzy, but instead of paying with plastic, many will use *electronic wallets*—online spending accounts. And many parents will breathe easier.

DoughNet, ICanBuy, and **RocketCash** are three such e-commerce sites where parents can set up special online shopping accounts for their kids. All three are easy to navigate, but RocketCash has the largest number of shops to choose from and the slickest interface for its target audience. DoughNet's interface has the most traditional look (read: business). All three of the sites do business with brand-name merchants, selling everything from clothing and sports equipment to the hottest CDs and videos. DoughNet and ICanBuy also work with some nonprofit organizations to let kids donate money.


DoughNET.com - Shop, Bank, Save and Donate
File Edit View Favorites Tools Help
We want to give you $20 to take back to school!
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You Can Bank on It
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Free Money!
We pass the buck... GIVING FUND
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SHOP
SCORE THE GOODS
no danger, no mark-ups, no credit card
BANK
STASH YOUR CASH
spend it now or let the interest grow
DONATE
SHARE THE WEALTH
give time or money: your donations add up
INVEST
GO TO MARKET
how stocks work and how to work 'em
TRUSTe

DOUGHNET HAS A MORE TRADITIONAL INTERFACE and allows kids to save their money and donate to charity if they want.

Parents can set up account limits, deposit allowances automatically, and monitor each transaction. The level of monitoring varies; parents can control a child's access to certain stores, limit purchases to certain hours, or even require parental approval for each purchase. Setting up an account (via credit card or deposit) is free at each site, and account minimums vary from $1 to $15, depending on the Web site. All three of the sites offer debit accounts, which means parents deposit money up front. DoughNet can also use the parent's credit card—which the child never sees—for charges as purchases are made, up to the parents' specified limit.

Each service displays users' balance while they shop. With RocketCash and DoughNet, customers can go directly to merchants' Web sites; ICanBuy provides its own virtual mall, controlling the shopping experience more tightly than the other sites. As expected in business involving children on the Net, each company has strict privacy and security policies. All the sites have Trust-e certification; ICanBuy adds the Better Business Bureau OnLine's as well.

Only DoughNet lets you set up an interest-bearing savings account for your teens, which can help them learn about money management. You can also transfer money from the debit shopping account to savings. DoughNet partners with USAccess Bank, a brick-and-mortar institution, to offer this service. ICanBuy plans to add a similar service.

Undoubtedly, some kids will continue to favor an old-fashioned cash allowance (fewer parental strings). If yours yearn to fill up their own electronic shopping carts, RocketCash will give them the most choices. For extra protection and control for younger kids, visit ICanBuy. And if you want to instill a little fiscal responsibility, try DoughNet.

—Richard Jantz ▶

DoughNet

PRO: $1 minimum to open account, certified by Trust-e, integrated shopping/banking account option.

CON: May not be snazzy enough to attract teens.

VALUE: Best banking features for teaching teens money management.

Price: free

DoughNet
415/561-0500
www.doughnet.com

ICanBuy

PRO: $1 minimum to set up account, certified by Trust-e and BBBOnLine, best privacy protection policies.

CON: No option for an integrated shopping and banking account.

VALUE: Privacy policies make it a good choice for younger children.

Price: free

ICanBuy.com
415/575-3520
www.icanbuy.com

RocketCash

PRO: Certified by Trust-e, jazzy site graphics, most places to shop.

CON: $15 minimum to set up account, no online banking options.

VALUE: Hippest look but emphasizes spending, not donating or responsible saving.

Price: free

RocketCash
650/938-6078
www.rocketcash.com

QUICK TAKES

Acer Goes Wireless

ACER IS finally hopping on the wireless networking bandwagon. Its new **WarpLink Communicator Card,** aimed at the home and SOHO markets, connects two PCs or notebooks located up to 500 feet apart and supports data transfer speeds up to 1 mbps (typical for products at this level). The shipping unit comes with filtering software and the SyGate program, which lets multiple PCs share a single ISP connection. It even works with AOL 4. WarpLink makes the most sense when you need to connect PCs in different rooms away from phone jacks. (If access isn't an issue, phone-line alternatives tend to be cheaper and faster.) Pricing is on a par with the competition's: A kit with two ISA cards lists for $199; $224 gets you one ISA card and one PC Card. A USB version is due in early 2000. Acer NeWeb; 408/467-7400; www.acerneweb.com

PRODUCT INFO NO. 713

—Dan Miller

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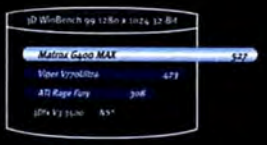

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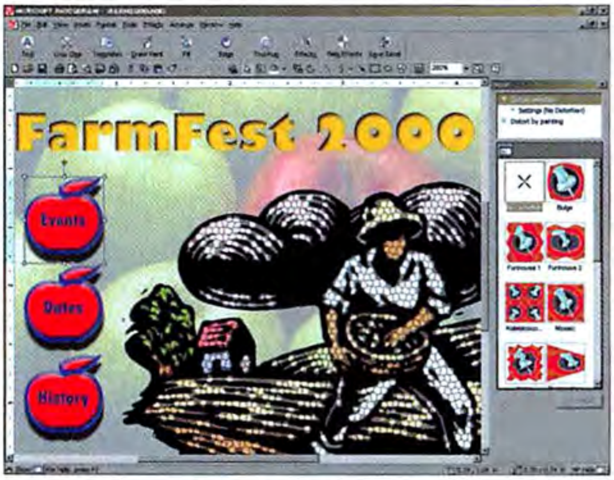
Graphics Apps Add Web Muscle

GRAPHICS

MICROSOFT'S **PhotoDraw 2000 version 2** and Deneba Systems' **Canvas 7** are among the few graphics packages that handle both vector drawings (such as clip art) and bit-map images (like photos) within a single application. But ultimately, the two programs are more different than they are alike. With PhotoDraw, Microsoft aims to let ordinary businesspeople create eye-catching graphics for print and the Web. Canvas, meanwhile, is a better fit for advanced users willing to invest some time in mastering its powerful tools.

SECOND TIME AROUND

I TESTED A shipping copy of the $109 PhotoDraw 2000 version 2 (MS Office users get a $20 rebate). The program's greatest strength remains its slick special effects. With a click or two, you can extrude vector drawings, bit maps, and text into 3D shapes; warp them fun house–style; or give them a chalk-drawing look.



APPLYING FANCY GRAPHICS TRICKS is a snap with PhotoDraw 2000's extensive gallery of ready-to-use special effects.

Most of the new features either ease Microsoft Office integration or beef up the Web tools. You can now zap graphics directly into PowerPoint 2000 and FrontPage 2000, and load a Web graphic simply by opening an HTML page and clicking on the element. But some of the Internet features seem half-baked. For example, while the package can create flashy animations, you must export them to a browser to see your work.

The program's interface ▶

PhotoDraw 2000 version 2

PRO: Tons of great special effects, improved integration with other Office programs, reasonable price.

CON: Some new Web tools are cumbersome, interface remains cluttered, performance can be sluggish.

VALUE: Enormous potential for business and casual users, still marred by rough spots.

Street price: $109

Microsoft

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www.microsoft.com/photodraw

PRODUCT INFO NO. 705

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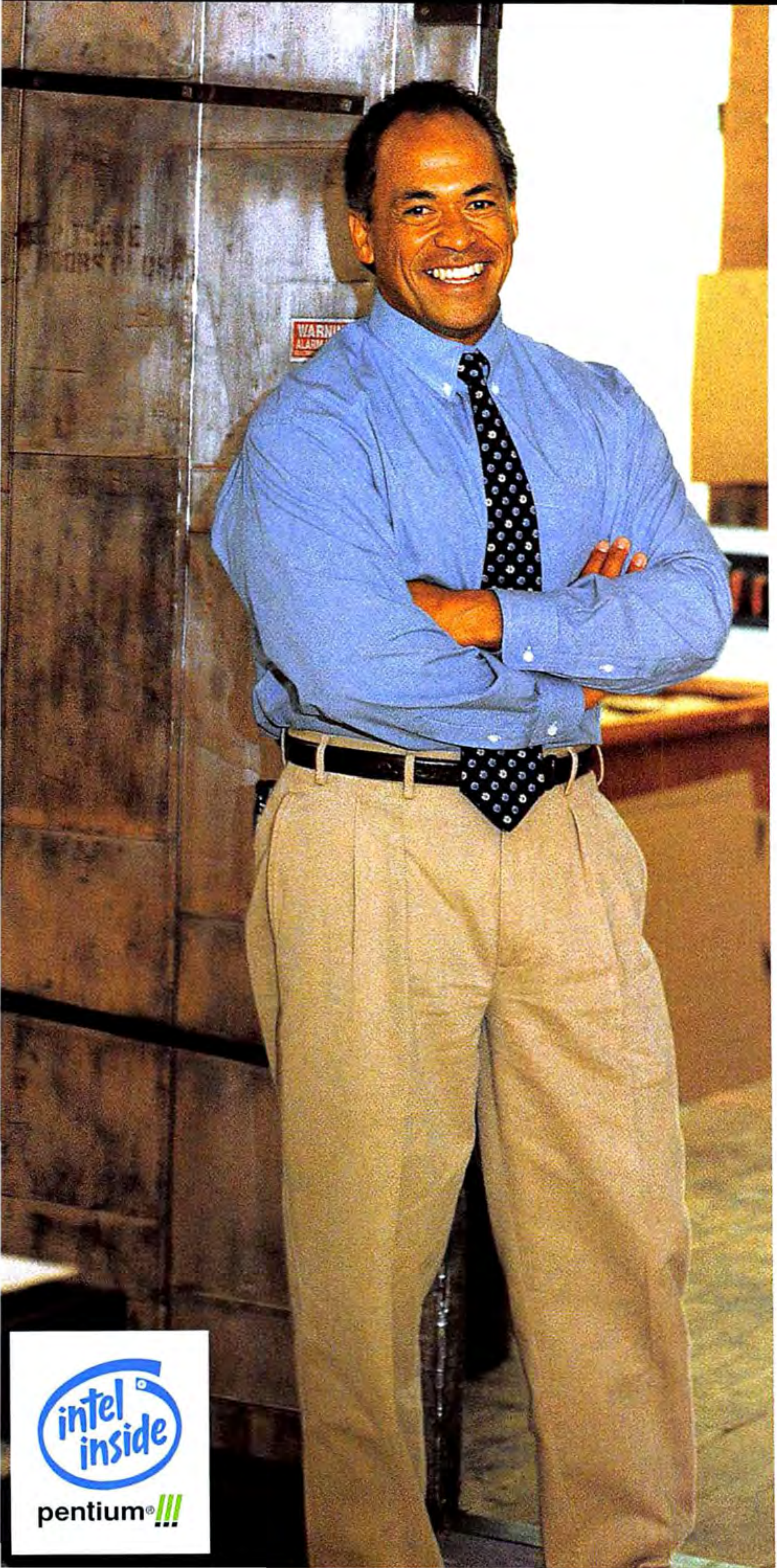

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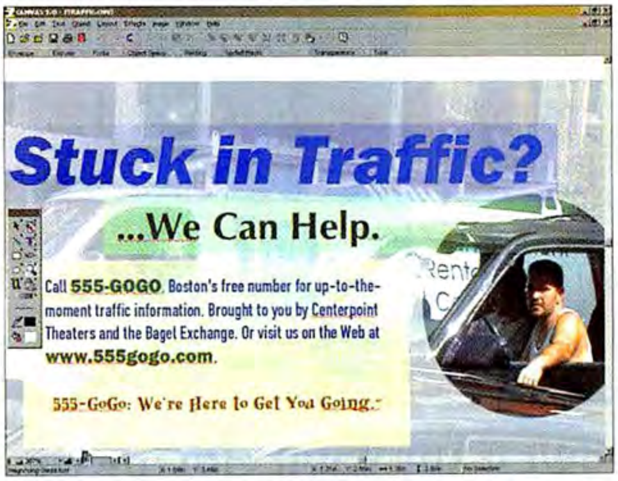
remains cluttered, with a grand total of 20 menus. And although speedier than its predecessor, this upgrade bogged down as I applied more effects—previewing a complex image in a Web browser took several minutes on a Pentium II-300 with 64MB of RAM.

MORE POWER TO YOU

THE NEWEST upgrade to the venerable Canvas app provides many more heavy-duty features than PhotoDraw. The $375 product comes with a full set of technical-illustration tools and precise typographical controls. You can use color tools like the Pantone Matching System, and produce separations for professional printing. I looked at a beta version.



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CANVAS 7 LACKS PHOTODRAW'S point-and-click simplicity, but it's packed with features that will empower serious users.

Among the most notable of Canvas's more than 150 new features are SpriteEffects, a series of image filters that you can apply to any vector or bitmap element in layers, and then turn on or off at any time. The package's tools for creating complex vector illustrations from scratch are now more flexible and easier to use, and Canvas is now more adept at outputting graphics—even animations—for the Web. And in an age of bloated graphics applications, Canvas 7 requires a mere 80MB of hard disk space.

Like CorelDraw and other high-end packages, however, Canvas offers few canned effects for casual users. And its learning curve can be daunting, in part because its interface strays considerably from Windows conventions.

But if you're willing to put in the time and create your own effects, Canvas is worthwhile. For less serious graphics users, PhotoDraw will be a better fit, despite some flaws.

—Harry McCracken ■

Canvas 7

PRO: Professional-strength tools, fast performance.

CON: A challenge to learn, few canned effects.

VALUE: Worthwhile contender for advanced users.

Street price: $375; upgrade for Canvas 6 users $100, for users of previous versions and competing products $200

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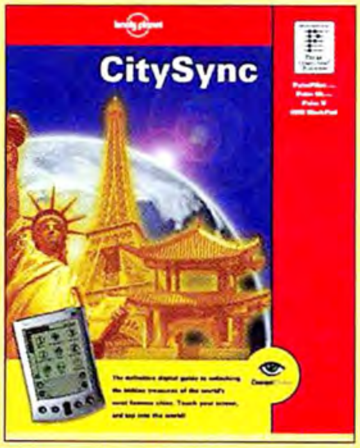

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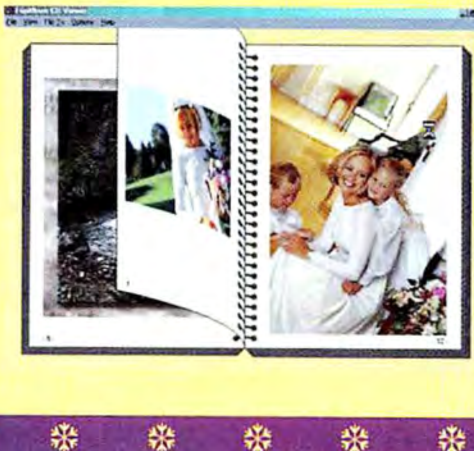

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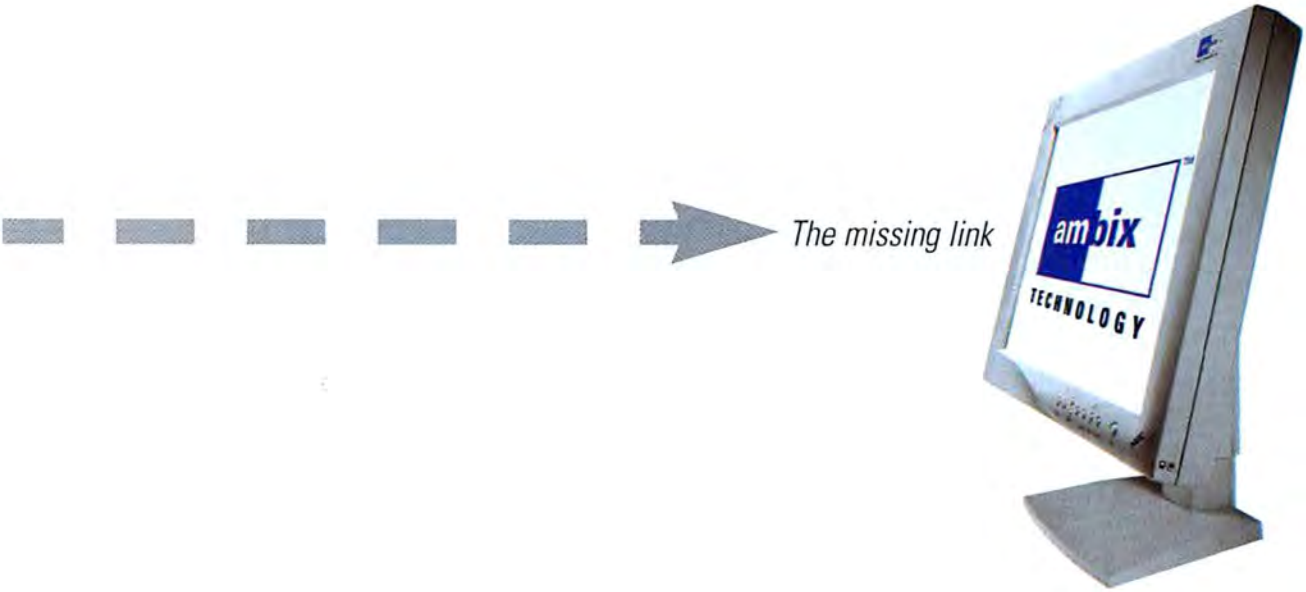

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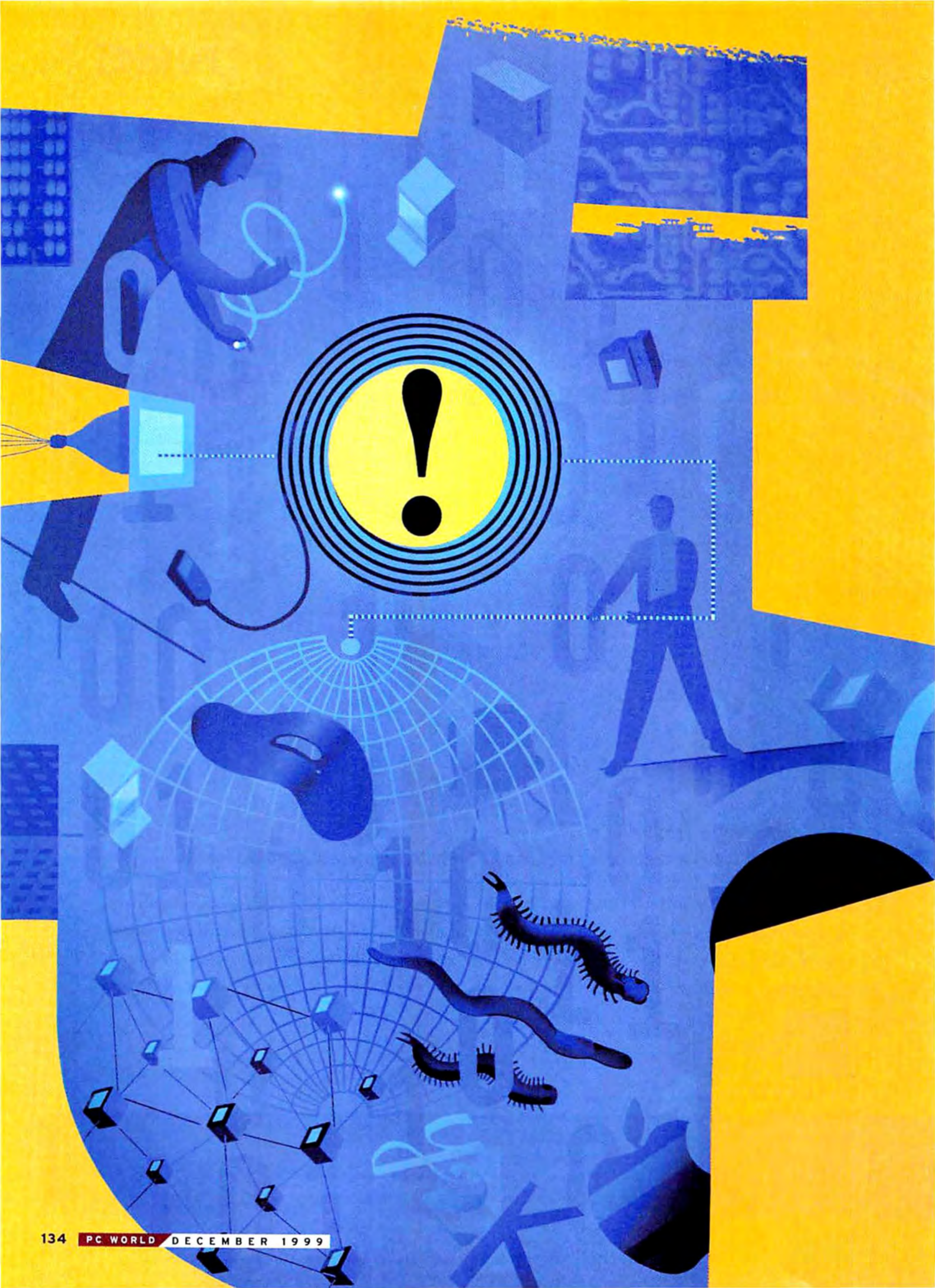
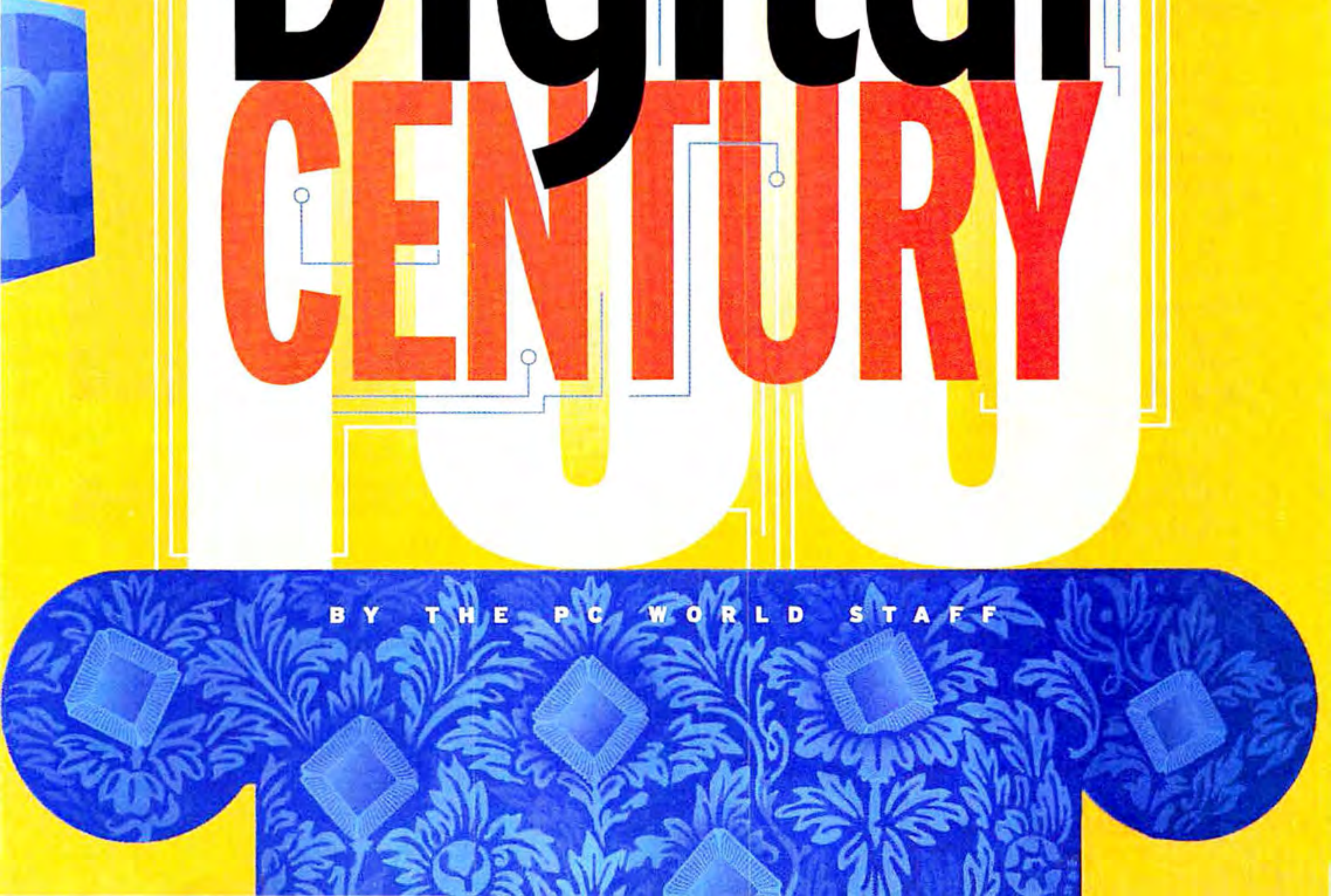


ILLUSTRATION BY MICK WIGGINS

100 of the best, worst, and weirdest events in computing history.

THE Digital CENTURY



BY THE PC WORLD STAFF

DIGITAL CENTURY

LET'S JUST SAY IT: The personal computer is the greatest invention of the 20th century. No other device has had a greater impact on the way we live, work, and communicate. Coupled with the Web, the PC has changed the economy of the world, created vast fortunes, and done what few thought possible—it's made geeks chic. If the Y2K doomsayers are right, it could also wreak havoc when the big clock hits 2000 a few weeks from now. How did we get here, and where are we headed? Our two-part series will provide some answers.

This month, *PC World* looks back at the highlights and low points of our digital century—from the birth of the ENIAC in 1945 to the introduction of the World Wide Web in 1989 to the IPO mania of the 1990s—and unearths the real story behind some of the greatest innovations and biggest blunders in computing history. Our editors and writers also name the best products ever made, as well as the biggest flops (anyone remember Microsoft Bob or IBM's PCjr?); a list of buzzwords we'd like to see retired; Web sites we'd take with us to a deserted island (along with a notebook, wireless Net connection, and tons of batteries); and ten ways to tell if you're a Y2K wacko. Next month, we'll peer into the future to see how PCs, the Net, and our lives may look in the next century.

It's been a bumpy ride, and there's no telling what's around the bend. Unless, of course, the world really does go dark on January 1—in which case you may be reading this issue in a bunker, by flashlight.

The IBM Blues

IT'S NO SECRET that IBM was initially reluctant to participate in the personal computing field. Only after Apple released its Apple II in 1977 did maverick IBM workers cobble together a comparable machine, which contained no IBM parts and ran on a Microsoft operating system.

But IBM executives weren't the only ones questioning their investment in personal computing. In 1981, when Big Blue introduced the IBM PC, Apple took out a now-famous *Wall Street Journal* ad implying that IBM presented no real threat.

In only six months, however, IBM sold 50,000 machines, and within two years it had surpassed Apple in sales. Big Blue had put its stamp on personal computing, and *PC* became the de facto term of a burgeoning industry. **–Yael Li-Ron**

Greatest PCs of All Time

❶ **Altair 8800:** The machine that inspired a generation.

❷ **Apple II:** The definitive PC–at least until IBM joined the party.

❸ **IBM PC AT:** Set standards still in use today.

❹ **Compaq Deskpro 386:** Pioneered a new Intel processor before IBM did, inspiring a horde of other clone vendors.

❺ **Radio Shack TRS-80 Model 100:** The first successful notebook.

❻ **Apple Macintosh 512K:** The first truly useful Mac.

❼ **Amiga:** Did multimedia tricks in 1985 that today's PCs still can't do.

❽ **Commodore 64:** Possibly the most beloved computer of all time.

❾ **IBM ThinkPad 560:** Thin, light, and durable: our pick for the perfect traveling companion.

❿ **Palm Pilot:** Small is beautiful.

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3000 B.C.E. An early form of the bead-and-wire abacus is used in Asia.

876 C.E. First recorded use of the symbol for zero occurs in India.

1620 Edmund Gunter of England invents the slide rule, forerunner of the electric calculator.

1642 Blaise Pascal designs the first functioning mechanical calculator, which can perform the work of six accountants; initial public reaction is less than overwhelming, but the Pascaline will remain in use until the mid-20th century.

1694 Gottfried Leibniz builds a calculating machine that uses binary representations of numbers.

1812 Factory worker Ned Ludd inspires other workers to destroy "labor-saving" machines that they fear will take over their jobs; *Luddite* later comes to refer to anyone who opposes technology.

The Mother of All PCs

TRACE THE lineage of that PC portable on your lap, and you'll find the Electronic Numerical Integrator and Computer at the base of the family tree. The first high-speed digital computer, the ENIAC signaled the start of the computer industry.

Developed at the University of Pennsylvania 53 years ago, the machine housed over 17,000 vacuum tubes, 70,000 resistors, and 6000 switches in its 3-ton bulk. It calculated 5000 additions per second.

Originally conceived to compute ballistics tables for U.S. Army gunners in World War II, the computer wasn't completed in time to help the war effort. But it broke new ground in scores of ways. Its designers pioneered the use of low-level power and the concept of "burning in" components. And it was probably the first computer to use the conditional IF-THEN statement.

A straight line runs from the ENIAC to the UNIVAC of 1951 (one of the first commercial computers), to the IBM PC, to the Palm Pilot in your pocket. The ENIAC *is* the mother of all PCs. —Gregg Keizer

True Brew

FLASH BACK 25 years to March 1975. Picture a two-car garage in Menlo Park, California, where 32 hobbyists are staring at a box with flashing LEDs. Jump ahead a few meetings and you might find one of them using the machine, an Altair 8800, to play "Fool on the Hill" through a radio.

Think Homebrew. No, not sudsy beer, but the Bay Area Amateur Computer Users Group, also known as the Homebrew Club. The club was a techno-dweeb magnet, attracting, among others, Apple's Steve Wozniak and Steve Jobs. It even got the attention of Bill Gates, who wrote the club in 1976, accusing the hobbyists of pirating Altair BASIC, his first operating system.

Homebrew set the standard for user groups such as the Boston Computer Society and the Capital PC group in Washington, D.C. Today, some 2000 clubs meet worldwide. For a list, check out www.apcug.org. **—Steve Bass**

The Birth of the Internet

GET ONE THING STRAIGHT: The Internet was not developed to withstand a nuclear blast.

Urban legend has it that the federal government created the Net as a communications network that could survive any attack the Russkies could throw at us. In fact, its genesis was wholly peaceful.

In July 1968, the Defense Department's Advanced Research Projects Agency contracted with Bolt Beranek and Newman, a computer design firm in Cambridge, Massachusetts, to build ARPAnet, a network that would link research computers around the nation. By fall 1969, the company had connected computers at the Stanford Research Institute, UCLA, UC Santa Barbara, and the University of Utah. As protocols and switching technologies developed, the network expanded. In 1973, designers united separate nets in a project dubbed the "Internetting problem." By 1983, some 400 computers were connected, and in 1986 the National Science Foundation created NSFNet, linking regional networks over a high-speed national backbone.

But the commercial Net we know today did not form until the mid-nineties, with the development of Web browsers and the attendant user-friendly content those browsers supported. Soon online service providers like CompuServe and AOL connected to the Net. Today 150 to 200 million people worldwide use the Internet—a number that's expected to grow to 300 million by 2005. **—Dan Miller**

1832 Charles Babbage designs the first computer driven by external instructions; due to lack of funding, however, he never builds it.

1854 George Boole publishes his thoughts on symbolic logic, which decades later will form the basis of computer science applications.

1857 Sir Charles Wheatstone introduces continuously feeding paper tape that can be used for storing and reading data.

1876 Alexander Graham Bell, 27 years old, files a patent for the telephone.

1890 Herman Hollerith designs the punch-card tabulation machine, allowing the U.S. Census Bureau to reduce its data calculation time from ten years to two and a half.

1896 Herman Hollerith founds the Tabulating Machine Company, one of three companies that will later merge and become known as IBM.

1897 Karl Braun develops the cathode-ray tube.

1918 Two inventors build a calculating machine based on the binary numbers 1 and 0.

1937 John Atanasoff begins work on the first electronic digital computer but neglects to take out a patent; almost ten years later, the ENIAC will be based on his pioneering work. Georges Stibitz de-

CLOCKWISE FROM TOP: CORBIS/BETTMAN; GORDON STUDER; JAMES ARONOVSKY; CORBIS/BETTMAN

Garage Mechanics: The Apple Seedling

It has become the stuff of legend. College dropouts Steve Jobs and Steve Wozniak (below) sold a VW bus and a calculator to bankroll a tiny company named Apple Computer, which briefly operated from a family garage. But when Apple began on April 1, 1976, hardly anyone had faith in the fledgling enterprise—including Apple's forgotten third founder, Ron Wayne.

Two weeks later, Wayne backed out and sold his share for $800—earning him a place beside such other early departers as drummer Pete Best, who left the Beatles at the cusp of stardom in 1962. Not that Wayne's decision was groundless. The hobbyists who paid $666.66 for the Apple I didn't get a case, display, or keyboard—only a motherboard. But two years later another computer would come from the garage: the legendary Apple II. And soon Atari, HP, and other companies would be hustling to hop on the Apple bandwagon. **—Harry McCracken**

How the Web Was Spun

IT MIGHT SEEM as though the World Wide Web burst on the scene fully realized in the mid-1990s, but it was a long time abornin'. In 1945 a government scientist named Vannevar Bush theorized about a futuristic communications device that he dubbed a memex, which in retrospect sounds amazingly like a browser-equipped PC. In 1960, Ted Nelson, the father of hypertext, conceived a Weblike information network called Project Xanadu (a project he's still working on today). And of course, the Web sits atop the infrastructure established by the ARPAnet in 1969.

But the Web really got going in March 1989, when Tim Berners-Lee (left), a British software engineer at the European Laboratory for Particle Physics in Geneva, devised a system that would allow the lab's researchers to share disparate documents in hyperlinked, browsable form. By 1992, his project—dubbed the World Wide Web—had begun to catch on among the Internet's then-exclusive populace of scientists and researchers. Among its fans was Marc Andreessen, an undergrad with a job at the National Center for Supercom-

10 Web Sites We'd Take to a Deserted Island

① **Amazon.com:** Want it? They've got it—or at least they'll have it soon.

② **Salon:** Sometimes crass, sometimes silly, always worth reading.

③ **Yahoo:** The original Web directory, and still the best.

④ **EBay:** The world's greatest swap meet; weirdly addictive.

⑤ **Spinner:** Get down, boogie oogie oogie.

⑥ **Deja.com:** All the newsgroups fit to print, and a lot more.

⑦ **CNN Online:** For your daily dose of reality.

⑧ **Mapquest:** Even on an island, you wanna know where you are.

⑨ **Official Gilligan's Island Fan Club:** In case you want to build a radio from coconuts.

⑩ **Drugstore.com:** One word: sunscreen.

(See www.pcworld.com/dec99/century for URLs.)

CLOCKWISE FROM TOP: MICHAEL WARREN; CORBIS/BETTMAN; HEWLETT-PACKARD COMPANY, REPRINTED WITH PERMISSION; PHOTO COURTESY OF APPLE COMPUTER, INC.

velops the first binary circuit at Bell Labs.

1938 William Hewlett and David Packard form HP in a garage in Palo Alto, California. Konrad Zuse produces the first computer that uses binary code.

1939 Georges Stibitz and Samuel Williams build the Complex Number Computer, which has 400 telephone relays and is connected to three teletype machines—precursors to the modern-day terminal.

1944 Engineers at Harvard build the Mark I computer, but the machine breaks down repeatedly.

1946 Engineers at the University of Pennsylvania demonstrate the ENIAC, the first general-purpose electronic computer.

1947 Two workers at Bell Laboratories experiment with the first transistor.

1949 John Mauchly develops the Short Code, the world's first high-level programming language.

1951 Mauchly and John Eckert build the UNIVAC I, the first commercial electronic computer, which is installed at the U.S. Census Bureau. Grace Murray Hopper develops A0, which translates programming code into binary code.

puting Applications. In 1993, working with NCSA programmer Eric Bina, Andreessen designed a highly graphical point-and-click browser, named NCSA Mosaic. The Web's popularity began to skyrocket—especially after Andreessen and Bina joined a start-up called Netscape in 1994 and spearheaded the creation of an even better browser, known as Navigator.

How fast has the Web grown? Put it this way: It took five years for the number of servers on the Web to go from 0 to around 1500. Another five years later, the number of servers has surpassed 7 million, and the figure keeps growing. **—Harry McCracken**

10 Biggest Hardware Flops

① IBM PCjr: Orphaned at an early age; famously awful keyboard.

② NeXT machine: Sleek, black, and Unix-based; ten years ahead of its time.

③ Apple Lisa: Suffice it to say that 2700 of them were buried in a landfill.

④ IBM PS/2: Failed to take PC market away from the clones.

⑤ The Net PC: Dumb and dumber terminals.

⑥ The network computer: No Java, just jive.

⑦ Newton MessagePad: Lookd kool, two bad it never learnd tous pell.

⑧ Pentop computers: Write idea; wrong time, price, and size.

⑨ PowerPC: Once seen as an Intel killer; never more than just another Mac.

⑩ Xerox Alto: Can you say "blown opportunity"?

Intel Misses the Points

WHAT'S A FEW decimal points between friends? A lot, as Intel learned when it got bitten by the Pentium math bug in November 1994. The problem? In doing some calculations, the chip produced errors beyond eight decimal places. Intel dismissed the bug as trivial. Then CNN picked up the story, and attorneys general in eight states filed liability suits against Intel. It quickly became the biggest PR blunder in computing history. "It was a classic case of how even incredibly smart people can do incredibly dumb things," says Lou Hoffman, principal of the Hoffman Agency, a PR firm in San Jose, California.

Intel finally agreed to replace all Pentium chips on request—at a cost of $475 million. The company apparently learned its lesson. In 1997, when flaws were uncovered in the Pentium II, Intel promptly issued fixes. It now publishes an errata sheet of known bugs for every chip it builds. **—Daniel Tynan**

Veni, Vidi, VisiCalc

THE SOFTWARE industry's Holy Grail is the *killer app*—a program so essential that consumers buy computers just to use it. The archetypal killer app is VisiCalc, the first digital spreadsheet.

Toiling in an attic in Arlington, Massachusetts, Dan Bricklin and Bob Frankston devised the program in 1979. By adding up columns and rows of numbers on the fly, their software revolutionized number-crunching and completed in seconds tasks that would take an accountant hours to finish. More than 700,000 copies of the $99 program sold, making it the most popular software of its time.

But Bricklin and Frankston never patented VisiCalc, and by the mid-eighties Lotus's more sophisticated 1-2-3 had eclipsed it in sales. That program was in turn surpassed by Microsoft's Excel.

Bricklin and Frankston's design days weren't over. Bricklin went on to create the Trellix Web-publishing program, and Frankston pioneered home networking via phone lines. **—Harry McCracken**

CLOCKWISE FROM LEFT: MICK WIGGINS; COURTESY IBM ARCHIVES; MARK MATCHO; CORBIS/BETTMAN

1952 The UNIVAC I successfully predicts a landslide presidential victory for candidate Dwight Eisenhower over Adlai Stevenson, despite pundit predictions to the contrary.

1953 IBM manufactures its model 650, the first mass-produced computer; the company sells 1500 units before taking it off the market in 1969.

1955 Narinder Kapany develops the optical fiber. American Airlines installs the first large database network, built by IBM, connecting 1200 teletypewriters.

1956 IBM develops the first hard drive, called RAMAC.

Programmers at IBM write the computer language FORTRAN. The MANIAC I becomes the first computer program to defeat a human opponent in a game of chess.

1958 Texas Instruments builds the first integrated circuit. Bell Telephone introduces the first modems. Researchers at Bell Labs invent the laser.

1959 Using an abacus, Lee Kaichen, a Chinese professor, performs calculations faster than computers in Seattle, New York, and

Amazing Grace

WITHOUT standard programming languages, computing would be a Tower of Babel–style mess. Much of the credit for making order out of the chaos goes to Grace Murray Hopper (below right)—a Vassar math professor, a rear admiral in the U.S. Naval Reserve, and one of the first women to make a mark in the world of computing.

Hopper questioned conventions all her life. By 1955, prompted by a desire to write programs that would allow nonscientists to use computers, she'd developed Flow-matic—the first computing language to use words such as "count" and "display." In 1959 that program grew into Common-Business-Oriented Language, which Hopper wrote with colleagues at the Eckert-Mauchly Computer Corporation. COBOL revolutionized the way computers operated, marking the first time they responded to words rather than numbers.

Former students remember Hopper as a colorful and dynamic character. "I was a freshman at Vassar in 1934 and I was completely enamored with [her] teaching," remembers Winifred Asprey, the founder of the computer science department at Vassar. "She also taught me how to smoke." **–Aoife McEvoy**

The Unhappy Hacker

THE FIRST MAJOR electronic break-in occurred in 1982, when a group of hackers from Milwaukee infiltrated the Los Alamos National Laboratory computer network via modem. Calling themselves the 414 Gang after their area code, the culprits embarked on a nine-day spree, hitting 60 computing systems before being caught by the FBI.

But it was the 1983 movie *War Games*, in which Matthew Broderick's character breaks into the Pentagon's computer system and brings the world to the brink of nuclear destruction, that launched the career of many an adolescent hacker.

Like graffiti artists, hackers hack to leave their mark—and occasionally to make a political statement, too. Motivated by curiosity, boredom, and hunger for a little power, they range from the mildly annoying (such as the Hacking for Girlies group that brought down the New York Times site on the day the Starr Report came out) on up to the criminal "crackers" (such as Vladimir Levin, who allegedly transferred millions of dollars from Citibank's mainframe computers to accounts in Finland and Israel).

The most famous hacker is still Kevin Mitnick (above). Now 36 years old, Mitnick was arrested in 1995 following a two-year FBI manhunt, and sentenced to 46 months for hacking into corporate computers. He languished in prison for four years before sentencing, making him the Mumia Abu-Jamal poster boy for the hacker/slacker generation.

Whether you call them hackers, crackers, or *computervredebreuk* (Dutch for "disturbers of the peace of a computer"), there's no doubt that as long as computing systems exist, people will be looking for—and finding—ways to break into them. **–Andrew Brandt**

CLOCKWISE FROM TOP LEFT: CORBIS/BETTMAN; CORBIS SYGMA/J BOUNDS-RNO; MARK MATCHO; PHOTO COURTESY OF APPLE COMPUTER, INC.

10 Greatest Software Packages

1. **Netscape Navigator:** Changed the Web forever.
2. **Electric Pencil:** Father of all word processors.
3. **Microsoft Excel:** The last truly innovative program from Microsoft.
4. **dBASE II:** Brought programming to the masses.
5. **HyperCard:** Created hypertext—the glue that holds the Web together.
6. **XyWrite:** The last great DOS word processor.
7. **VisiCalc:** Proof that the PC meant business.
8. **Myst:** We're still trying to finish it.
9. **PC-Talk:** Communications package invented the shareware concept.
10. **DOS 1.0:** Bill Gates does CP/M for IBM—and the rest is history.

Taipei. Grace Murray Hopper and Charles Phillips invent COBOL. John McCarthy and Marvin Minsky form the Artificial Intelligence Lab at MIT. Xerox introduces the first commercial copier.

1960 Digital Equipment Corporation develops the PDP-1, the first commercial computer equipped with a keyboard and monitor.

1961 John Kelly at Bell Labs programs a computer to sing a song; the tune it warbles: "Daisy Bell (Bicycle Built for Two)."

1962 The People's National Bank in Gouster, Virginia, installs the world's first ATM; it isn't a success, however, and its maker eventually goes out of business. Programmers at MIT create the first video game.

1963 Douglas Engelbart develops the mouse at the Stanford Research Institute; two decades later, the Macintosh will make it a standard component.

1964 Computer dating services become a fad. Zenith develops the first commercial product that uses an integrated circuit—a hearing aid. The American Standard Association adopts ASCII as the standard code for data transfer.

1965 Digital Equipment Corporation builds the first minicomputer; it costs $18,000. The

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Copy This!

SOME FOLKS SAY Steve Jobs pulled the heist of the century when he struck a deal with Xerox in 1979: The firm could invest $1 million in Apple if Jobs could visit its Palo Alto Research Center. Xerox said yes, and a Pandora's box swung open.

At PARC, Jobs spied the Alto, an experimental PC with a graphical user interface. Within minutes, it's been reported, Jobs realized that in the future, all computers would use a GUI.

According to conventional wisdom, Apple then cloned the Alto with its Macintosh—before Microsoft, in turn, mimicked the Mac with Windows. But Apple's work on the Mac had already begun when Jobs toured Xerox. And Jef Raskin, an Apple employee, had been exploring graphical interfaces as early as 1967. "The only thing [Apple] took," says historian Owen W. Linzmayer, "was inspiration." Indeed, the company was solely responsible for many elements of the modern GUI, including the clipboard, trash can, and drag-and-drop file management—making the visit to PARC seem like something less than grand larceny. **—Harry McCracken**

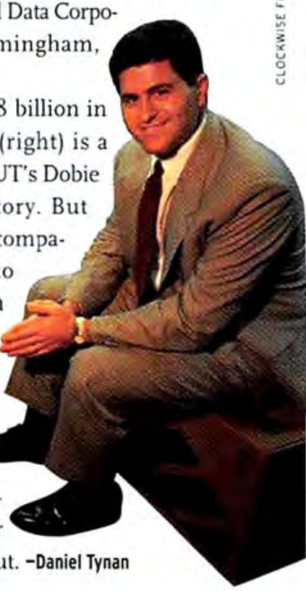
10 Biggest Software Flops

1. **Microsoft Bob:** Windows' half-wit cousin, now vacationing with Jimmy Hoffa.
2. **Apple Copland:** Like Bigfoot, this Mac OS has never been seen in public.
3. **OS/2:** Smothered by its half brother, Windows.
4. **WordPerfect for Windows 5.1:** Slow and buggy; helped hand word processor market to Microsoft.
5. **Lion King CD-ROM:** The nightmare after Christmas for many Mouseketeers.
6. **Microsoft Outlook 1.0:** So big and slow, even Microsoft was embarrassed.
7. **RAM doublers:** Nice idea, if they worked.
8. **MCI Mail:** Could have been e-mail king, but hit the Web way too late.
9. **Apple EWorld:** Remember this online service? Neither does anyone else.
10. **Windows CE 1.0:** Windows on a palm PC? Kind of like stuffing a moose into a matchbox.

Mail-Order Pride

MENTION a dormitory and most people think of rooms littered with books, bottle caps, and pizza cartons. But if you visited Michael Dell's dorm room in 1983, you'd have found CPUs and floppy drives. While Dell's classmates were cramming for midterms, he was cramming circuit cards into motherboards and selling PCs via mail order. Before completing his first year at the University of Texas in Austin, the erstwhile premed student had abandoned school and founded PCs Limited, precursor to Dell Computer.

Michael Dell's days as a dorm-room tycoon are part of computer industry lore. But his real innovation was the direct-sales model. By cutting out the retailer, he revolutionized the way PCs were sold. "They're not just the company that made the box, they're the people that sold it to you," says Roger Kay, research manager for International Data Corporation in Framingham, Massachusetts.



Now with $18 billion in revenue, Dell (right) is a long way from UT's Dobie Center dormitory. But his namesake company continues to lead the way in direct computer sales, most recently by pioneering direct sales over the Internet. Not bad for a college dropout. **—Daniel Tynan**

CLOCKWISE FROM TOP: MICK WIGGINS; CORBIS SYGMA/GIASANTI GIANNI; JAMES ARONOVSKY; COURTESY IBM ARCHIVES; MARK MATCHO

simplified computer language BASIC is developed; it will later become the standard language for PCs.

1968 Intel is formed. For the first time, a computer (HAL 9000) costars in a movie, Stanley Kubrick's *2001: A Space Odyssey;* as its memory is unplugged, it sings "Daisy Bell (Bicycle Built for Two)"—the same tune John Kelly's computer had sung seven years earlier.

1969 Honeywell releases its H316 "Kitchen Computer," the first home computer; priced at $10,600 in the Neiman Marcus catalog, the computer can plan menus and take care of other household business. ARPAnet, precursor to the Internet, debuts. ATMs become more widely used in banks. "Bubble memory" makes its debut, allowing computers to retain memory after being shut off.

1970 The floppy disk is introduced. Intel develops the first memory chip, which stores 1024 bits of data. Xerox establishes its Palo Alto Research Center. The daisy wheel printer appears on the market. Bell Labs develops Unix.

1971 Texas Instruments introduces the pocket calculator. Dot matrix printers appear. Niklaus Wirth develops PASCAL. The first speech-recognition software, Hearsay, is developed in India.

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Start Me Up

SEVERAL hours before midnight on August 23, 1995, hordes of consumers lined up outside computer stores across the nation. Their purpose? To be the first PC users to buy Windows 95, the much-heralded follow-up to Windows 3.1.

After three years in production, numerous false starts, and massive hype, the operating system was unveiled in a circus tent on Microsoft's Redmond, Washington, campus. Onstage, ringmaster Bill Gates listed some of the production stats—362 "builds" of the software, 77 babies born to members of the design team—while a Rolling Stones recording urged the crowd to "Start Me Up."

The new version catapulted Windows into the mainstream, and sold more than 3 million copies in five weeks. But Gates's real genius lay in marketing. His $200 million publicity campaign (including $12 million for rights to the Stones song) created a hysteria never before seen in computing.

But while Windows 95 did improve on Windows 3.1—with a revamped interface, Plug and Play compatibility, and Internet connectivity—at its heart it was still basically DOS. And its awkward mix of 16- and 32-bit code made it hopelessly crash-prone.

As one analyst noted incredulously, "They spent all that money to promote the fact that there's a Start button in Windows 95!"

Other observers wondered if Gates knew the refrain to his $12 million tune: "You make a grown man cry." **—Yael Li-Ron**

Pong, Anyone?

IN 1972, FEW PEOPLE had seen a computer up close. Maybe that's why Atari's arcade game Pong was such a huge sensation. The graphics and concept were fantastically primitive: A vertical white line divided the screen, separating two smaller vertical bars (the paddles) on either side. A distinctive "ping" sounded whenever the ball hit a paddle.

Pong wasn't the first video game or even the first with a Ping-Pong theme. (Some say it wasn't a computer game at all, since it used hardwired circuits instead of a microprocessor.) But the addictive game gobbled up quarters in record numbers from the minute it debuted at a California pub. Such variants as Super Pong, Quadra-Pong, and Puppy Pong (in a doghouse-shaped console) followed. Every digital diversion since, from Pac-Man to Tomb Raider, owes a debt to the electronic table-tennis game. **—Harry McCracken**

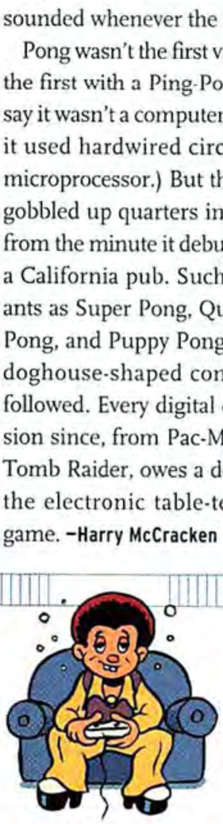
The 50-Pound Featherweight

PORTABILITY is relative. Consider IBM's Model 5100. Introduced in 1975, the portable system tipped the scales at 50 pounds and cost $19,975 fully loaded. Certainly it was a behemoth by today's standards. But in a day when mainframes took up an entire room, the 5100 seemed positively petite.

Computers didn't get *really* small until the early 1980s—and even then, the first popular portable, 1981's Osborne 1, was as big as a sewing machine and weighed 24 pounds. The first notebook, Epson's HX-20, crammed a built-in printer and tape drive into its 3-pound case but displayed just four lines of text at a time. In 1980, Radio Shack's Pocket Computer debuted. With a tiny QWERTY keyboard and 1.9KB of RAM, it was a primitive forebear of today's handhelds—call it the prehistoric digital assistant. **—Harry McCracken**

Buzzwords We'd Like to Bury

1. dot-com
2. information superhighway
3. e- or cyber-anything
4. bleeding edge
5. Net-centric
6. Web-enabled
7. feature-rich
8. virtual (fill in blank)
9. app
10. Y2K



1972 Ray Tomlinson invents e-mail. The first home video games are designed for use on the TV, and Atari releases the first arcade game, Pong. Programmers at Bell Labs develop the computer language C.

1974 Congress passes the Privacy Act, which gives the public greater control over the collection and use of personal information.

1975 First widely marketed personal computer, the Altair 8800, debuts. Liquid crystal displays are marketed. Bob Metcalfe at Xerox develops Ethernet. The first word-processing software, the Electric Pencil, is developed. The federal government's antitrust suit against IBM goes to trial; the government will drop the case in 1982, but not before producing some 30 million pages of documentation. IBM introduces the laser printer. Microsoft, the unofficial partnership of Bill Gates and Paul Allen, achieves sales of $16,000.

ALTAIR 8800 COMPUTER

1976 Data General unveils its computer chips in the navel of a belly dancer at the National Computer Conference in New York. Gary Kildall develops CP/M. IBM develops the ink jet printer. Steve Wozniak and Steve Jobs form Apple Computer.

CLOCKWISE FROM TOP: CORBIS SYGMA/CARINALE STEPHANE; GORDON STUDER; DOUG WILSON/BLACK STAR; JAMES ARONOVSKY; MARK MATCHO

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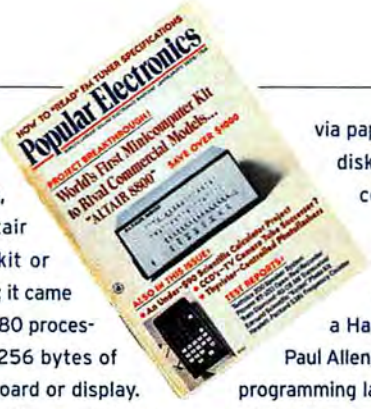
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TEST REPORTS:

"THE HOME computer is here!" crowed the January 1975 issue of *Popular Electronics* magazine. The cover story on a mail-order computer kit called the Altair 8800 sparked the imagination of thousands of readers. "I got all excited," recalls Russell Banks, now a cartographer in Arlington, Virginia. "And it wasn't a couple of days before I put a check in the mail."

The Altair wasn't the first PC; among its forgotten predecessors were the Kenbak (1971), sold by a one-man company, and the Micral (1973), a French product. But it was the Altair that launched the microcomputer revolution.

Manufactured by MITS, a tiny company in Albuquerque, New Mexico, the Altair sold for $397 as a kit or $498 fully assembled; it came with Intel's 2-MHz 8080 processor and a whopping 256 bytes of memory, but no keyboard or display. "All you could do was flip switches and make lights blink," recalls Banks, who was nonetheless so taken by it that he opened one of the country's first computer stores.

The Altair soon acquired a display, keyboard, more memory, and mass storage (first via paper tape and then via floppy disk). It also spawned a microcomputer operating system (CP/M), and a little software vendor named Microsoft.

After eyeing the cover girl in a Harvard dorm, Bill Gates, with Paul Allen, cobbled together the BASIC programming language and dropped out of college to parlay it into an empire.

Gates and Allen went on to become multibillionaires, of course, but MITS founder Ed Roberts sold his company in 1977 and became a country doctor. The Altair ceased production within two years. **—Harry McCracken**

Computers Get Personal

THE FIRST PCs required some pretty daunting skills, such as a knack for programming and knowledge of binary math. That changed in 1977 with the first prepackaged PCs. The Apple II sported snazzy color graphics; Commodore's PET 2001 (named after the Pet Rock) had a built-in monitor.

Unlike the first microcomputers, these PCs were useful right out of the box. "You turned the TRS-80 on and it *did* something," remembers composer Dennis Báthory-Kitsz, who bought one in 1978. Not that they were perfect. Early TRS-80s—the first computer sold by a dealer (Radio Shack) tended to randommly rrepeat charracters as you typpedd; the PET's calculator-style keys made touch-typing impossible; and the original Apple II could handle only integers, not decimals. Once these flaws were fixed, all three systems prospered. By the mid-eighties, however, the IBM PC and its clones had gobbled up most of the market. Today, a cult of nostalgia freaks use emulation software to turn today's PCs into virtual Apple IIs, PETs, and TRS-80s. **—Harry McCracken**

Gettin' Buggy Wit It

IN 1947, AS HARVARD researchers were testing the Mark II computer, the machine suddenly stopped. Inside its cabinet, the scientists found the carcass of a moth. The insect had been beaten to death by the unrelenting current—killed, one could say, in a calculated way. The corpse was then taped to a logbook with the notation: "First actual case of bug being found." But contrary to legend, this was not the birth of the term *bug*.

"*Bug*, as it applies to a flaw, dates back to Thomas Edison," says Dr. Peggy Kidwell, mathematics curator at the Smithsonian and an expert on the word's etymology. A bug's life in computing began not long after computers were born. In the early 1940s, IBM techs brought the term to Harvard as they helped troubleshoot the Mark I. The little buggers have been with us ever since. **—Gregg Keizer**

1977 Bill Gates and Paul Allen officially found Microsoft. Apple introduces the Apple II, the first preassembled personal computer; the Apple II will lead the PC market until the IBM PC appears in 1981. Tandy and Commodore release PCs with built-in monitors—no need for a TV hookup.

1978 Wordstar is released and quickly becomes the most popular word processing program.

1979 Steve Jobs visits Xerox PARC. Dan Bricklin and Bob Frankston introduce VisiCalc ("visible calculator"), the first killer app.

1980 dBASE II appears on the market.

1981 IBM introduces the IBM PC with an MS-DOS operating system.

1982 Dr. Barney Clark receives the first artificial heart; a microprocessor controls its functions. Andrew Fluegelman creates the first shareware, PC-Talk. Compact disc players are introduced. Osborne builds the first PC portable. The first IBM PC clones are marketed. *Time* magazine names the PC "Man of the Year."

1983 Workers lay the Boston/New York/Washington, D.C. fiber-optic link. Apple introduces the $9,995 Lisa, the first computer to use a graphical user

CLOCKWISE FROM TOP: COURTESY OF POPULAR ELECTRONICS; GORDON STUDER; PHOTO COURTESY OF APPLE COMPUTER, INC.; MARK MATCHO; JAMES ARONOVSKY; MICK WIGGINS

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Acer Altos: Servers That SERVE

There are four words that strike abject fear into the hearts of business managers: "The system is down." That is because business today runs on a steady diet of real-time information, always available and accessible.

So it is not surprising that the people who run those systems, usually anchored by server technology, cite *reliability* as the number one feature they want in their servers, along with overall value. Nor is it surprising that the server of choice when reliability and value matter has the Acer Altos brand.

There are good reasons for those choices. The Acer Altos 21000 is the acknowledged world-leading price-performance server, based upon the universally accepted TPC-C benchmark specifications.

Need further independent verification of the strength and value of Acer Altos server technology? *PC World Online* recently awarded the Acer Altos 12000 its coveted Best Buy distinction in a current review comparing network servers, finding that the 12000's "admirable attention to detail and rampant redundancy and excellent setup and fault-tolerance features make this big and brawny powerhouse top choice for servers that serve. The 12000 makes a server serve, not cry out for service."

QUALITY WINS FANS

It is precisely this kind of server quality that has made Philadelphia-based Medco/Tool Inc. a big fan of Acer Altos servers. With just a single Acer Altos 21000 running out of its home office, Medco/Tool supports all customer and inventory activities at six warehouses and at a remote sales and marketing office in St. Louis as well. The reliability of the 21000 permits the single-server installation and gives Medco/Tool the ability to manage the entire system, including software upgrades and network management, from the single central office site.

"Acer Altos servers offer simply outstanding price/performance and reliability," notes Bill DiPietro, sales manager for Hatfield, Pa.-based Comped, which installed Medco/Tool's 21000. "They rarely, if ever, fail." DiPietro also applauds the ease of integration of Acer Altos servers as well as their ability to scale from single-processor systems to beefy, multiprocessor units as the business grows. "We take applications off older systems and move them to the new Acer Altos platforms with little, if any, conversion problems," DiPietro says.

As though it were trumping its own reliability and value predominance, Acer America has also unleashed AcerSupport.com, a service and support Web site providing world-class customer service to channel partners and product owners.

The bottom line for buyers is simply this: When your business runs on information, the information runs best on Acer Altos servers.

FAST FACTS ABOUT A HOT COMPANY

- In business 24 years, the Acer Group is the world's third largest PC manufacturer, employing more than 28,000 people in 44 countries.
- Acer offers full support for its network of 10,000 dealers and distributors operating in more than 100 countries, which means your business is never far from help wherever you need it.
- Quality starts on the factory floor, and Acer facilities are certified ISO-compliant. As one of the world's largest computer manufacturers with facilities worldwide, Acer also custom manufactures more of its quality-controlled computer components than any other maker.
- Acer America, established 23 years ago, has developed partnerships with key vendors, including Citrix, 3Com, Adaptec, Computer Associates, Intel, Microsoft, and others.
- In the 1999 "Asian SuperBrands Questionaire" of 34,000 people, conducted by *Readers' Digest*, Acer was named the number one computer brand.
- Acer and IBM have inked an $8 billion technology pact relating to Acer's server, desktop, and notebook products.

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Big Brother Meets the Little Tramp

DURING the third quarter of Super Bowl XVIII in 1984, CBS went to a commercial break, and millions of viewers en route to the refrigerator stopped cold in their tracks. On screen, a woman in running shorts and tank top sprinted into a dank hall filled with futuristic workers and swung a sledgehammer into the televised face of their Big Brother–type oppressor. "On January 24th," a voice intoned, "Apple Computer will introduce Macintosh. And you'll see why 1984 won't be like *1984*." Directed by Ridley Scott, the stylish ad drew on the bleak images of George Orwell's novel to eclipse another famous Super Bowl pitch—for IBM.

Where Apple's ad was moody, the perky IBM spot featured Charlie Chaplin's Little Tramp wheeling the PCjr in a stroller. The tag line read, "The bright little addition to the family," and seemed to say, "We're not a big, bad corporation. Even the champion of the toiling masses loves us."

Nobody bought the message—and few bought the PCjr, with its limited functionality and $999 price. In 1985, IBM pulled the plug on its offspring.

But while Apple won that battle, IBM and PC clones won the war. The "1984" pitch was an act of hubris that helped to fuel Apple's spectacular rise but also set the stage for its eventual fall. **—Karen Silver**

Greatest Internet Hoaxes

5

① The Good Times virus: Can an e-mail with the words "good times" in the subject line damage your PC? No, but thousands of gullible users thought so—endlessly recycling warnings about this and other virtual viruses.

② Navy missile shot down Flight 800: No one knows what caused TWA Flight 800 to crash into the ocean in July 1996. But former ABC correspondent Pierre Salinger's reputation got shot down when he "broke" the bogus missile theory weeks after it had swirled around the Net.

③ Kurt Vonnegut's MIT commencement speech (aka "Wear sunscreen"): Wise, whimsical, and convincing enough to fool even Mrs. Vonnegut, but actually penned by *Chicago Tribune* columnist Mary Schmich.

④ The $1000 e-mail: To test a new e-mail tracking program, Bill Gates supposedly sent an e-mail promising to pay $1000 to anyone who forwarded a copy of the message. We're still waiting for our checks.

⑤ The Net virgins: In July 1998, two California teens announced plans to lose their virginity in front of a worldwide Web audience. Then it was revealed that the teens were really actors involved in a moneymaking stunt. The event was canceled, and a grateful nation went back to watching *Ally McBeal.*

IPO Mania

WALL STREET'S infatuation with all things Internet began August 9, 1995, the day Netscape went public. The 15-month-old start-up opened at $28 per share and hit a high of $74.75 that day. The world had its first glimpse of one of the late 20th century's wildest phenomena: the Internet initial public offering. High-profile companies like Yahoo, Amazon.com, and E-Trade followed with IPOs of their own, racking up outrageous price/earning ratios. Today, investors large and small continue to bank on Web start-ups, with little regard to profitability. "Investors continue to ignore quality," says Ben Holmes, founder of IPOPros.com, a Boulder, Colorado, research firm. "Rather than looking at a company's earnings, they're still looking at hype and market potential."

So why hasn't Internet IPO mania petered out? "It's the revolution of our time," Holmes asserts. "The Internet is entertainment, commerce, and information all rolled into one." Side effects of the phenomenon have included day trading and the birth of the 24-hour stock exchange. Though Holmes remains confident that we'll continue to see Internet IPOs in the future, he believes that significant market consolidation is inevitable. "Three to five years from now, half these Internet stocks won't exist," he predicts. "They'll be eliminated by acquisition or attrition." **—Michelle Campanale-Surkan**

CLOCKWISE FROM CENTER: GORDON STUDER; MARK MATCHO

interface and a mouse. IBM launches the PC-XT, the first computer with a built-in hard drive, and also introduces the PCjr.

1984 CD-ROM debuts; Apple releases the Macintosh. 2400-baud modems are introduced. Hewlett-Packard markets the LaserJet, the first personal laser printer. Novelist William Gibson coins the term *cyberspace.*

1985 America Online is founded. Microsoft develops Windows 1.0 for the IBM PC. Bill Gates and Apple CEO John Sculley sign a confidential agreement granting Microsoft the right to use aspects of Apple's graphical interface in its software, while acknowledging the Mac OS as the inspiration for Microsoft Windows. Nintendo arrives in the United States.

1986 Microsoft goes public. The National Science Foundation approves funding for the Internet backbone.

1988 Microsoft releases Windows 2.03, whose overlapping windows resemble the Macintosh's, and Apple files suit; six years and some $10 million later the court will decide in Microsoft's favor. Steve Jobs introduces NeXT. The Internet Worm, a piece of self-replicating software, wriggles through the Internet.

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1989 Tim Berners-Lee invents the World Wide Web. Xerox files suit against Apple for stealing its graphical interface designs for the Lisa and Macintosh

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Use Encryption, Go to Jail

ENCRYPTION has long been used by governments to secure their correspondence. But in 1991, when programmer Phil Zimmermann wrote his Pretty Good Privacy freeware to do the same thing, U.S. officials swooped down with an injunction. PGP was the first public-key encryption utility; it allowed users to send coded e-mail that snoops couldn't decipher.

When the program was posted to a newsgroup and distributed worldwide, Zimmermann found himself on the wrong end of a federal criminal investigation. The posting ran afoul of a U.S. law prohibiting the export of strong encryption outside the United States. The event augured the privacy issues that currently dog the digital age, and marked the beginning of the government's battle to police the Net.

Following public outcry, the government dropped its case in 1995. But the future of encryption is far from secure. Legislators view the technology as a tool for spies and terrorists and want encryption software to include a back door for federal authorities to decode mail. Nevertheless, PGP is still available free for downloading at web.mit.edu/network/pgp.html. **–Scott Spanbauer**

Do You, Uh, Yahoo?

IN APRIL 1994, two Stanford grad students caught a break when their professor left town on sabbatical. Engineering students David Filo and Jerry Yang (below) had little to do but surf the Web. It didn't take long for them to compile a hefty bookmark list, organized by subject. Eventually they thought: Why not put it on the Web? They slapped together a database program to handle the job, posted the results online, and the rest is history. The bookmark collection, now known as Yahoo, receives some 80 million visitors a month. As for Filo and Yang? They're gazillionaires, giving hope to grad students everywhere. **–Dan Miller**

As the Worm Turns

THE NATIONWIDE Internet was only a couple of years old when it suffered its first serious security breach. In 1988, 23-year-old Cornell University graduate student Robert T. Morris, Jr. (whose father happened to be chief scientist at the government's National Computer Security Center), let loose his now-infamous Internet Worm on the fledgling Net. Within two days, the out-of-control, self-replicating program spread to more than 6000 university, military, and medical research computers, shutting down major Internet nodes and leading to Morris's arrest. He was later convicted of computer fraud and abuse, sentenced to three years probation, and fined $10,050.

Morris's program wasn't the first worm or virus ever spawned. Pranksters probably wrote self-replicating programs on mainframes as early as the 1960s. But the Worm powerfully demonstrated the Internet's potential as a viral breeding ground.

In 1989, the U.S. Department of Energy formed the Computer Incident Advisory Capability to combat significant threats to the Internet's infrastructure. But advances in operating systems have sped the creation of new viruses.

Experts have identified around 40,000 strains of computer virus. Reports from the viral underground, however, suggest that virus writers are working furiously to raise that number to 200,000 by the year 2000. **–Andrew Brandt**

CLOCKWISE FROM TOP: GORDON STUDER; CORBIS SYGMA; CORBIS SYGMA/GIASANTI GIANNI; MARK MATCHO; MARC SIMON

computers; after selling only 60,000 or so Lisas, Apple discontinues the model and buries the remaining units in a landfill in Utah. HDTV appears in Japan.

1990 Intel introduces the i486 chip. The U.S. Federal Trade Commission begins its investigation of Microsoft. Microsoft sales hit $1 billion; Windows hits 3.0.

1993 Personal digital assistants (handheld computers) introduced. Intel releases the Pentium chip. Marc Andreessen and Eric Bina design Mosaic, the first graphical Web browser. The Apple Newton debuts.

1994 GPS auto navigation systems become available in U.S. Intel ships 2 million flawed Pentium chips. Iomega introduces the Zip drive and disks. Marc Andreessen helps found Netscape.

1995 Flat-screen TVs introduced. Microsoft releases Windows 95. Pixar Animation Studios and Disney release the first full-length computer-generated feature film, *Toy Story*. Microsoft introduces Windows 95 and Office 95. DVD technology is standardized. Jeffrey Bezos founds Amazon.com. Netscape goes public.

1996 Set-top boxes allow users to surf the Web through their TV. Palm Pilot debuts.

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– **Fred Lugano**, weatherization.com, Vermont

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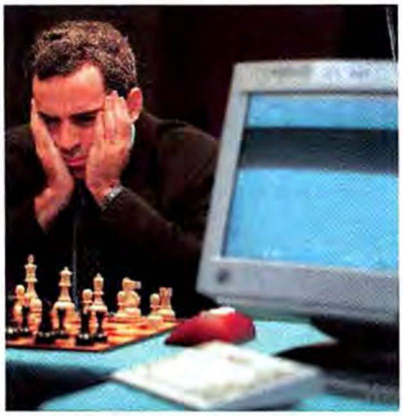
Computers 1, Humans 0



FEBRUARY 1996: World chess champion Garry Kasparov (above) squared off against IBM's Deep Blue in a six-game match. The computer won the first game, becoming the first machine to beat a reigning world champ. But Kasparov rallied to win three subsequent games and draw twice, giving him a 4 to 2 overall victory. For the moment, humankind's dominance over machines remained intact.

Anticipating a rematch, IBM took Deep Blue back to the lab and bulked up its processors to compute 200 million moves per second–twice as many as before. Over nine days in May 1997, the chess titans met again. This time Kasparov took the first game, but victory ultimately eluded him. Two losses and three draws later, the exhausted human conceded victory to the stoic machine, 3.5 to 2.5.

In game two of the match, Kasparov grew obsessed by a move the machine made that seemed eerily human. The move, which indicated a level of forward thinking not usually exhibited by computers, spooked Kasparov and ruined his focus. But Kasparov refused to see his defeat as signaling the end of human dominance in chess: "I have no doubt," he said, "in a proper...[match] this machine will be beaten."

We may never find out. Perhaps wary of the hostility Deep Blue might incur if it continued to beat human opponents, IBM pulled it from competition, claiming that its scientists wanted to move on to "other challenges." **–Steven Gray**

Scandal in a Blue Dress

STARR REPORT

IT WAS LURID. It was hot. And anyone could get it with the click of a mouse. On September 11, 1998, Net media came of age when the House of Representatives released Independent Counsel Kenneth Starr's 445-page report over the Web. Pundits predicted that demand for the report would bring the Internet down. Indeed, servers crashed as millions raced to read the salacious details of the White House intern and her cigar-aficionado president.

For good or ill, the Internet had arrived as a mass medium. The public could now get some of its news from the source, instead of through the filter of newspapers and TV. What's more, the Internet reported it more quickly. It was Web columnist Matt Drudge who broke the scandal that *Newsweek* was reluctant to report. Network news took another three days to catch up.

But the event didn't exactly presage the end of Dan Rather and Rupert Murdoch. The Starr Report was cumbersome and loaded with legalese: Most readers just did keyword searches for "cigar" and "the Gap." And the public continued to look to conventional media for independent verification of the facts. **–Anush Yegyazarian**

online

For complete author credits and links to other computer histories, visit PC World Online at www.pcworld.com/dec99/century. ■

Warning Signs That You're a Y2K Wacko

① You live in a log cabin.
② You're learning how to trap, kill, and skin your own dinner.
③ You purchase beef jerky in 100-pound economy slabs.
④ Your idea of luxury accommodations is a bomb shelter equipped with a flush toilet.
⑤ You're more heavily armed than most terrorist groups.
⑥ Your mantra is "God, guns, and groceries."
⑦ You sport more facial hair than a Wookiee.
⑧ You're hoarding a five-year supply of candle wax and kerosene wicks.
⑨ Your mattress is padded with more currency than a Swiss bank.
⑩ You collect recipes for house-pet hash and squirrel stew.

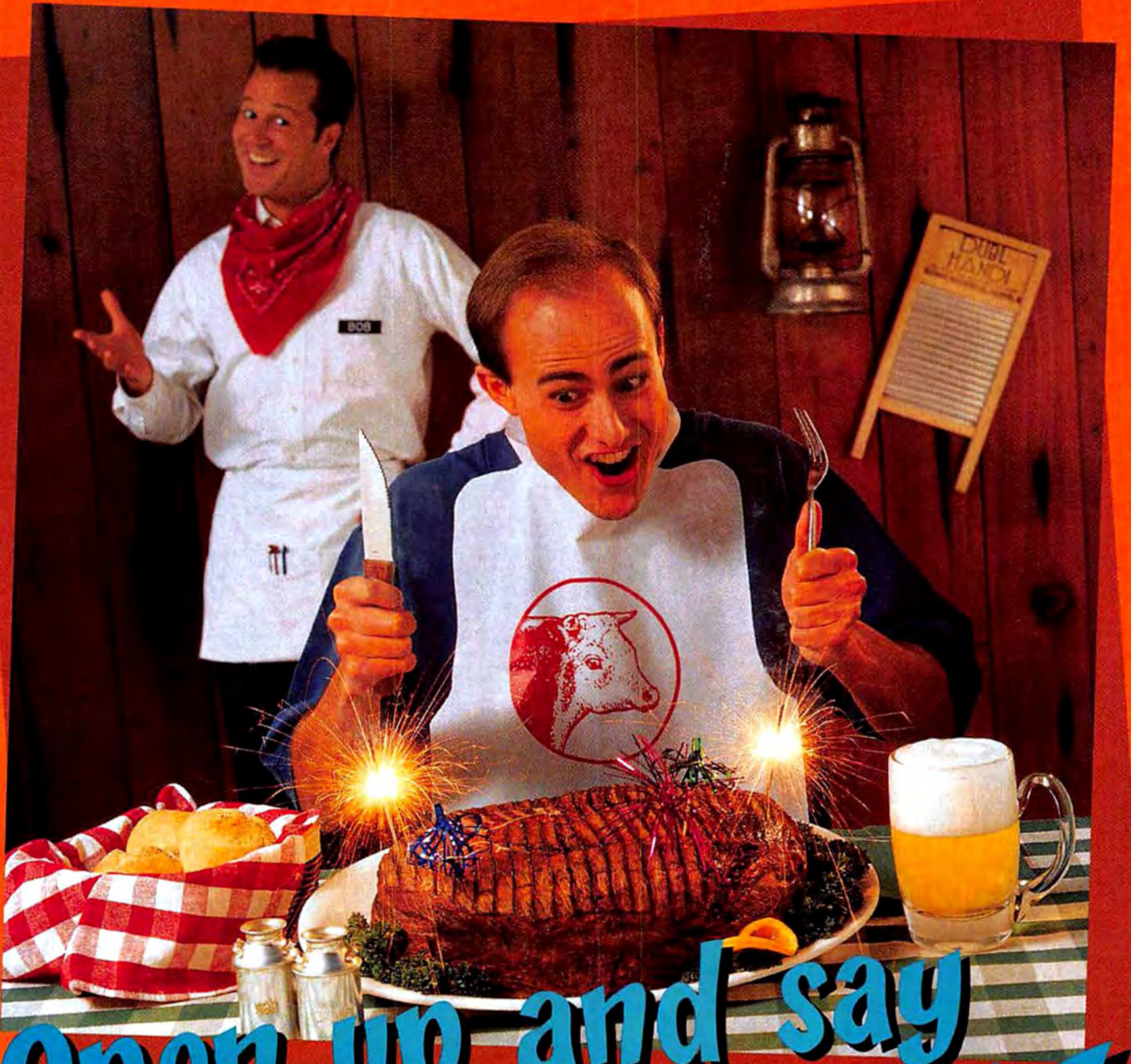
CLOCKWISE FROM TOP: CORBIS SYGMA/UIMONEN ILKKA; GORDON STUDER; MARK MATCHO; JEFF BERLIN

1997 DVD players become available in the United States.

1998 Diamond Multimedia introduces the portable MP3. The Starr Report is released online; within hours, the Hacking for Girlies group breaks into the New York Times Web site and brings it down for nine hours. Apple releases its candy-colored iMacs. E-commerce explodes as a new shopping medium and some 30 million households are purchasing goods over the Internet. Clarion and Microsoft introduce the Auto PC. Share prices of Yahoo and Infoseek stocks skyrocket.

1999 The Linux OS hits the big time. AOL completes its acquisition of Netscape. Microsoft, with 27,320 employees, reaches $14.48 billion in sales. E-Trade experiences outages three days in a row.

2000 The Y2K crisis hits–end of civilization as we know it.



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COMPUSA

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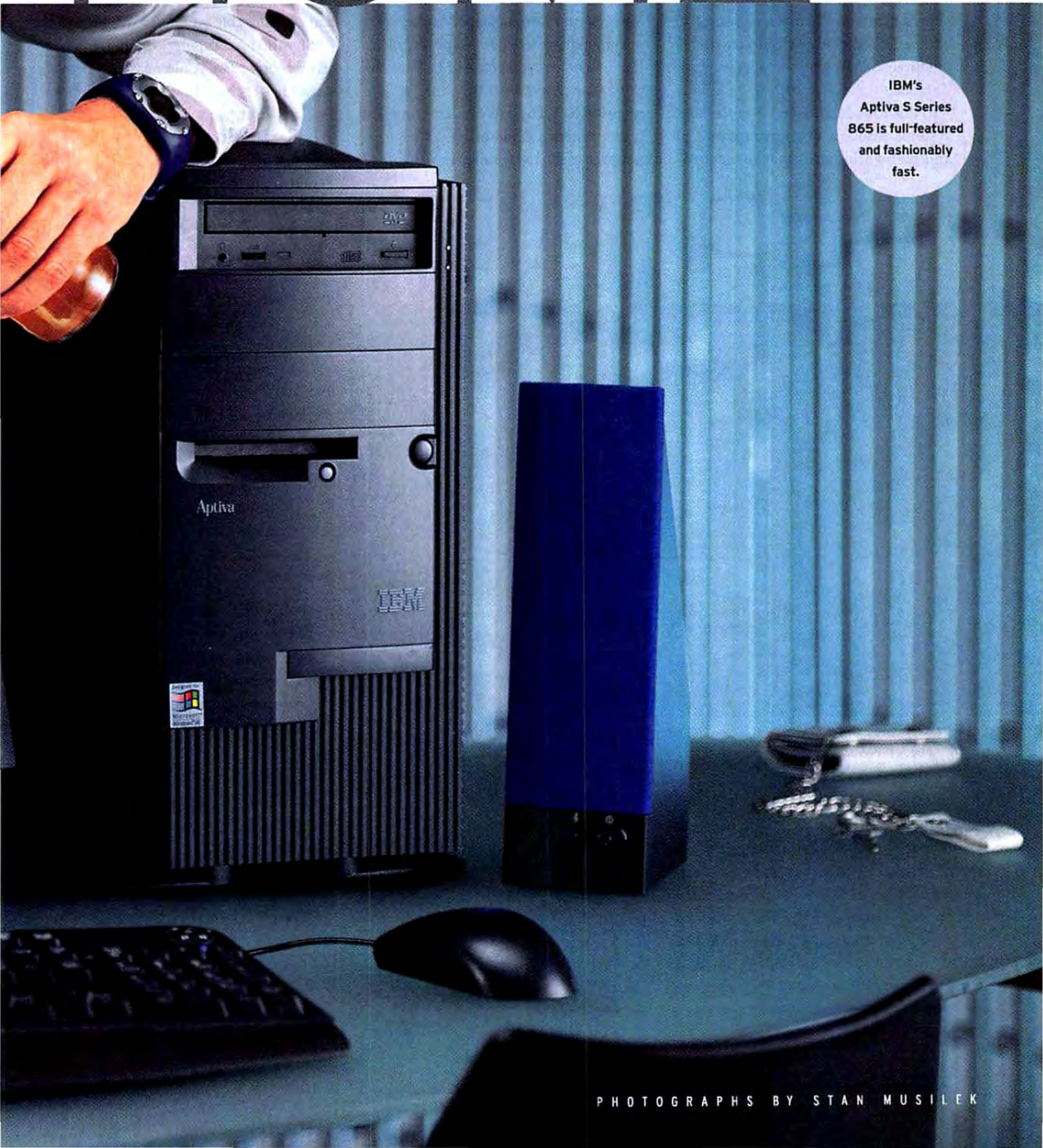
ULTIMATE BUYERS GUIDE

BY KIRK STEERS & JOEL STRAUCH

Finally, PCs are breaking out of the beige doldrums, with choices ranging from sub-$1000 bargain boxes to $2000-plus dream machines. Here's our list of the 15 best.

HOME PCS


DVD
Aptiva
IBM

IBM's Aptiva S Series 865 is full-featured and fashionably fast.

PHOTOGRAPHS BY STAN MUSILEK

Some of today's PCs will not only help you tally your credit card bills and design your smashing Web site, they'll also handsomely accentuate your home office. Thanks to a wave of snazzy and luscious boxes, you can choose from a number of offbeat machines, such as IBM's Aptiva S Series 865, NEC's all-in-one Z1, and the Emachines EOne—a PC that looks so much like the iMac that Apple filed a lawsuit. Of the three, only the pricey, relatively slow Z1 failed to crack our Top 15.

In this roundup, we put 25 of the latest systems through a battery of hands-on and real-world performance tests. We rank the best of these in our newly updated *Top 15 Home PCs* chart. Taking a cue from the Top 10 desktop PC charts, which focus on computers for businesses, we've divided the home PCs section into three categories: power (machines that cost $2000 and up); midrange ($1200 to $1999); and budget (under $1200).

While most models here offer an appealing blend of speed, hardware, and price, one system in each category stands out. And though we looked at some jazzy PCs, the top choices still come in beige wrappers. Our power Best Buy, the Dell Dimension XPS T600, is one such unit that puts substance ahead of style. Its boring box packs such top features as a Diamond Viper V770 Ultra graphics card, an 8X DVD-ROM drive, and a 250MB Zip drive.

Another Dell, the Dimension XPS T500, takes top honors on the midrange chart with good performance, easy setup, and a bundled 100MB Zip drive.

A Micron gets the spotlight in the budget category. The Millennia C466 is the fastest budget home PC we've seen, and its handy keyboard has a volume control and customizable buttons.

"Slow home computer" is getting to be an oxymoron. Two Athlon-based systems on our power chart, IBM's Aptiva S Series 865 and Compaq's Presario 5861, establish new PC WorldBench performance 98 records for systems running Windows 98. Most power PCs also boast huge hard drives, blazing 3D graphics, 17- or 19-inch monitors, and more RAM than you'll probably ever need. So if you work with formula-laden spreadsheets, large multimedia files, or high-resolution graphics—or if you just want to play the hottest comput-

POWER

TOP DOG: Dell's powerful Dimension XPS T600 comes with a 19-inch monitor.

MIDRANGE

FOR $800 LESS, Dell's Dimension XPS T500 (below) has a smaller monitor but runs plenty fast.

FURNITURE: THE MAGAZINE

Best Buys

Dell's Dimension XPS T600 earns our power Best Buy, with blazing performance, lots of storage space, and a reasonable price tag of $2459. Knock some of the T600's features down a notch and you get our midrange Best Buy, the **Dell Dimension XPS T500** (and you pocket $800). The low-cost champ, **Micron's Millennia C466** is the speediest budget system we tested, and it features a multimedia keyboard.

er games—consider buying one of the systems on our power chart.

Some midrange PCs we reviewed also offer more than enough speed for running office applications and playing games, though they tend to have slightly slower 450- to 500-MHz processors and smaller hard drives.

The five budget systems on our chart come with fewer features, but they're perfectly adequate for day-to-day tasks such as Web browsing and word processing. Most come with a 400 MHz or faster Intel Celeron processor and have a barebones configuration: half the system memory of midrange and power systems, a dinky 15-inch monitor, a small hard drive, and integrated graphics. Because most budget systems lack an AGP slot, you'll have to buy a PCI graphics card if you want better graphics or 3D-gaming performance. All things considered, budget machines are ideal for those who are looking for a low-cost family system or a second, basic PC.

Whether you're buying a top-of-the-line system as a holiday gift or seeking a more modest system that'll help you track your bills without doubling them, our comprehensive review of the best home PCs will help you find the right one for your needs, and hopefully shave a few hours off of your shopping time.

Power

1) Dell Dimension XPS T600

WHAT'S HOT: The Dimension XPS T600 is a great all-around machine. Although not the fastest system in this roundup, it earned a relatively high PC WorldBench 98 score of 256—that means it's more than speedy enough for standard business applications such as Microsoft Word and Lotus 1-2-3. This system also provides first-rate graphics performance, producing smooth AVI video playback and good-looking images in 3D games. The documentation, which includes a well-written manual covering beginner and advanced topics as well as basic troubleshooting guides, comes in a handy box for easy storage. Color-coded connectors ease setup further. To top it all off, the XPS T600's bundled Altec Lansing speakers and subwoofer generate rich, full sound.

WHAT'S NOT: Although our test system's 19-inch monitor displayed sharp text and good color, DVD movie images looked a bit dark. The scanty software bundle consists of Microsoft's Works Suite 99 and Encarta. Finally, the XPS T600's plain beige box doesn't exactly brighten a room.

WHAT ELSE: You can use the included 250MB Zip drive to back up files on the enormous 20.4GB hard drive. Adding new cards is a snap; the Dimension XPS T600's easy-to-remove cover gives you hassle-free access to the roomy interior, where you'll find three available PCI slots and one open drive bay.

BEST USE: An excellent hedge against PC obsolescence, this system comes with room for expansion and enough horsepower to handle any small-office/home-office application.

2) Compaq Presario 5861

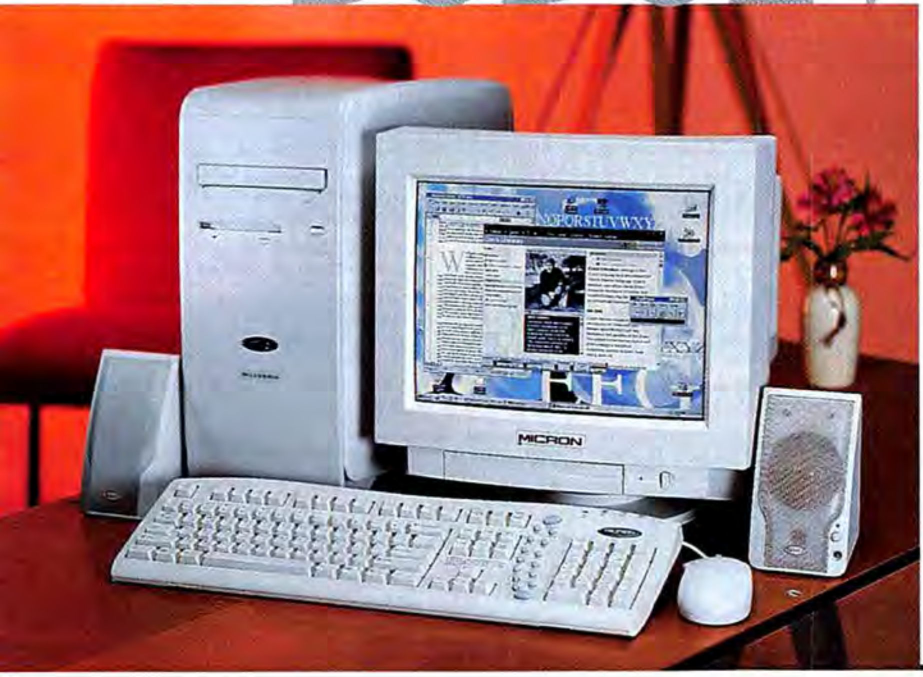
WHAT'S HOT: It's been a while since we've seen a reasonably priced muscle machine from Compaq. At $2178, the Presario 5861 packs a 600-MHz AMD Athlon CPU and a thundering Klipsch Promedia sound system that comes with four satellite speakers and a huge subwoofer. The Compaq earned a PC WorldBench 98 score of 267, trailing only the Athlon-650–based IBM Aptiva. But the Presario's 3dfx Voodoo3 3500 video card helped produce better-looking 3D images in games.

WHAT'S NOT: A removable plastic door that covers two externally accessible drive bays may irk those who frequently access the drives. The Presario 5861 doesn't have any open ISA slots, and its paltry software bundle consists entirely of Microsoft Works and Word 2000.

WHAT ELSE: USB and IEEE 1394 ports on the front of the case make plugging in compatible peripherals hassle-free. On the back, a video-out connector enables you to view DVD movies and other video on a television screen. Inside, you have clear access to the three open PCI slots and three available drive bays.

BEST USE: This system has the makings of a deluxe home-entertainment system. But its impressive performance means that it can pull double duty as a powerful home-office PC. ▶

BUDGET



FAST AND CHEAP: Micron's $1008 Millennia C466 outperforms other budget PCs.

3) Sony VAIO Digital Studio PCV-R539DS

WHAT'S HOT: This stylish lavender PC is armed with accoutrements suitable for graphic artists. A generous 17GB hard disk and a CD-Rewritable drive provide ample space for storing immense digital video files. IEEE 1394 ports enable speedy file downloads from a video camera to the computer. The Digital Studio also comes with a generous software bundle, including video editing tools, a video compression utility, and a program for creating and refining audio tracks.

WHAT'S NOT: Though this 550-MHz system offers plenty of punch for business applications, casual gaming, and video editing, it's the slowest home system on the power list. Our test unit's 17-inch monitor displayed colorful graphics and crisp text but had a limited contrast range. As a result, some of the scenes in our DVD movie playback test looked dark.

WHAT ELSE: Thanks to a well-written (though somewhat basic) manual and labeled, color-coded cables and connectors, setting up this PC is quick and easy. The Digital Studio's small Sony SRS-Z050V speakers sound good, but digital video enthusiasts may want to invest in a more sophisticated audio system.

BEST USE: High-capacity storage and rich digital video features suit this system well for multimedia buffs and for families who'll be sharing a computer.

TOP 15 HOME PCs FEATURES COMPARISON

	POWER SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (9/10/99)	PC WorldBench 98 performance score[1] Faster ▶	Base configuration[2]
1	**Dell Dimension XPS T600** 800/388-8542 www.dell.com	NEW	91	Average: $2459	Very good 256	Pentium III-600, 128MB of RAM, 512KB L2 cache, 20.4GB hard drive, midsize tower case, 19-inch monitor, Windows 98
2	**Compaq Presario 5861** 800/345-1518 www.compaq.com	NEW	84	Inexpensive: $2178	Outstanding 267	AMD Athlon-600, 128MB of RAM, 512KB L2 cache, 13.5GB hard drive, midsize tower case, 17-inch monitor, Windows 98
3	**Sony VAIO Digital Studio PCV-R539DS** 888/315-7669 www.sony.com/pc	NEW	84	Average: $2349	Good 233	Pentium III-550, 128MB of RAM, 512KB L2 cache, 17GB hard drive, minitower case, 17-inch monitor, Windows 98
4	**ABS All In Wonder System 1** 800/876-8088 www.buyabs.com	NEW	83	Expensive: $2699	Very good 254	Pentium III-600, 256MB of RAM, 512KB L2 cache, 27GB hard drive, midsize tower case, 19-inch monitor, Windows 98
5	**IBM Aptiva S Series 865** 800/426-7235 ext. 4690 www.pc.ibm.com/us	NEW	82	Very expensive: $3748	Outstanding 283	AMD Athlon-650, 128MB of RAM, 512KB L2 cache, 20.4GB hard drive, midsize tower case, 15-inch LCD monitor, Win 98
	MIDRANGE SYSTEM: $1200 TO $1999	Percent of overall rating ▶		Price: 10 percent	Performance: 20 percent	
1	**Dell Dimension XPS T500** 800/388-8542 www.dell.com	retested this month	97	Average: $1659	Good 228	Pentium III-500, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, midsize tower case, 17-inch monitor, Windows 98
2	**Quantex M500c/810** 800/896-4898 www.quantex.com	retested this month	91	Inexpensive: $1379	Good 213	Celeron-500, 128MB of RAM, 128KB L2 cache, 13GB hard drive, midsize tower case, 19-inch monitor, Windows 98
3	**Gateway Performance 500** 800/315-2536 www.gateway.com	retested this month	90	Average: $1589	Very good 230	Pentium III-500, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, midsize tower case, 17-inch monitor, Windows 98
4	**Sony VAIO Digital Studio PCV-R532DS** 888/315-7669 www.sony.com/pc	NEW	88	Very inexpensive: $1249	Satisfactory 195	Celeron-466, 64MB of RAM, 128KB L2 cache, 10GB hard drive, minitower case, 17-inch monitor, Windows 98
5	**CyberMax Enthusiast 450N** 800/437-4596 www.cybermaxpc.com	NEW	87	Inexpensive: $1499	Satisfactory 206	AMD K6-III-450, 128MB of RAM, 256KB L2 cache, 17.2GB hard drive, midsize tower case, 19-inch monitor, Windows 98
	BUDGET SYSTEM: UNDER $1200	Percent of overall rating ▶		Price: 20 percent	Performance: 15 percent	
1	**Micron Millennia C466** 800/642-7667 www.micronpc.com	retested this month	84	Average: $1008	Outstanding 203	Celeron-466, 64MB of RAM, 128KB L2 cache, 4.3GB hard drive, minitower case, 15-inch monitor, Windows 98
2	**Dell Dimension L400c** 800/388-8542 www.dell.com	retested this month	81	Average: $939	Good 185	Celeron-400, 64MB of RAM, 128KB L2 cache, 6.4GB hard drive, minitower case, 15-inch monitor, Windows 98
3	**Gateway Essential 400C** 800/315-2536 www.gateway.com	NEW	78	Average: $1068	Good 182	Celeron-400, 32MB of RAM, 128KB L2 cache, 6.5GB hard drive, minitower case, 15-inch monitor, Windows 98
4	**Emachines EOne** 877/566-3463 www.e4me.com	NEW	75	Inexpensive: $849	Good 185	Celeron-433, 64MB of RAM, 128KB L2 cache, 6.4GB hard drive, all-in-one case, 15-inch monitor, Windows 98
5	**Compaq Presario 5304** 800/345-1518 www.compaq.com	NEW	67	Inexpensive: $898	Poor 147	Cyrix M II-366, 64MB of RAM, 512KB L2 cache, 4.3GB hard drive, minitower case, 17-inch monitor, Windows 98
	Best Buy	Percent of overall rating ▶		Price: 25 percent	Performance: 15 percent	

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 267.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

4) ABS All In Wonder System 1

WHAT'S HOT: ABS's All In Wonder System 1 lives up to its name: It provides good speed and comes with a soup-to-nuts list of components, including a 27GB hard disk and a 250MB Zip drive, plus a mind-boggling 256MB of RAM—all for $2699. Its Matrox Millennium G400 graphics card produces vibrant graphics and boosts gaming performance. This system also has room to grow. Beneath its easy-off panel, you have unobstructed access to two free PCI slots, two open ISA slots, and three available drive bays.

WHAT'S NOT: Since both the floppy and the Zip drive are located near the bottom of this midsize tower's case, they can be a little difficult to reach, especially if the system is on the floor. Some scenes in our DVD-movie playback looked too dark, even after we made several brightness and contrast adjustments.

WHAT ELSE: Music CDs and DVD movies sound clear and full, thanks to the system's Altec Lansing ADA305 speakers. ABS also throws in a no-frills scanner, a digital camera that mounts on the monitor for teleconferencing, a four-port USB hub, and a Microsoft Natural keyboard. Software includes Corel's WordPerfect Suite 2000 and Grolier Multimedia.

BEST USE: This is an incredible deal considering all the stuff you get. It's ideal as a gaming machine or second PC. ▶

Extra features	Setup/ ease of use	Graphics	Reliability/ support	Comments	Product info number[1]
Outstanding: Diamond Viper V770 Ultra graphics board with 32MB of SDRAM, 8X DVD-ROM drive, V.90 modem, 250MB Zip drive	**Outstanding/ Good**	**Very good**	**Good/ Outstanding**	**PRO:** Speediest Pentium III PC here, great graphics, high-quality speakers. **CON:** Relatively pricey for what you get, paltry software bundle.	-
Good: 3dfx Voodoo3 3500 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem	**Good/ Good**	**Good**	**Fair/ Poor**	**PRO:** Superb speed, vibrant graphics, amazing sound system. **CON:** Drive bay cover can be a nuisance, no free ISA slots.	622
Good: ATI Xpert 128 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem, Sony CD-RW drive	**Outstanding/ Satisfactory**	**Good**	**Good/ Fair**	**PRO:** Good graphics performer, lots of useful video editing software. **CON:** Middle-of-the-road speed and sound.	623
Outstanding: Matrox Millennium G400 graphics board with 32MB of SGRAM, 6X DVD-ROM drive, V.90 modem, 250MB Zip drive, scanner	**Satisfactory/ Good**	**Good**	[4]/[4]	**PRO:** Solid performer, loaded with extras such as a bundled scanner. **CON:** Floppy and Zip drives inconveniently located.	624
Outstanding: ELSA Erazor III TNT2 Ultra graphics board with 32MB of SGRAM, 8X DVD-ROM drive, V.90 modem	**Good/ Good**	**Satisfactory**	**Good/ Fair**	**PRO:** Fastest system here, space-saving digital LCD flat panel, built-in ethernet port. **CON:** Most expensive on chart, lackluster graphics.	-
Extra features: 15 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 35 percent		
Very good: 3dfx Voodoo3 3000 graphics board with 16MB of SDRAM, 8X DVD-ROM drive, V.90 modem, 100MB Zip drive	**Outstanding/ Very good**	**Good**	**Good/ Outstanding**	**PRO:** Strong on 3D graphics and audio, second-fastest midrange home PC. **CON:** Expensive compared to its peers.	-
Good: integrated Intel 810 graphics with 1MB of UMA, 6X DVD-ROM drive, V.90 modem, 100MB Zip drive	**Good/ Very good**	**Satisfactory**	**Good/ Good**	**PRO:** Bargain price, good monitor, WordPerfect Office 2000. **CON:** Slow 3D graphics performance, mediocre speakers.	625
Good: 3dfx Voodoo3 3000 graphics board with 16MB of SDRAM, 6X DVD-ROM drive, V.90 modem	**Satisfactory/ Very good**	**Good**	**Fair/ Good**	**PRO:** Fastest machine on midrange chart, performs well in 3D games, built-in ethernet port. **CON:** Low-quality monitor.	626
Satisfactory: integrated Intel 810 graphics with 4MB of UMA, 8X DVD-ROM drive, V.90 modem	**Outstanding/ Very good**	**Satisfactory**	**Good/ Fair**	**PRO:** Least expensive in midrange category, software includes Word and Adobe PhotoDeluxe. **CON:** Has half the RAM of competitors.	627
Very good: Apollo Savage4 graphics board with 16MB of SDRAM, 4.8X DVD-ROM drive, V.90 modem, 100MB Zip drive	**Good/ Good**	**Good**	**Fair/ Good**	**PRO:** Good speed for the price, terrific speakers and monitor. **CON:** Slow with 3D games, lacks color-coded ports.	628
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 35 percent		
Satisfactory: integrated NVidia RIVA 128ZX graphics with 8MB of SGRAM, 17X-40X CD-ROM drive, V.90 modem	**Satisfactory/ Good**	**Satisfactory**	**Good/ Outstanding**	**PRO:** Fastest budget system here, multimedia keyboard. **CON:** Limited expandability, poor-sounding speakers.	629
Satisfactory: integrated Intel 810 graphics with 4MB of SDRAM, 17X-40X CD-ROM drive, V.90 modem	**Outstanding/ Very good**	**Good**	**Good/ Good**	**PRO:** Good price, small but expandable case, built-in ethernet port. **CON:** Limited range of software titles.	-
Good: integrated ATI Rage 128 graphics with 8MB of SDRAM, 14X-40X CD-ROM drive, V.90 modem, ink jet printer	**Good/ Very good**	**Good**	**Fair/ Good**	**PRO:** Clearly marked cables make for easy setup, price includes ink jet printer. **CON:** Scanty 32MB of RAM, messy interior.	630
Satisfactory: integrated ATI Xpert XL graphics with 8MB of SDRAM, 24X CD-ROM drive, V.90 modem	**Good/ Very good**	**Satisfactory**	[4]/[4]	**PRO:** Cool, all-in-one design; cheapest PC on Top 15; built-in ethernet port. **CON:** Unimpressive performance on 3D games, tiny keyboard.	631
Satisfactory: integrated SiS 530 graphics with 4MB of UMA, 32X CD-ROM drive, V.90 modem	**Good/ Good**	**Good**	**Fair/ Poor**	**PRO:** Extremely affordable, only budget home PC with 17-inch monitor. **CON:** Slowest system here, software bundle consists of MS Works only.	632
Extra features: 5 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 35 percent		

[1] For more information about the products listed in this table, select number 902 on the product information card or visit www.pcworld.com/productinfo.

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs.

5) IBM Aptiva S Series 865

WHAT'S HOT: If we gave an award for best-looking PC, the Aptiva S Series 865 would win in a heartbeat. It sports a stylish black chassis with a matching LCD display and keyboard. Under the hood is AMD's superfast Athlon-650 CPU, which helped the Aptiva blaze past all other home systems we've seen. Beginners will find this machine easy to set up, since it comes with an illustrated instruction sheet and color-coded cables and connectors. The sturdy, sculpted keyboard has a palm rest, a volume control, handy arrow keys for navigating back and forth through Web pages, and several customizable buttons.

WHAT'S NOT: At $3748, the Aptiva is by far the priciest PC in this review. Though the 865 delivers very smooth AVI video playback, its ELSA Erazor III TNT2 Ultra graphics card led the system to a sluggish finish in our 3D gaming tests using Redline Racer and Incoming. Our test unit's fancy 15-inch digital LCD screen (which accounts for a big chunk of the price) displays only average-quality graphics and text. Expandability is limited: The Aptiva has only two free PCI slots and no ISA slots. You have to fight your way through a tangle of cables to add more memory on the PC's motherboard.

WHAT ELSE: Hardware extras include a built-in ethernet port for home networking and a mouse with a small eraserhead for scrolling through pages. Bundled software includes Lotus's SmartSuite Millennium and a 3D game, MechWarrior III.

BEST USE: The BMW of PCs, this fast, glamorous system is a great choice for power users with deep pockets.

Midrange

1) Dell Dimension XPS T500

WHAT'S HOT: This Dell uses a 3dfx Voodoo3 3000 card to deliver strong graphics, and a Turtle Beach Montego II sound card and Altec Lansing ACS340 speakers to produce crisp sound. An easy-to-use CD player interface makes adjusting audio settings a breeze. The T500 also has a 100MB Zip drive—handy for backing up files or shuttling data between work and home.

WHAT'S NOT: At $1659, it's the priciest midrange home PC in this review. Video playback is good, but the DVD-ROM drive on our test PC wouldn't automatically play our sample movie because DVD drivers hadn't been preinstalled. Dell supplies the DVD software, but setting the player up is still a drag. The scanty software pack- ▶

The Highs and LOWS of PC Features

SHOPPING FOR A NEW PC IS MUCH EASIER if you stay on top of the latest hardware trends. Here's the scoop.

Iomega's stalwart 100MB Zip drive still offers plenty of storage and a handy way of shuttling data from one PC to another. Five of the systems among our Top 15 include a Zip drive, and two of them, Dell's Dimension XPS T600 and ABS's All In Wonder System 1, come with a 250MB version of the drive. But If you need to store or back up immense files (such as databases, digital photos, or MP3 audio), choose a system with a built-in CD-Rewritable drive; CD-RW discs hold up to 650MB of data. Sony's VAIO Digital Studio PCV-R539DS is the only CD-RW-equipped system that made our Top 15 chart. But other PC vendors, including Compaq, HP, IBM, and Sony, also offer systems with a CD-RW drive.

Ethernet ports are also showing up more frequently. Just last year, ethernet cards were bundled primarily with corporate PCs, but the emergence of home networking products and, more importantly, high-speed DSL and cable modem Internet access, have made ethernet ports more common in home machines. Five of our Top 15 provide ethernet capability.

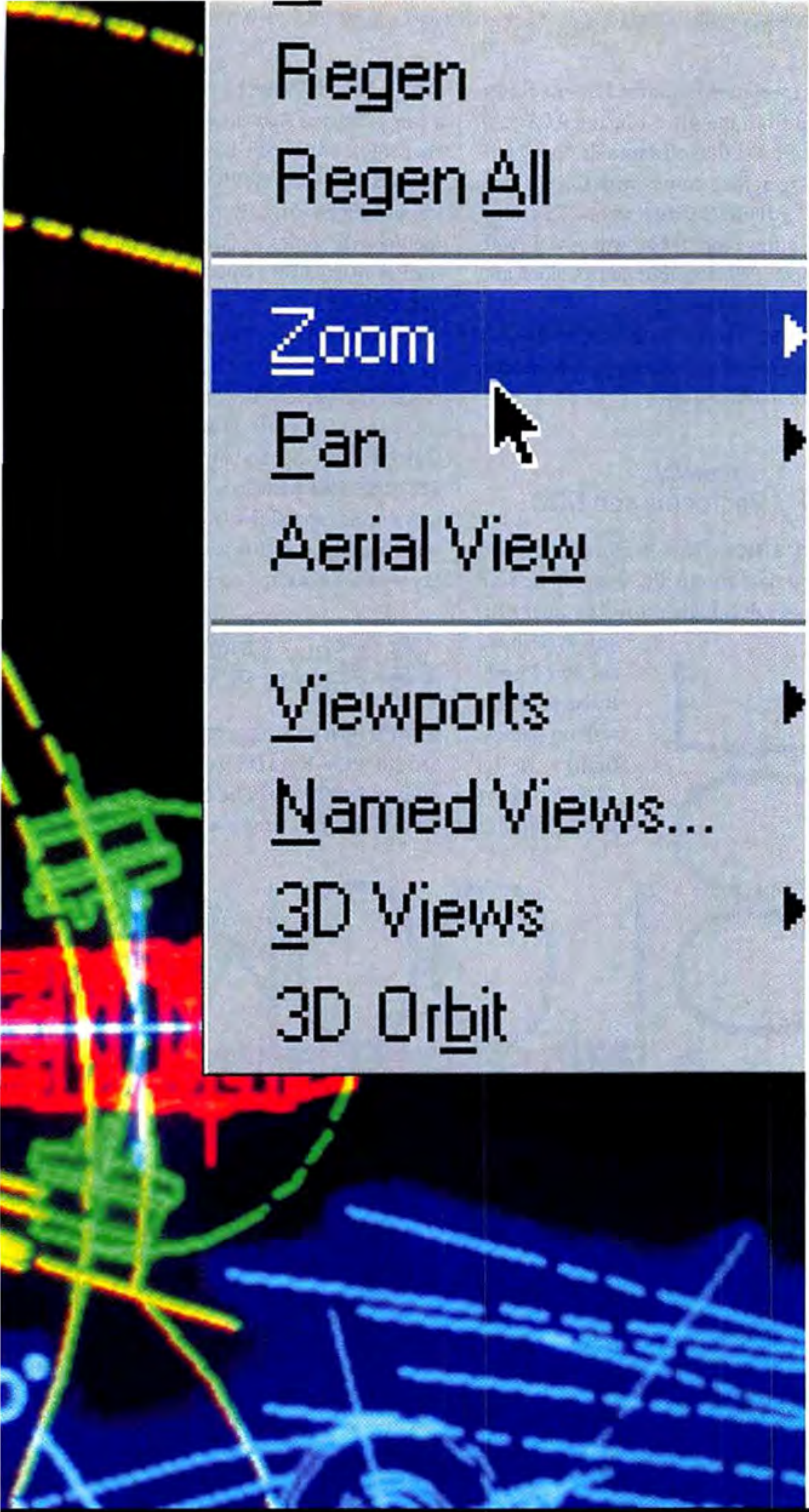
The IEEE 1394 interface is another kind of high-speed connection, but one that very few PC vendors have adopted. Its biggest advantage remains providing swift downloads of data from a digital video camera to a PC's hard drive. Of the systems we evaluated, only Compaq's Presario 5861 and the two Sony VAIO models include IEEE 1394 connectors.

On the flip side, open ISA slots in computers are disappearing because fewer components support this standard today. Some internal modems and SCSI hard-disk adapters, however, still use ISA.

On the software front, we're seeing fewer titles bundled with home PCs. But the good news is that you can purchase optional software or hardware when you buy a new computer. Gateway and Dell offer Microsoft's Office 2000 Small Business Edition for $130—that's a big discount from its regular price of $249. Dell also offers Epson's Stylus Color 770 ink jet printer for $165. Most vendors sell scanners and digital cameras, as well as software tools, at a discount. –Kirk Steers

Zip drive
Scanners
home networking
CD-rewritable

ILLUSTRATION: JACQUES LAPLANTE



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age consists of Microsoft Works Suite 99 and Descent FreeSpace (a game).

WHAT ELSE: The PC WorldBench 98 score of 228 means that it's plenty fast for most office applications.

BEST USE: The Dimension XPS T500 is a good all-around workhorse for office tasks and games, but the thin software bundle may disappoint first-timers.

2) Quantex M500c/810

WHAT'S HOT: This Quantex is affordable at $1379, and that price includes a Zip drive and a 19-inch Quantex AT1097F monitor that displays sharp text and vibrant colors.

WHAT'S NOT: Its Achilles' heel is graphics. With an integrated Intel 810 chip, the Quantex performed slowly on games and yielded some flawed images in our Incoming game test.

WHAT ELSE: DVD movies look great, but the experience is marred by mediocre sound from the Altec Lansing ACS90W speakers. On the software side, the Quantex M500c/810 comes with Corel's useful WordPerfect Office 2000. This computer offers room for growth as well, with two open PCI slots (but no ISA slots) and five free drive bays.

BEST USE: The Quantex M500c/810 is a fine, inexpensive choice for light to moderate home-office duty.

3) Gateway Performance 500

WHAT'S HOT: The Performance 500 scored 230 on our PC WorldBench 98 tests—slightly higher than any other PIII-500 system we reviewed here. It also performs well on games, thanks to its 3dfx Voodoo3 3000 graphics card. A Sound Blaster Live audio card and a pair of Boston Acoustics BA 735 speakers generate full-bodied, bass-rich sound.

WHAT'S NOT: Our test PC's 17-inch monitor produced slightly blurry text and mediocre graphics in our tests and was further marred by a constantly scrolling horizontal line.

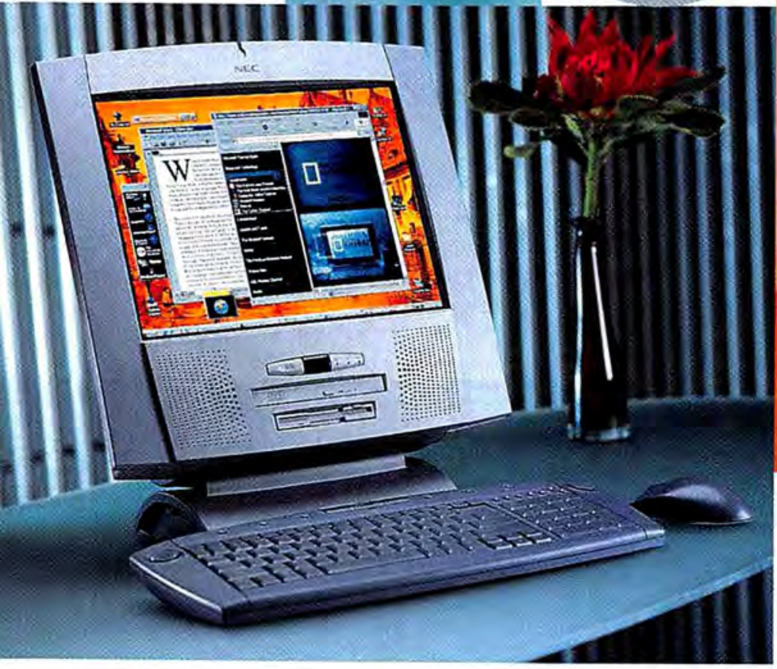
WHAT ELSE: An included ethernet port enables you to set up a home office network. The generous software bundle includes Microsoft Works Suite 99, Quicken Basic 99, and Streets 98.

BEST USE: Fast overall performance, home-networking capabilities, and a useful software package suit this machine for both home-office work and occasional gaming.

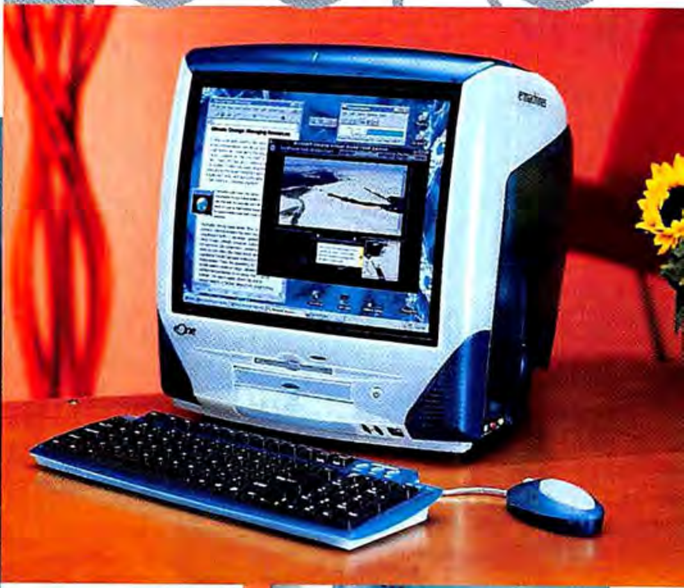
4) Sony VAIO Digital Studio PCV-R532DS

WHAT'S HOT: At $1249, the VAIO Digital Studio PCV-R532DS is the cheapest midrange PC here. The tiny Sony SRS-Z050V speakers produce sound that ▶

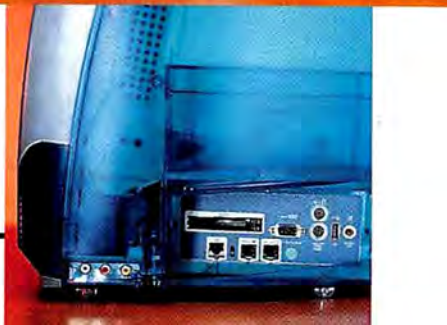
COOL LOOKS

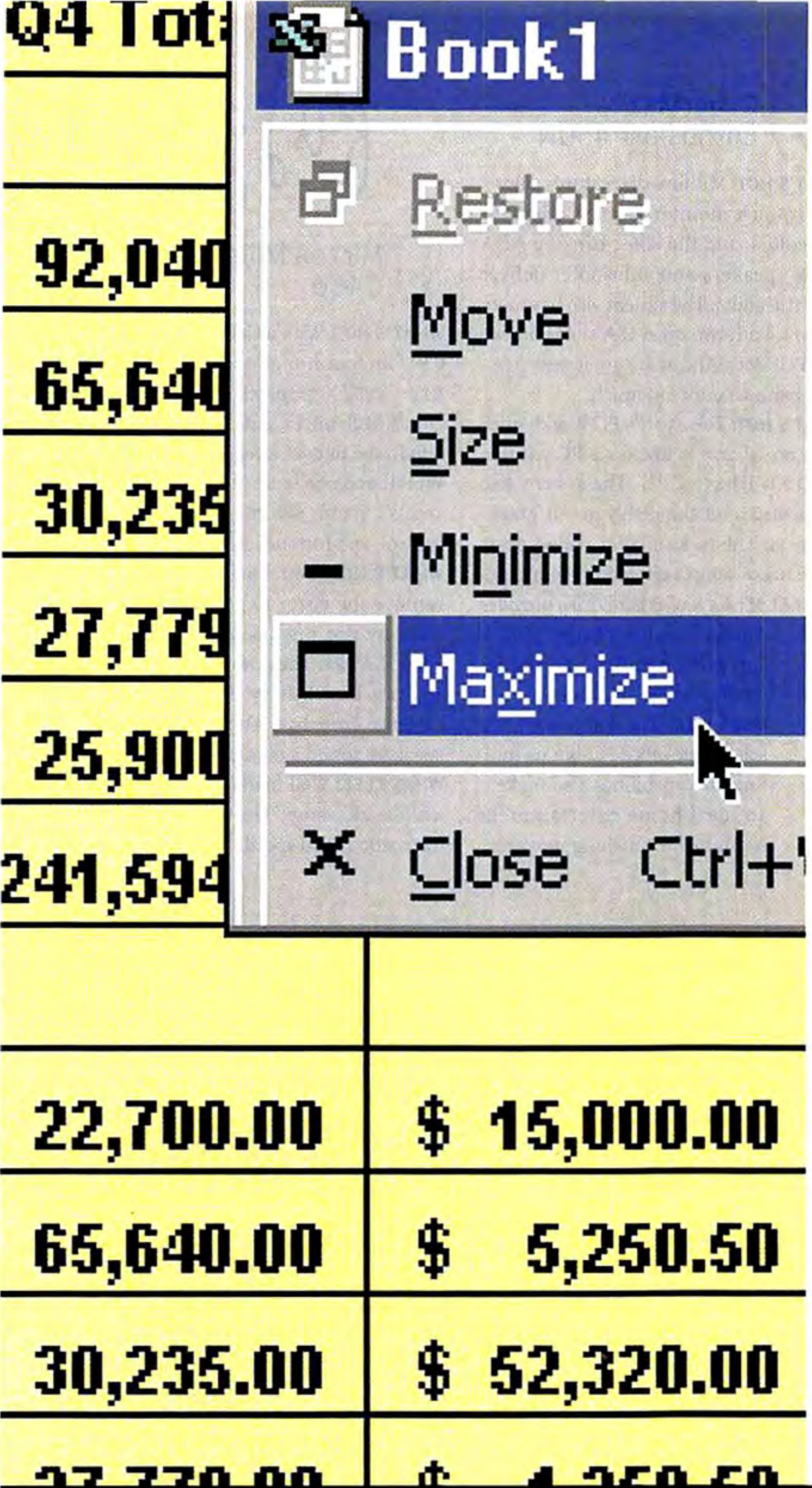


NEC'S SVELTE $2499 Z1 (right and below) saves space and looks great but runs too slowly for our power chart.



WHEN IS AN iMAC not an iMac? When it's the Emachines EOne (above). The all-in-one case has ports handily located on one side.




Q4 Tot
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Move
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27,77
25,90
241,59
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65,640.00
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belies their size. The stylish PC sports a fancy lavender case with silver trim and matching 17-inch monitor.

WHAT'S NOT: The Sony's integrated video chip holds back 3D game performance, and its Celeron-466 CPU helped earn it a mediocre 195 on our PC WorldBench 98 tests. Expansion room is limited to just two open PCI slots and no ISA slots.

WHAT ELSE: Our test unit's monitor generated legible text and colorful graphics. The system comes with two IEEE 1394 ports for fast digital video downloads. Software includes Adobe PhotoDeluxe, Quicken 99, and Microsoft Works Suite 99, Word, and Money.

BEST USE: This Sony's not superfast, but it has fine multimedia features, including DVD and good speakers, for a low price.

5) CyberMax Enthusiast 450N

WHAT'S HOT: Multimedia features galore: The 19-inch monitor displays crisp text and colors, and the Altec Lansing ADA 305W speakers and subwoofer deliver powerful audio. The system also has room to grow, with two open ISA slots and two free PCI slots. And at $1499, it won't trim your bank account too much.

WHAT'S NOT: The 450N's PC WorldBench 98 score of 206 is low for a PC with an AMD K6-III-450 CPU. The system also performed a bit sluggishly in our graphics tests. The lack of color-coded ports could make setup a chore for beginners.

WHAT ELSE: A 17.2GB hard drive provides ample room for internal storage, while a Zip drive handles removable-media storage and backup.

BEST USE: The Enthusiast is a solid home-office PC, but its multimedia capabilities also make it an ideal home entertainment machine for watching movies.

Budget

1) Micron Millennia C466

WHAT'S HOT: With a Celeron-466 CPU and an integrated NVidia RIVA 128ZX graphics chip, Micron's Millennia C466 is the fastest system in the budget category, earning a PC WorldBench 98 score of 203. Its keyboard sports a handy volume knob, CD player control, and Internet access buttons.

WHAT'S NOT: You need a screwdriver to remove the cover to get to its one free memory slot, one open PCI slot, or one open ISA slot. The power supply restricts access to the CD-ROM drive and available external drive bay. The Advent AV009 speakers sound a bit tinny and flat.

WHAT ELSE: Well-marked cables and connectors aid setup. The manual provides instructions and specifications on sys- ▶

Home Free... NOT Quite

OFTEN MALIGNED and sometimes praised, free and nearly free PCs have become difficult to ignore. "I lucked out," says Laura Goderez, an infant-development specialist from Oakland, California. Last September, she bought an Emachines computer with a 15-inch monitor and a Canon BJC-1000 printer for $720. The 366-MHz Celeron machine came with $240 worth of rebates, plus another $400 of CompuServe rebates if she signed up for three years of its online service at $21 per month, cutting her cost for the system down to about $80.

"Some deals do represent value to the end user," says Roger Kay, research manager at International Data Corporation, but others, he suggests, just stretch out your payments over a long time. "The idea of free is there's no up-front pay," Kay says. "That's the illusion of getting a free PC in a world where nothing is free."

How does a vendor recoup the cost of a "free" PC? That depends on the company. The major players providing free or nearly free PCs include start-ups (such as Gobi, Idealab, and InterSquid), major original equipment manufacturers (Dell, Hewlett-Packard, Micron), retailers (Best Buy, CompUSA, MicroCenter), and ISPs (CompuServe, Direct Web, MSN, Prodigy). Most deals entail one or more of the following trade-offs: signing up with a fee-based ISP for a specified period of time, viewing content and advertising, or promising to buy goods on the Web.

While Goderez is happy with her nearly free PC, hundreds of others who've gotten free or supercheap PCs have logged complaints with Better Business Bureaus (www.bbb.org) around the country. According to Tiffany West, a spokesperson at the Washington state BBB, prospective buyers should check out a company's customer service history before they buy. "The Better Business Bureau can tell you if a company has had complaints and if it has responded to them." The Federal Trade Commission is also examining the free-PC phenomenon. According to an FTC spokesperson, "Anytime a company claims they're doing something for free, it's going to bring up some questions. It's a huge area, and we're looking into the issue."

How long will the free-PC movement last? Not much longer, says Kay. "People will be disappointed with being locked into ISP deals when broadband [cable and DSL connections] comes into play in the next year. And bailout costs are fairly high." Prospective PC buyers take heed: Read the fine print. **–Michelle Campanale-Surkan**

Free!
almost!

ILLUSTRATION: JACQUES LAPLANTE

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Grow
Similar
Transform Selecti
Load Selection...
Save Selection...

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4.3 GB Ultra ATA Hard Drive	8 GB Ultra ATA Hard Drive	8 GB Ultra ATA Hard Drive	13 GB Ultra ATA Hard Drive
Intel 3D Direct AGP Integrated Graphics	Intel 3D Direct AGP Integrated Graphics	Creative Labs 3D AGP Graphics Card (16MB)	Creative Labs 3D AGP Graphics Card (16MB)
15", .28 Dot Pitch Monitor (13.8" viewable)	17", .26 Dot Pitch Monitor (15.8" viewable)	15", .26 Dot Pitch Monitor (13.8" viewable)	17", .26 Dot Pitch Monitor (15.8" viewable)
PCI Wavetable Integrated Sound	PCI Wavetable Integrated Sound	48X (max) CD-ROM Drive[1]	48X (max) CD-ROM Drive[1]
40X (max) CD-ROM[1]	40X (max) CD-ROM Drive[1]	3Com Fast EtherLink XL PCI Adapter	3Com Fast EtherLink XL PCI Adapter
3Com® 56K V.90 Modem for Windows[2]	3Com 56K V.90 Modem for Windows[2]		
Lease $23/Month **$749**	**Lease $32/Month** **$949**	**Lease $36/Mo.** **$1049**	**Lease $41/Mo.** **$1199**
Item # PVW-400c-12	Item # PVW-466c-12	Item # PVW-T450-12	Item # PVW-T500-12
Upgrade $949 Item # PVO-400c-12	**Upgrade $1099 Item # PVO-466c-12**	**Upgrade $1269 Item # PVO-T450-12**	**Upgrade $1399 Item # PVO-T500-12**
Upgrade the above to include: 64MB SDRAM 8 GB Ultra ATA Hard Drive Microsoft Office 2000 Small Business	***Upgrade the above to include:*** 13 GB Ultra ATA Hard Drive Microsoft Office 2000 Small Business	***Upgrade the above to include:*** 13 GB Ultra ATA Hard Drive Microsoft Office 2000 Small Business 17", .26 Dot Pitch Monitor (15.8" viewable)	***Upgrade the above to include:*** 100MB Zip Drive (IDE) Microsoft Office 2000 Small Business

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- 64MB SDRAM
- 13 GB Ultra ATA 7200 RPM Hard Drive
- Ultra ATA 66 integrated Controller
- nVIDIA Vanta 4X/2X AGP Graphics (16MB)
- 17", .26 Dot Pitch Monitor (15.8" viewable)
- 48X (max) CD-ROM Drive[1]
- 3Com Fast EtherLink XL PCI Adapter

Lease $52/Mo. **$1519**

Item # PVW-T600-12

Upgrade $1799 Item # PVO-T600-12

Upgrade the above to include:
250MB Zip drive (IDE)
Microsoft Office 2000 Small Business

Corporate PC Series

Corporate 667B

- Intel® Pentium® III Processor 667B MHz
- 64MB SDRAM
- 20 GB Ultra ATA 7200 RPM Hard Drive
- Ultra ATA 66 integrated Controller
- nVIDIA Vanta 4X/2X AGP Graphics (16MB)
- 17", .26 Dot Pitch Monitor (15.8" viewable)
- 48X (max) CD-ROM Drive[1]
- 3Com Fast etherLink XL PCI Adapter

Lease $59/Mo. **$1729**

Item # PVW-T667-12

Upgrade $2049 Item # PVO-T667-12

Upgrade the above to include:
128MB 100MHz SDRAM
Microsoft Office 2000 Small Business
27 GB 7200 RPM Hard Drive

Corporate PC Series

Corporate 733B

- Intel® Pentium® III Processor 733B MHz
- 128MB SDRAM
- 20 GB Ultra ATA 7200 RPM Hard Drive
- Ultra ATA 66 integrated Controller
- TNT2 4X/2X AGP Graphics Card (32MB)
- 19", .26 Dot Pitch Monitor (18" viewable)
- 48X (max) CD-ROM Drive[1]
- Creative Labs Ensoniq 128V Sound Card
- Cambridge SoundWorks SBS-52 Speakers
- 3Com Fast EtherLink XL PCI Adapter

Lease $80/Mo. **$2349**

Item # PVW-T733-12

Upgrade $2679 Item # PVO-T733-12

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250MB Zip Drive (IDE)
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[1] CD-ROM speeds are variable. Maximum speed shown.

[2] Maximum data transfer rate may vary due to the particular modem you are communicating with, telephone lines and communication protocols.

Circle 243 on card or go to www.pcworld.com/productinfo

tem maintenance but is written for experienced users. Microsoft Works Suite 99 is the only notable bundled software.

BEST USE: With above-average speed, the Millennia C466 is a good choice for cost-conscious users who need a basic workhorse for standard office applications.

2) Dell Dimension L400c

WHAT'S HOT: For less than a thousand bucks, you can get a PC backed by Dell's superb reputation for reliability and support. The L400c is easy to set up, thanks to color-coded cables and an illustrated poster. Its power supply swings out of the case to give access to three free PCI slots and one drive bay. The included Harman/Kardon HK-195 speakers are a cut above most budget PC speakers: If you're fussy about bass tones, you'll love the rich sound this pair pumps out.

WHAT'S NOT: Though $939 gets you a Celeron-400 PC from Dell, just $69 more buys the notably faster Micron Millennia C466. So if performance means more to you than a company's reputation for support, you're better off with the Micron.

WHAT ELSE: The ethernet port enables you to attach a DSL or cable modem (assuming you have DSL or cable access).

BEST USE: This budget PC is great for families or home-office users who will want to add hardware down the road.

3) Gateway Essential 400C

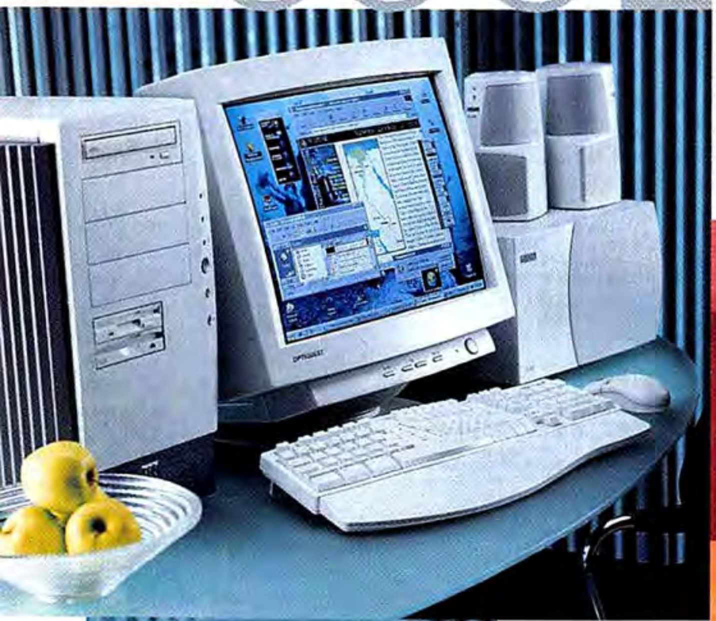
WHAT'S HOT: Gateway's minitower gives you a lot of PC for your buck. For starters, the $1068 price includes a Canon BJC-2010 ink jet printer. (By the time you read this, Gateway may be bundling a different but comparable printer with the system.) The Essential 400C is fast enough for day-to-day computing, and its integrated ATI Rage 128 graphics chip delivered respectable video with vivid color and crisp text on our test system's 15-inch monitor. An illustrated setup sheet, clearly labeled cables and connectors, and a comprehensive manual will help simplify the process of getting the machine up and running.

WHAT'S NOT: The Essential 400C is the only system in this review equipped with just 32MB of system memory; all the others have at least 64MB. (That shortcoming doesn't severely hamper the PC's overall performance, however.) Upgrading the system may be a challenge for nonexperts. The cover could be easier to remove, and a power supply blocks access to the CPU, memory slots, and drive bays.

WHAT ELSE: The Essential 400C's keyboard has buttons for volume, CD player control, and Internet access. The Cambridge SoundWorks speakers produce crisp, clear high tones, but the bass is a bit murky. Gateway bundles Microsoft's Works Suite 99 and Encarta.

BEST USE: More than adequate speed, a low price, and hassle-free setup make the 400C a good deal for first-time and intermediate users. ▶

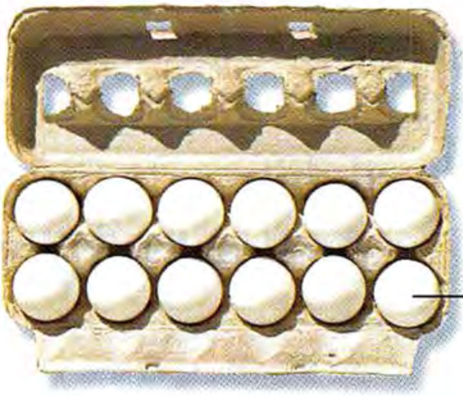
COOL DEALS



EXTRAS such as a scanner and a PC camera (left) come with the $2699 ABS All In Wonder System 1 (above).

GATEWAY BUNDLES a Canon BJC-2010 ink jet printer (below) with the Essential 400C (bottom), making it a great value at $1068.

this is your
hard drive



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MultiSync FE700M™ (with multimedia)	17" (16")	0.25mm	1280 x 1024 @ 66Hz	Available Now
MultiSync FE750™	17" (16")	0.25mm	1600 x 1200 @ 73Hz	January 2000
MultiSync FE950™	19" (18")	0.25 - 0.27mm variable	1600 x 1200 @ 77Hz	January 2000
MultiSync FE1250™	22" (20")	0.25 - 0.27mm variable	1920 x 1440 @ 73Hz	January 2000

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4) Emachines EOne

WHAT'S HOT: The EOne has turned a lot of heads, including those of Apple's lawyers. With its monitor and PC enclosed in a translucent peacock blue case that takes up about the same amount of desk space as a 15-inch monitor, it looks like Apple's iMac. But at $849, the EOne costs less than the iMac or any model here. Marked ports and comprehensible documentation make setup a breeze, and ports for such components as a modem and speakers are located on one side of the system.

WHAT'S NOT: To upgrade components, you may have to send the EOne to a repair shop—access to the interior is that difficult. Its mouse and smallish keyboard seem a bit chintzy. The Better Business Bureau has received service complaints about supercheap-PC vendors, including Emachines. We'll look into these potential problems in an upcoming issue.

WHAT ELSE: The monitor displays vibrant colors, but you'll see a hint of uneven hues around the edges of the screen. Its built-in speakers sound terrible, but plugging in optional speakers is easy and automatically disables the internal ones.

BEST USE: Casual users on a tight budget, especially those who have limited desk space, may fancy this low-cost machine.

5) Compaq Presario 5304

WHAT'S HOT: Compaq has made a commitment to lower prices in order to compete with other vendors, and the Presario 5304 is a shining example of its efforts. At $898 it's a great buy, considering the easy-to-use, high-quality 17-inch monitor. (You will save $100 if you settle for a 15-inch model.) The JBL Pro Premium speakers are also a cut above what we'd expect with a sub-$1000 PC.

WHAT'S NOT: The Presario's Cyrix M II-366 CPU cuts the cost but shortchanges performance. The Presario is the slowest PC here by a long shot.

WHAT ELSE: This Compaq is easy to set up, thanks to well-written, illustrated guides. And it's easily expandable, with two free PCI slots and one free ISA slot.

BEST USE: Basic tasks such as word processing and Web surfing are well within the 5304's capabilities, and it's surprisingly expandable given its price.

Kirk Steers is a contributing editor for PC World. *Joel Strauch is a freelance writer based in the San Francisco Bay Area. Andrew Brandt and Michelle Campanale-Surkan are* PC World *associate editors.* ■

Exclusive Reviews on PCWORLD.COM

WE EVALUATED these ten new home computers along with the models that appear on our *Top 15 Home PCs* chart, but they didn't score high enough to make the list. For complete write-ups of these systems, point your Web browser to PC World Online at www.pcworld.com/dec99/homepcs.

- **Axis Systems Orion 100X DVD**
- **Compaq Presario 5834**
- **Emachines ETower 400ix**
- **HP Pavilion 8500**
- **HP Pavilion 8590C**
- **IBM E Series 595**
- **NEC Z1**
- **NexTrend NexStar-600H**
- **Micron Millennia C500**
- **Packard Bell Multimedia 7951**

The Goods FOR Gamers

SERIOUS GAMERS customize their computers the way hot-rodders trick out their cars. For starters, a souped-up machine should have the fastest CPU available and at least 128MB of RAM. Then it's time for the detailing. You can choose from an array of graphics boards, sound cards, speakers, and input devices. Here's our guide to the best.

Graphics boards: If you have an AGP-equipped PC, choose Diamond's $179 Viper V770 Ultra or Creative Labs' $200 3D Blaster RIVA TNT2 Ultra.

Sound cards: Your best bet is a card that supports Surround Sound audio, which uses four speakers and subwoofer. Consider the $185 Creative Labs Sound Blaster Live or the $80 Diamond Monster Sound MX300.

Speakers: The Cambridge SoundWorks PCWorks five-speaker system is one of the finest available, and it will set you back only $50.

Input devices: A keyboard and a mouse are okay for first-person shooter games, but for more precision, try EverGlide's comfortable $17 Large Attack Pad mouse pad. If you play sports games, pick Gravis's $40 Xterminator game pad, which comes with a variety of controls. Virtual pilots can fly high with Logitech's $40 WingMan Extreme Digital 3D, while car-racing fans might shift to Guillemot's $100 ThrustMaster NASCAR Pro steering wheel and pedals.

For complete information on where you can buy any of these products, visit www.pcworld.com/dec99/homepcs. —**Andrew Brandt**

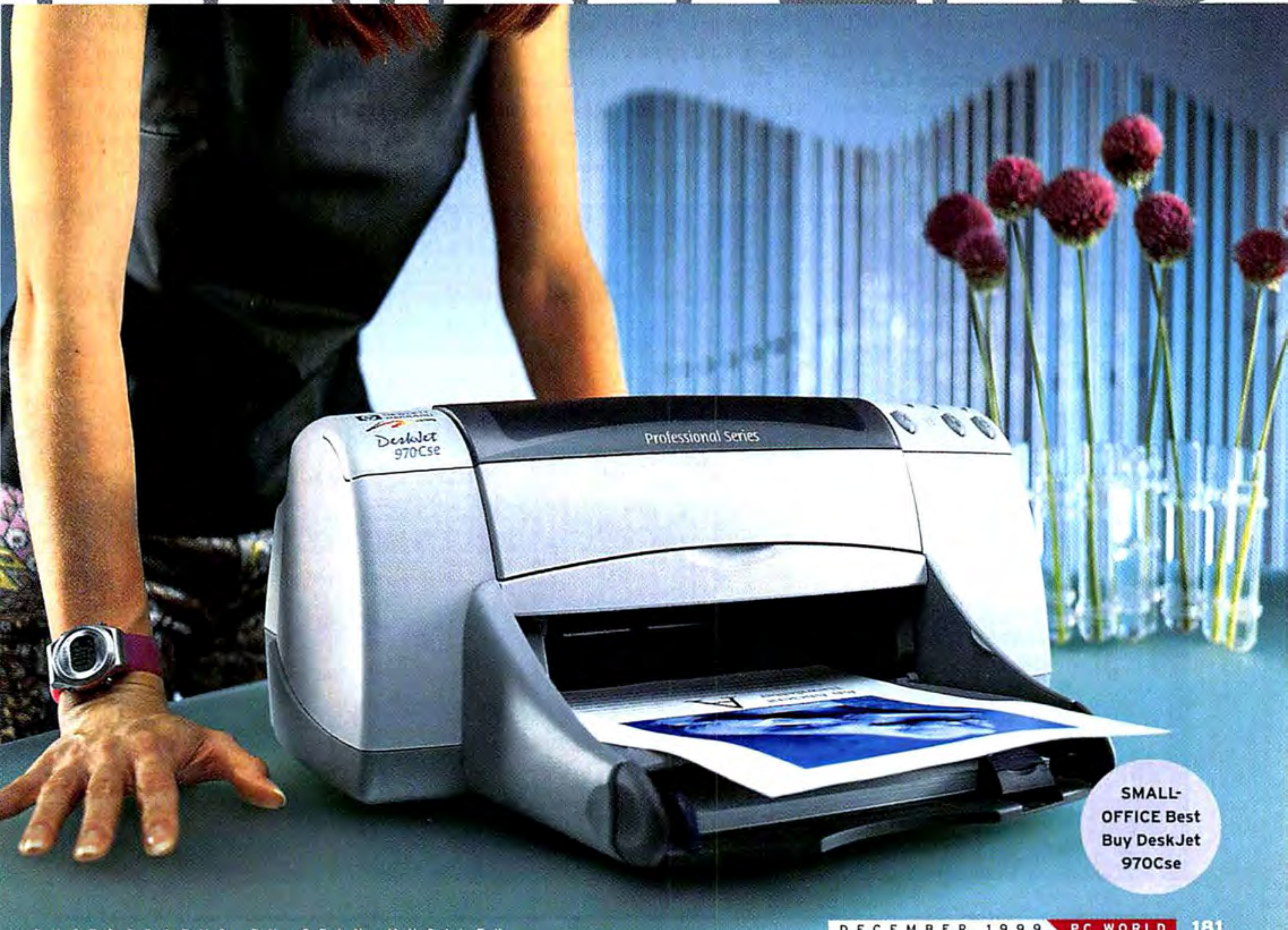
ILLUSTRATION: JACQUES LAPLANTE

COLOR PRINTERS

ULTIMATE BUYERS GUIDE

BY DAN LITTMAN

Priced as low as $99, color ink jets cost less than ever. But print quality ranges from crisp to fuzzy, and speeds run from fast to glacial. Here's our list of the ten best.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ALL-IN-WONDER 128
ALL-IN-WONDER 128 PRO
32

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64 MB

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RAGE FURY MAXX
64

Only ATI RAGE 128 PRO graphics give you state-of-the-art, push-the-envelope performance for games, graphics, DVD video and business applications. Plus, we pack more memory, more power, more technology and more features onto our graphics boards to turn your PC experience into a regular ocular orgasm.

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RAGE FURY PRO

RAGE FURY PRO
32

It's the all-around graphics and DVD video powerhouse for fabulous true color 3D gaming, super-smooth DVD playback and even still image and full-motion video capture. Powered by ATI RAGE 128 PRO and 32MB of memory for incredible true color 3D graphics action.

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32

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We humans crave color the way we crave food. We started brightening our bodies, clothing, and walls long before recorded history, with homemade extracts from crushed berries and boiled leaves and bark. Over time, tints evolved to include mass-produced synthetic paints, inks, and dyes for industrial processes and fine arts. Now we're bringing color back into the home, courtesy of small, inexpensive, awesomely capable color ink jet printers.

But not *just* into the home. A color ink jet often makes sense for a small office, too. Even a little color can make an otherwise bland brochure or flyer, for example, stand out. How does a home-office color ink jet differ from one designed for home use? In the home-office model, speed and the ability to deliver a professional look matter most. In a home ink jet, versatility, ease of use, and good-looking output of photographs are key.

Our extensive performance tests and stringent judging of print quality should identify the products best suited for business use. To help home users decide, we now test the image quality of high-resolution photos printed on the best media. The top performers on this test are marked with an icon indicating "Recommended for printing photos" (see features comparison chart below).

Whatever your needs, you'll find plenty of options from which to choose. For this article, we tested 15 color ink jets, ranging in price from $99 to $399. Their speeds run the gamut from slow to sizzling, and their print quality extends from barely tolerable to bright and stunningly crisp.

Some of the printers we evaluated have been around for a few months, so we retested them using more recent versions of applications. Some showed much better performance this time around—often thanks to new software drivers (proving that it pays to keep an eye on the manufacturer's Web site so you can download new drivers). Prices also dropped, especially on older models. Printer makers are chopping prices in preparation for intense competition at the holiday shopping season. The result: Half of the printers we looked at are 10 percent to 25 percent cheaper now than they were a few months ago. It's a good time to buy.

Though ink jet prices have sunk to all-time lows, maintenance remains expensive. We looked closely at the price of consumables—ink, printheads, and other replaceable elements that run out or wear out. You may be surprised how much you can spend using a printer enthusiastically. (See "The True Cost of Cheap Printers," page 192, for our findings.)

1) HP DeskJet 812C

WHAT'S HOT: Just about everything. The DeskJet 812C prints text at 3.7 pages per minute—that's 33 to 66 percent faster than other $149 models we've seen—and it keeps up with the pack on graphics with a speed of 0.5 ppm. It prints even, black text and clean line art and handles color and grayscale photos, too, with subtle shading, fine detail, and smooth transitions. And that's just on plain paper. Throw coated ink jet stock into the mix, and everything comes out cleaner, subtler, and simply gorgeous. **WHAT'S NOT:** As with most HP ink jets, you have to empty the output tray to access the single-envelope feeder. (Alternatively, you can slap a stack of envelopes in the input tray.) The software bundle lacks some of the basics, like a photo-editing program. The high cost of consumables (see page 192) makes this printer less of a bargain than its low price suggests.

TOP 10 PRINTERS FEATURES COMPARISON

	COLOR INK JET PRINTER	Street price (9/13/99)	Overall rating	Vendor's rated speed for monochrome/color (ppm)	Tested speed for plain text/full-page graphics (ppm)	Print quality for text/color graphics	Maximum resolution (dpi)	Paper capacity (input/output)
1	**HP DeskJet 812C** 800/752-0900 www.hp.com	$149	**92**	4.6/3.1	3.7/0.5	Good/Good	600 x 600	100/50
2	**HP DeskJet 970Cse** NEW 800/752-0900 www.hp.com	$399	**87**	6.5/5.3	4.3/0.7	Very good/Good	2400 x 1200	150/50
3	**Canon BJC-6000** 800/652-2666 www.usa.canon.com	$199	**85**	8/5	4.4/1.1	Very good/Adequate	1440 x 720	130/130
4	**Lexmark Z51 Color Jetprinter** 800/539-6275 www.lexmark.com	$249	**83**	10/5	3.9/0.5	Good/Very good	1200 x 1200	100/50
5	**HP DeskJet 882C** 800/752-0900 www.hp.com	$249	**83**	5.1/3.6	4.3/0.8	Good/Good	600 x 600	100/50
6	**Lexmark Z31 Color Jetprinter** NEW 800/539-6275 www.lexmark.com	$199	**82**	8/3.5	2.7/0.3	Good/Good	1200 x 1200	100/50
7	**Epson Stylus Color 900** 800/463-7766 www.epson.com	$399	**77**	12/10	6.8/2.2	Good/Good	1440 x 720	100/30
8	**Lexmark 3200 Color Jetprinter** 800/539-6275 www.lexmark.com	$149	**76**	6/2.5	2.2/0.4	Good/Good	1200 x 1200	100/25
9	**Lexmark Z11 Color Jetprinter** 800/539-6275 www.lexmark.com	$99	**73**	4/2.5	2.2/0.4	Good/Adequate	1200 x 1200	100/25
10	**HP DeskJet 895Cse** 800/752-0900 www.hp.com	$299	**73**	5.1/3.6	4.6/1.0	Good/Good	600 x 600	100/50

Best Buy   Recommended for home   Recommended for printing photos

HP Takes Top Spots

HP'S DESKJET 812C takes Best Buy honors for home use on the strength of its $149 price and its good speed for the cost. The $399 **HP DeskJet 970Cse** is our SOHO choice, thanks to its zippy speed, handy duplexer, and great text output.

HP'S QUICK DeskJet 970Cse cranks out high-quality text and includes a duplexer.

SOHO

WHAT ELSE: Its color-photo output rivals that of more expensive units—images appeared rich and detailed. The printer is so easy to set up and use, you probably won't mind that the generic manual covers other models as well. Also, flaps inside the tray assembly pop out automatically to catch fresh prints and suspend them for a few extra moments while the previous print dries; this delay reduces the risk of pages sticking together or smudging.

BEST USE: An equally good investment for the home office (to make professional-looking business letters, say) or the home (for vivid photos or greeting cards).

2) HP DeskJet 970Cse

WHAT'S HOT: The duplexer, for starters. It lets you print on both sides of a page without having to remove the paper and turn it over. And the whole printer, with duplexer, costs $399—as much as you'd pay just to add a duplexer to your monochrome laser. The quiet DeskJet 970Cse cranks out text at an impressive 4.3 ppm. Text quality is the best of the bunch, too, with crisp black letters, smooth italics, and type that is legible all the way down to 2 points. The 970Cse also produces breathtaking, detailed gray-scale photos with clean transitions.

WHAT'S NOT: It prints photos with good detail and textures, but colors appear a bit faded when printed on plain paper. Upgrading to coated ink jet paper improves output dramatically, making color and gray-scale images palpably realistic and crisp. The DeskJet 970Cse alerts the user to errors by moving the ink-head carriage so that it stops below obscure markings on the inside of the case. Unfortunately, you'll find little indication as to what the markings stand for. ▶

THE HP DESKJET 812C won't bankrupt your budget but still delivers decent output quality.

HOME

Comments	Product info number
🏠 📷 Good print quality, especially at this price ($50 cheaper this month). Printer is nearly identical to the $249 HP DeskJet 882C but is slower at both graphics and text. Consumables costs add up quickly.	607
📷 Great small-office printer with duplexing capabilities produces good-looking text and lines. However, colors on graphics appear a bit faded, though output improves dramatically on ink jet paper.	608
🏠 📷 This quick, reasonably priced ink jet moves up the chart thanks to a $50 price cut. It offers strong text print quality, but graphics output could be better. Consumables are among the least expensive.	609
Great extra features and useful paper handling abilities outweigh underwhelming performance for the price. Print quality is good; the new Lexmark Z31 offers a cheaper, albeit slower, alternative.	610
📷 Zippy model with impressive text and graphics print quality sheds $50. HP's slower but cheaper DeskJet 812C may be a better deal initially, but you'll pay less for consumables with the 882C.	611
🏠 It's $50 cheaper than the Z51 Color Jetprinter, but considerably slower on text. Offers the same strong print-handling options as the Z51. Text and graphics output is good but not outstanding.	612
A price cut of $50 elevates this blazingly quick, but still pricey, Epson onto the chart. Highlights include a USB port and an overnight exchange warranty; graphics look a tad dull.	-
🏠 Offers solid print quality for a reasonable price, but performance is somewhat slow, design could be sturdier, and the unit tends to run noisily.	613
🏠 Lowest-priced model here delivers acceptable output, particularly considering its single-cartridge design. Colors are adequate, if a bit oversaturated, and text is slightly shadowed.	614
Quick printer lands on the chart following a $100 price cut. Output quality is generally strong, but for almost $300, you would expect less shadowing.	615

HOW WE TEST The overall rating for color ink jet printers is based on print quality (25 percent), price (25 percent), features (15 percent), speed (10 percent), service and support (10 percent), and ease of use (15 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

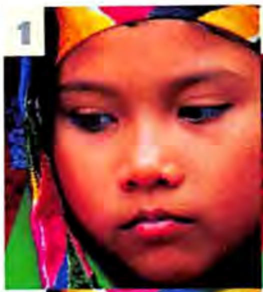
All products: 901

WHAT ELSE: The 970cse has the ability (uncommon in an ink jet) to print narrow parallel lines without making them look like well-worn corduroy. The 970Cse looks as if it was designed to search for rocks on Mars—its sleek, slightly bulbous shape, cast from three shades of gray plastic with dark purple highlights, appears a bit futuristic.

BEST USE: A luxury for the home, but definitely a competitive advantage in a business environment, particularly if you need double-sided printing.

Best & Worst

THE HIGHS and lows of our color photograph output tests.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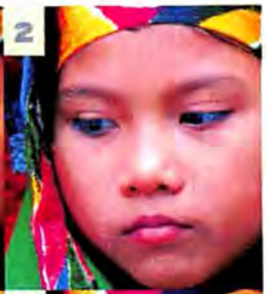
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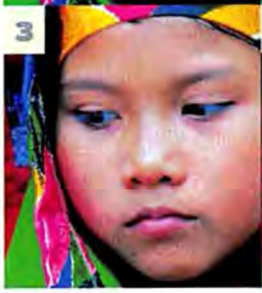
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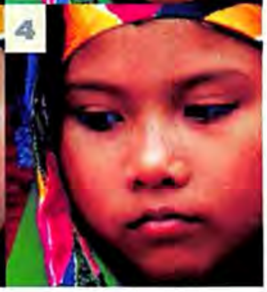
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1 **HP DeskJet 812C** Good transitions, rich color and good detail. Images look very similar to the originals.

2 **Canon BJC-6000** Very sharp detail; handles difficult shades well and doesn't lose detail; strong on transitions.

3 **Epson Stylus Color 900** The lightest color-photo output of any printer here; colors are washed out and lack punch.

4 **HP DeskJet 895Cse** Darkest output sample in the review. Colors are terribly oversaturated, and the entire image is weighted down by dark tones and shadows.

3) Canon BJC-6000

WHAT'S HOT: For a competitive $199, Canon's BJC-6000 provides the fastest performance of any ink jet in its price range. In fact, at 4.4 ppm on text, it's speedier than all but two other models here—the $399 Epson Stylus Color 900 and the $299 HP DeskJet 895Cse. Similarly, the BJC-6000's 1.1-ppm graphics speed puts it ahead of all but the Epson.

Text quality is impressive, with a strong, solid black and clear letterforms, even on italic, bold, and small type. Similarly, the BJC-6000 did an impressive job on our color photographic output test. Printing on high quality paper with the photo cartridges in place yielded lifelike, photo-realistic images and terrific colors.

WHAT'S NOT: Narrow parallel lines overlap, color graphics wash out and lack detail, and gray-scale images display a coarse dot texture. Even printing in high-resolution mode on ink jet paper doesn't help much. The software driver is packed with features, but poor design makes navigating them a challenge.

WHAT ELSE: The BJC-6000's design is unusually sturdy for an ink jet, with tough yet flexible paper trays. Unlike any other model in this review, the Canon has separately replaceable ink tanks, so you don't have to discard all the color ink when one tank runs out (a great design that other printers should emulate). This efficiency contributes to the BJC-6000's low total cost of ownership—it's far and away the most affordable in this roundup. An ethernet adapter is available for about $130.

BEST USE: Small-office users who need clean, quick text output and have limited graphics demands will like this printer.

TEST REPORT

Speedy Epson Wins the Race

HP and Canon next best among the pursuers.

	PRINTER	Text only (ppm)	Mixed text and graphics (ppm)	Full-page graphics (ppm)
1	HP DeskJet 812C*	3.7	0.9	0.5
2	HP DeskJet 970Cse*	4.3	1.2	0.7
3	Canon BJC-6000	4.4	1.8	1.1
4	Lexmark Z51 Color Jetprinter	3.9	1.0	0.5
5	HP DeskJet 882C	4.3	1.4	0.8
6	Lexmark Z31 Color Jetprinter	2.7	0.9	0.3
7	Epson Stylus Color 900	6.8	4.1	2.2
8	Lexmark 3200 Color Jetprinter	2.2	0.8	0.4
9	Lexmark Z11 Color Jetprinter	2.2	0.9	0.4
10	HP DeskJet 895Cse	4.6	1.5	1.0
	*Best Buy	Faster ▶	Faster ▶	Faster ▶

TEST PC WORLD CENTER **HOW WE TEST** Printers are tested in default mode under Windows 98 on a Gateway PIII-450 with 128MB of RAM. Tests are timed from the issuing of the print command until the last sheet is out of the printer. Test documents include ten pages of plain text and a two-page newsletter in Word 2000; a five-page plain spreadsheet and a two-page spreadsheet with a color pie chart in Excel 2000; an HTML page printed from a Web site in Netscape 4.61; a five-page color presentation in Lotus Freelance Graphics Millennium Edition 9.5; a color photo and a gray-scale photo in Adobe Photoshop 5.5; and a color photo in CorelDraw 9. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

4) Lexmark Z51 Color Jetprinter

WHAT'S HOT: Lexmark cranked up the Z51's performance since we first looked at it a few months ago. Tweaks to the software driver accelerated text speed by ▶

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- 3Com® V.90 56K[11] PCI Telephony WinModem
- *NEW* 1-Year Dellnet℠ Internet Access[14] with 20MB Online Backup[15]

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- 40X Max[5] Variable CD-ROM Drive ■ Yamaha XG 64V Wavetable Sound
- harman/kardon HK-195 Speakers ■ V.90 56K[11] PCI DataFax Modem
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[11] Download speeds limited to 53Kbps. Upload speeds are less (in the 30Kbps range) and vary by modem manufacturer. Speeds also vary depending on line conditions. Analog phone line and compatible server equipment required. [14] Includes 150 hours Internet access per month, with $1.50 per hour charge for each hour (or fraction thereof) over 150 hours. Remote subscribers subject to additional charge of $4.95 for each hour of Dellnet service. Excludes applicable taxes and local/long distance telephone access fees or charges. Additional $1.00/hour surcharge for Dellnet service in HI and AK. [15] Online backup services are provided by a third party, and such services are provided subject to terms and conditions between such third party and the customer. Limited to 20MB online storage; additional storage space available at additional charge. Dell disclaims any responsibility for lost customer data. [27] Software, packaging and documentation differ from retail versions. [28] For select Hewlett Packard printers. [30] Modem is designed to allow max. download rate in G.Lite mode of 1.5Mbps, but will vary with line conditions and distance. Activation of the G.Lite feature on this modem requires a software update via Internet. G.Lite service is not currently deployed, and once deployed, availability of G.Lite service will vary by region and Internet Service Provider (ISP), and may differ from V.90 ISP services. Simultaneous use of a single phone line for access and regular voice/fax usage in G.Lite mode may require a line splitter or filter under certain conditions. Installation of a line splitter must be performed by and is subject to additional fees charged by your local telephone company. [31] Limited time offer. Includes one (1) DVD title (max. $20.00 total value, including tax and shipping charges) with purchase of a new Dell system with a DVD-ROM drive. Internet access required to register for the offer; see details at www.dell.com/dellzone. Offer must be redeemed within 60 days from the date of system invoice. Intel, the Intel Inside logo and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. MS, Microsoft, IntelliMouse and Windows are registered trademarks of Microsoft Corporation. 3Com is a registered trademark of 3Com Corporation. HP and DeskJet are registered trademarks of Hewlett Packard Corporation. © 1999 Dell Computer Corporation. All rights reserved.

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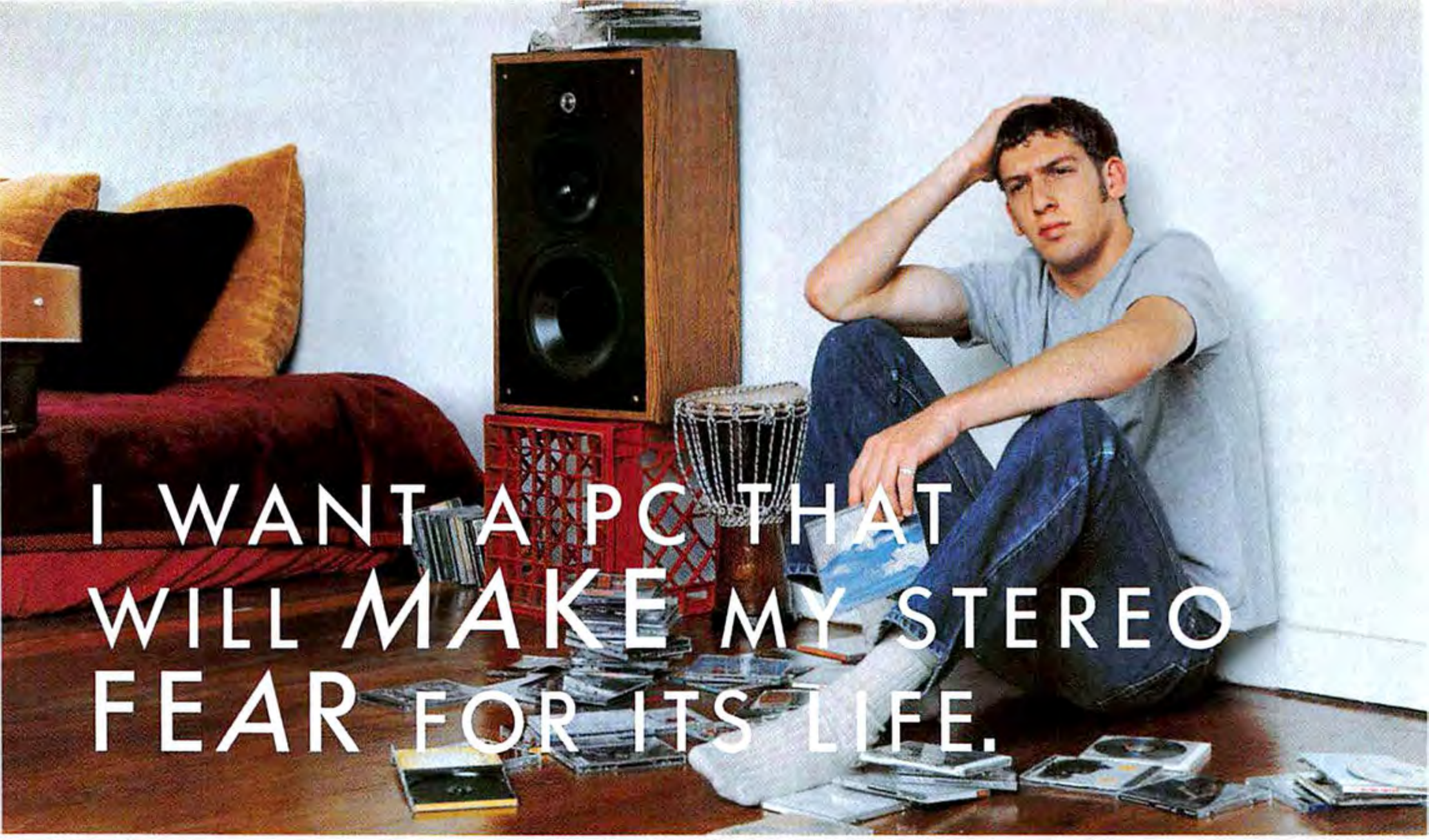

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intel inside
pentium® III

almost 20 percent, to 3.9 ppm, making it a solid SOHO contender in the performance stakes. It prints clean, even black text and attractive graphics with bright colors, smooth shading, and clear detail. The Z51 features a hand-fed slot for printing a single sheet or envelope without emptying the main paper tray. And if you need to print banners, you'll appreciate the Z51's extra paper flap, designed for feeding fanfold banner paper. Finally, the Z51's driver offers numerous special features. For example, you can print booklet pages in the order and position in which you'll fold and staple them later; the driver also delivers a page of instructions.

WHAT'S NOT: Ugly, disorganized documentation awaits you with this ink jet. Every page has a running sidebar of randomly scattered troubleshooting tips, glossary entries, and other tidbits that should be organized into discrete sections. Worse still, at $249, this printer may be due for a price cut. Gray-scale graphics and line art look surprisingly poor, considering how well the Z51 handles text and color. Also, be aware that some early Z51 units had defective paper-handling controls that could affect print quality.

WHAT ELSE: With the Z51, you get a great software bundle that includes Corel's Print House Magic 4 and ArcSoft's Photo FunHouse—Lexmark definitely intends people to have fun with this printer. When not in use, the Z51 conveniently folds up, resembling a turtle in its shell, to keep out dust and cats' paws.

BEST USE: This solid, versatile printer will be a welcome addition to a small-office or home.

COLORFUL

THE LEXMARK Z51 prints text and colors sharply and performs ingenious feats of paper handling.

5) HP DeskJet 882C

WHAT'S HOT: HP's DeskJet 882C scores high, thanks to its quick 4.3-ppm text performance and relatively fast 0.8-ppm graphics speed. A $50 price cut sweetens the deal, bringing the cost down to $249. Text shows a hint of unattractive shadowing, but letterforms are perfectly weighted and accurate, even at small sizes. On graphics, the 882C produces handsome color and gray-scale images. In fact, the 882C is probably the best of the printers on the chart for printing graphics, particularly on ink jet paper. Another plus: Its great collection of home-oriented software includes Microsoft's Picture It Express, Print Master Gold Publishing Suite, and Professor Franklin's Instant Photo Effects.

WHAT'S NOT: Some people may dislike the 882C's bulky power supply. Also, finished print jobs cover the slot into which you would feed single envelopes.

WHAT ELSE: With both parallel and USB ports, the 882C comes ready to connect to most PCs. It also features the same print-drying flaps found on the 812C.

BEST USE: SOHO users will like the 882C's speed, while its top-notch graphics and ease of use will please families.

6) Lexmark Z31 Color Jetprinter

WHAT'S HOT: In many ways Lexmark's Z31 Color Jetprinter resembles the Z51—it comes with the latter's fanfold paper flap and fully enclosed shell, for example—but costs $50 less. Its $199 price tag is right on the money; performance and output quality are good but not great.

WHAT'S NOT: The Z31 prints text 31 percent slower than the Z51, at 2.7 pages per minute, and graphics 40 percent slower, at a decidedly poky 0.3 pages per minute—quite a sacrifice for a $50 savings. Also, the driver doesn't have some of the Z51's job-finishing controls. Text output could be better: Letters come out slightly jagged, and narrow lines look crowded.

WHAT ELSE: Color and gray-scale graphics exhibit very good detail and shading, but colors and tones look weak.

BEST USE: Its relatively leisurely text printing relegates the Lexmark Z31 to the family fun room or den. ▶

CANON'S QUICK $199 BJC-6000 goes light on the wallet, thanks to reasonably priced consumables.

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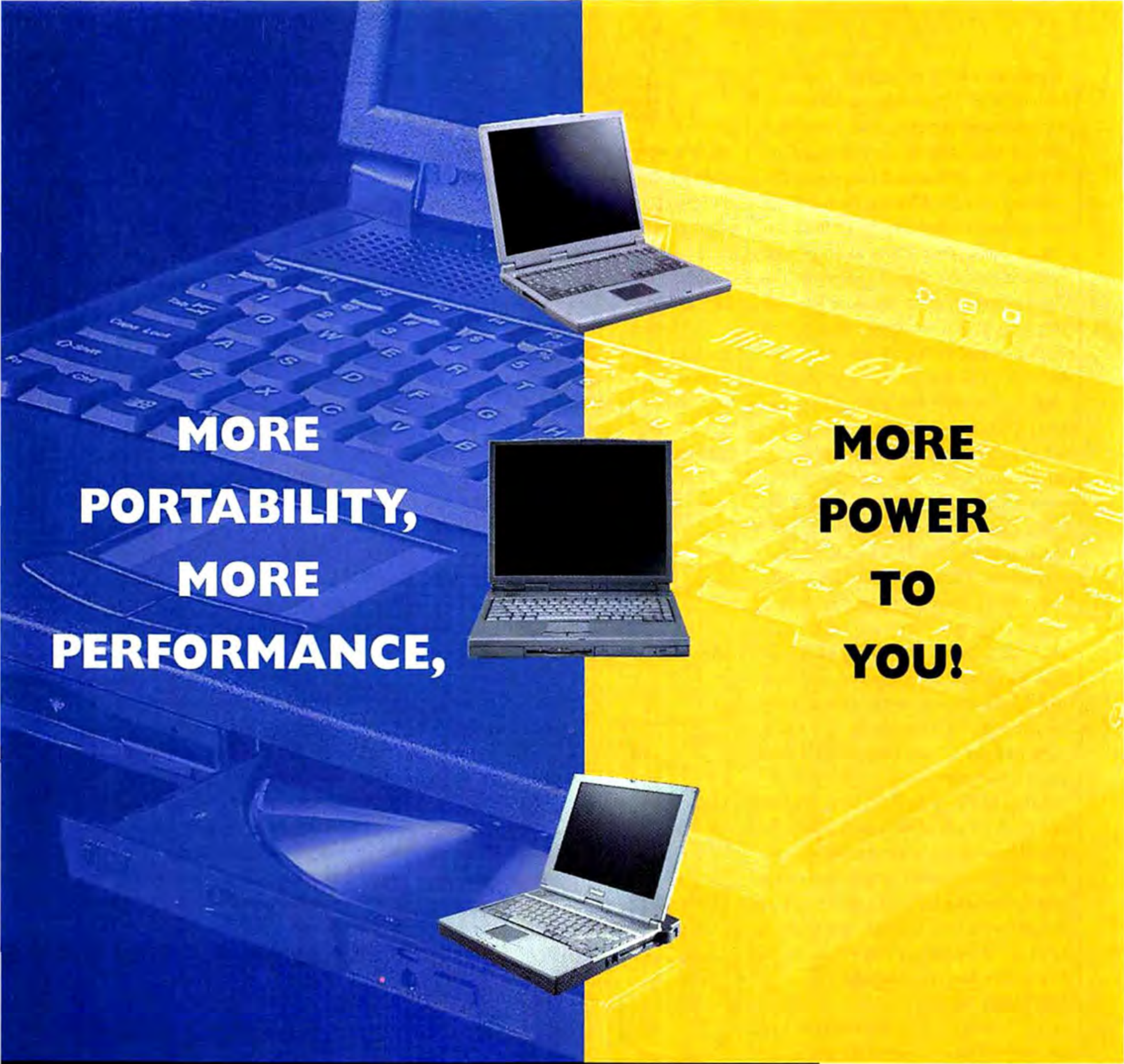

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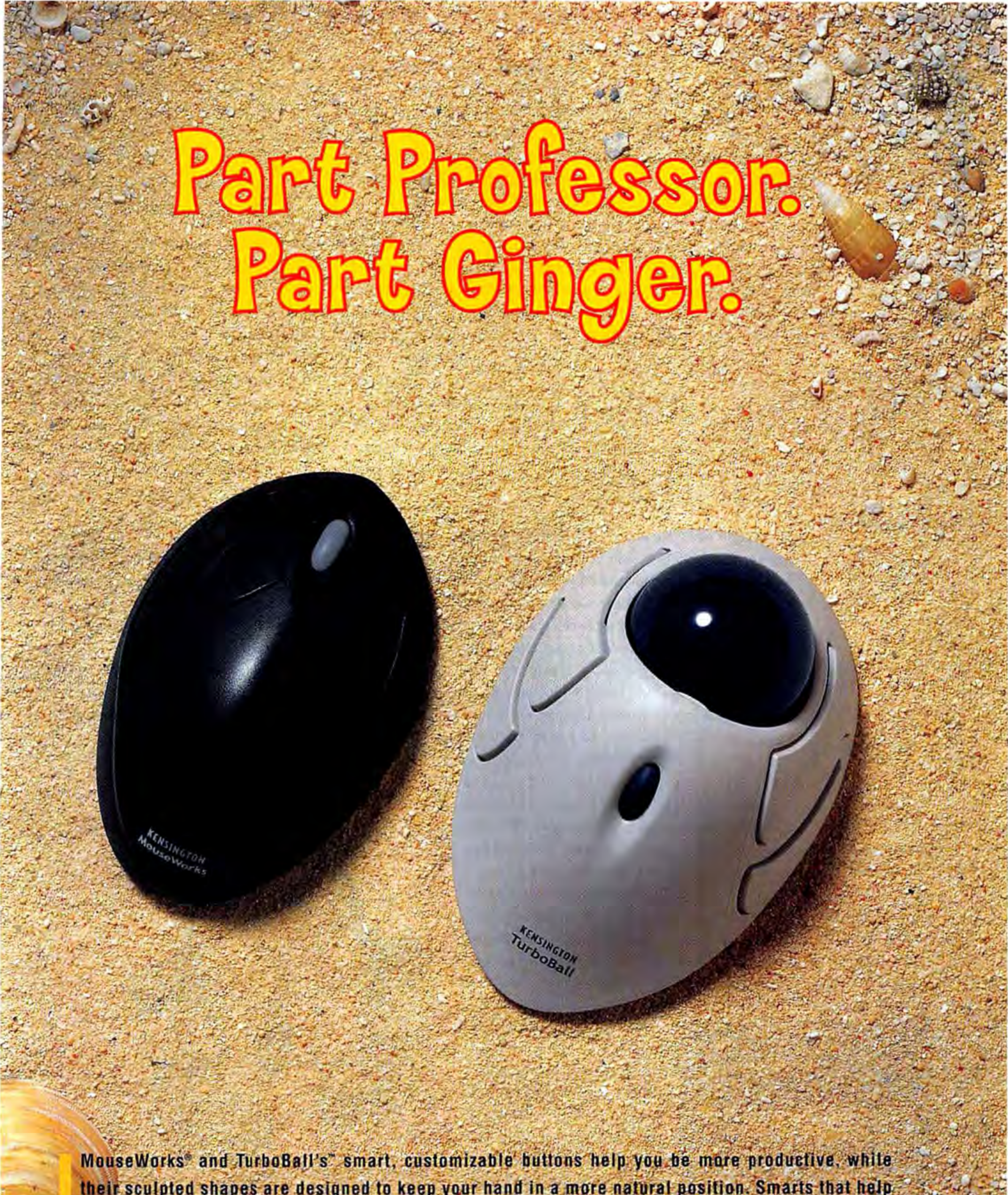
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7) Epson Stylus Color 900

WHAT'S HOT: If you really need speed and don't mind shelling out nearly $400, you might like Epson's Stylus Color 900. Printing text at 6.8 ppm, it beats all the others here handily, and it tears through graphics as fast as some models print text. The 900 comes with parallel, USB, and serial ports to accommodate either a PC or a Macintosh. And if the printer breaks down, don't worry: Epson's overnight-exchange warranty covers you. It's the only such policy among the printers here.

WHAT'S NOT: The $399 price, first of all. That kind of money could buy you a fast, reliable monochrome laser. Second, the 900's paper input tray sits precariously in its slot and has the annoying habit of falling off when you adjust it. Lastly, for anyone working in tight quarters, the printer's space requirements may prove a problem: With output trays extended, it stretches 25 inches from back to front.

WHAT ELSE: The Stylus Color 900 pumps out good text quality, and graphics look adequate, if a little bit grainy. Its printheads are permanent; the only consumable you'll have to pay for is ink.

BEST USE: Take this one to the office. With its high price and great speed, it'll feel like overkill in the home.

8) Lexmark 3200 Color Jetprinter

WHAT'S HOT: Lexmark's 3200 produces great output for just $149. Text is a crisp, even black, and line art looks better than with most ink jets. Colors are bright and realistic, especially on ink jet paper.

WHAT'S NOT: Text drifts out at 2.2 ppm and graphics at 0.4 ppm, so you'll have plenty of time to wonder if you should have bought something faster. And it's noisy: The rollers squeak and screech as paper moves through them.

▶

The True Cost of CHEAP Printers

IT'S HARDLY news that printer manufacturers make their money on ink and other consumables rather than from the sale of the printer itself. That's why vendors can afford to sell increasingly inexpensive models, and that's why printer makers are suing aftermarket companies trying to cash in on the profits by selling ink refill kits and refilled cartridges. (For more on using third-party supplies, see June's *Got a Problem?*, www.pcworld.com/jun99/gap.) But how much does running your printer really cost you over time? To determine that, we designed scenarios to represent occasional, moderate, and demanding users and added up the prices of cartridges, inks, and printheads for each printer in this article.

Remember that many factors will affect the amount of ink you use. For example, in some printers you can replace each color cartridge or ink tank separately, but in others they're all part of a single unit, meaning you'll have to replace the whole cartridge just to replenish one color. Fortunately, almost all printers have separate black ink. Paper also makes a difference. Ink jet paper holds ink much better than normal paper does and so burns through less ink.

So how will these considerations affect your printing costs? Say you own an HP DeskJet 970Cse and have modest printing needs. Each month you print 100 pages of black text and 20 pages of color graphics, which adds up to 1200 pages of text and 240 pages of graphics per year. The 970Cse has only two replaceable parts–the black ink tank/printhead combo ($29), and the color ink tank/printhead combo ($34). Given that the black combo lasts for about 850 pages, if you've used it to make 1440 prints (remember, graphics also use black)–you're on your second tank of black ink. Meanwhile, the color combo lasts for about 450 prints, so in the first year you don't have to buy another. This puts the cost of maintaining the 970Cse for year one (not including paper, electricity, or repairs) at about $29–not a wallet buster.

But what if you really put the 970Cse to work, printing 1000 text pages and 250 graphics pages a month? You'll spend about $700 in ink for the first year's use–far more than the printer's $399 purchase price.

For a chart projecting costs for the printers in this review, see "Printer Consumables' Costs Add Up" at www.pcworld.com/dec99/color_printers.

Feeding Your Printer

PRINTER	Annual cost[1]
Canon BJC-6000	$26
HP DeskJet 812C	$87
Average of 15 tested printers	$57

[1] Cost of cartridges, ink, and printheads, based on printing 100 text pages and 20 graphics pages per month.

Paper
INK Car-tridges

ILLUSTRATION: JACQUES LAPLANTE

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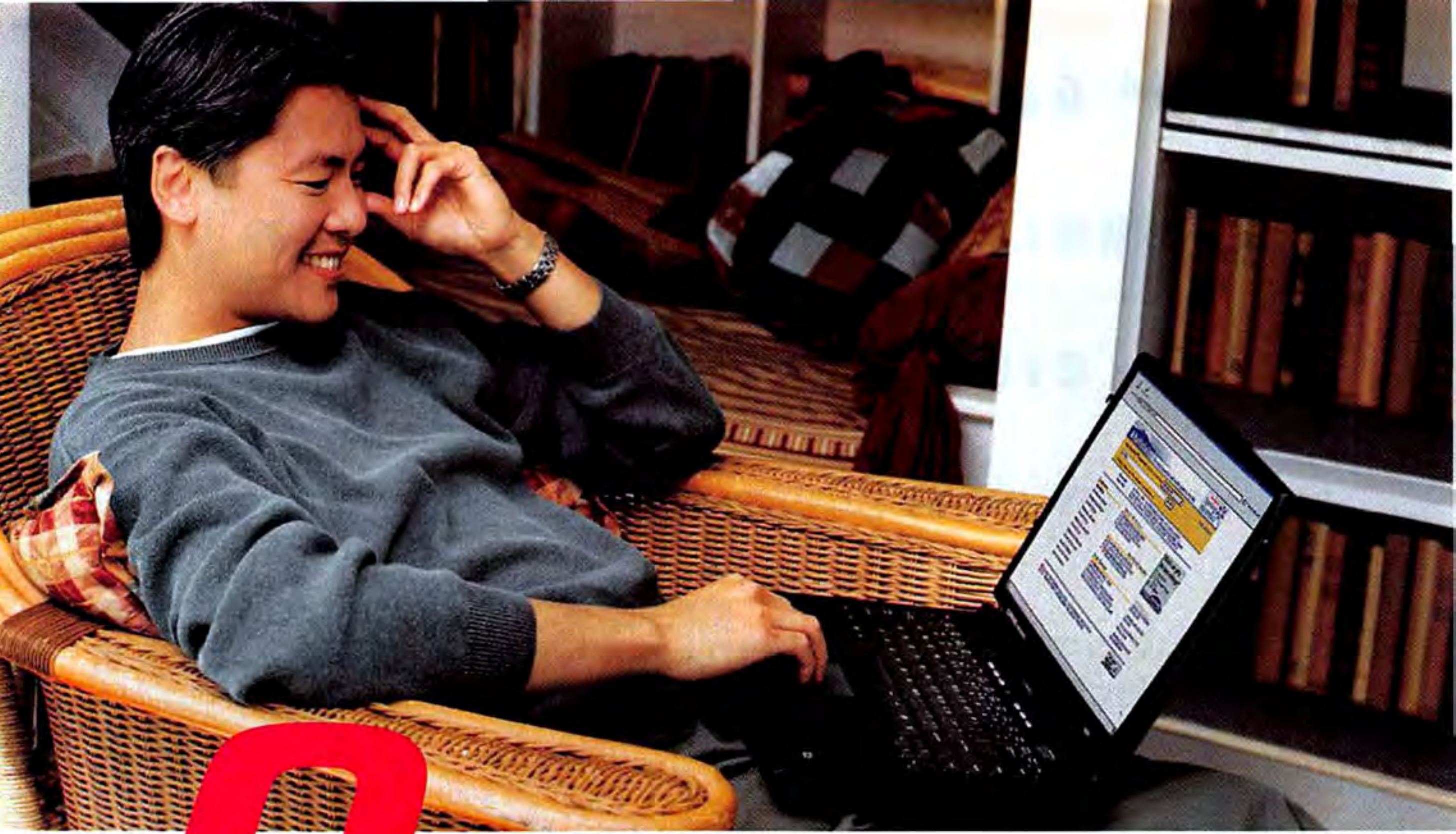

Shown here: Presario 1800T Internet Notebook PC.

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	64 MB SyncDRAM	64 MB SyncDRAM
	4.8 GB UltraDMA Hard Drive[1]	6.4 GB UltraDMA Hard Drive[1]
	24X Max CD-ROM Drive[2]	24X Max CD-ROM Drive[2]
	ATI 3D Rage LT Pro™ Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI 3D Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory
	56K ITU V.90 Modem (PCI)[3]	56K ITU V.90 Modem (PCI)[3]
	Hi-Capacity LiIon Battery	Hi-Capacity LiIon Battery
	2X AGP for Enhanced Video Graphics	2X AGP for Enhanced Video Graphics
	1 MB L2 Pipeline Burst Cache	1 MB L2 Pipeline Burst Cache
	Microsoft® Featured Home Collection	Microsoft Office 2000 Small Business Edition®
	Microsoft Windows®98	Microsoft Windows98
	$1799[‡] As low as **$51** per mo.[†]	**$1999**[‡] As low as **$56** per mo.[†]
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	6.4 GB UltraDMA Hard Drive[1]: Add $100	Compaq Value Case: Add $39
	Mobility Auto Adapter: Add $99	Extra Hi-Capacity LiIon Battery: Add $129

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INTERNET NOTEBOOK PC

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The all-in-one Compaq Presario 1600s Series Internet Notebook PC. The only thing missing from it is you.

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Hi-Capacity LiIon Battery	Hi-Capacity LiIon Battery	Hi-Capacity LiIon Battery	Hi-Capacity LiIon Battery
2X AGP for Enhanced Video Graphics	2X AGP for Enhanced Video Graphics	2X AGP for Enhanced Video Graphics	2X AGP for Enhanced Video Graphics
1 MB L2 Pipeline Burst Cache	1 MB L2 Pipeline Burst Cache	1 MB L2 Pipeline Burst Cache	1 MB L2 Pipeline Burst Cache
Microsoft Featured Home Collection	Tripp Lite 140 Watt Inverter	Compaq Value Case	APC Notebook Surge Protector
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Compaq Global II Case: Add $89	Extra A/C Adapter: Add $49	Extra A/C Adapter: Add $49	Extra AC Adapter: Add $49
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WHAT ELSE: The software bundle includes two home graphics applications, American Greetings' CreataCard and Windows Draw from Micrografx.

BEST USE: This inexpensive ink jet and its print quality—good but not outstanding—will suit the less-demanding home user.

9) Lexmark Z11 Color Jetprinter

WHAT'S HOT: For $99, the Z11's print quality is nowhere near as bad as it could be, and it prints text at a tolerable 2.2 pages per minute. Plus, it costs $50 less than the next-cheapest printer in this review. Despite its single-cartridge design (it can hold either a black or a color cartridge, but not both at the same time), you won't see the usual weird greenish text and dull colors. With the Z11, Lexmark delivers believable colors and solid text that can pass for black.

WHAT'S NOT: Black ink is an option—figure another $30 if you want really black text. Even with the black cartridge installed, though, the Z11 doesn't do a great job on narrow lines. Also, a minor annoyance: Every time you swap ink cartridges, you have to run the alignment utility.

WHAT ELSE: The Lexmark Z11 includes the same messy manual as the Lexmark Z31 and Z51, but it has no USB port.

BEST USE: Designed for budget-conscious users who don't need high-volume printing.

10) HP DeskJet 895Cse

WHAT'S HOT: HP whacked $100 off the 895Cse's price, bringing it to a more reasonable $299. This HP performs swiftly, pumping out text at 4.6 ppm and graphics at 1 ppm. Gray-scale and color graphics consist of subtle textures, smooth transitions, and bright colors. The 895Cse also features HP's trademark drying flaps, found also on the DeskJet 812C.

WHAT'S NOT: We expect a little better print quality from a near-$300 printer. Letters show a slight hint of fuzziness. The 895Cse could also do a better job on lines; narrow parallel lines run in together.

WHAT ELSE: The 895Cse offers both a USB port and well-organized, thorough documentation. The package includes some good software: KMT's Office in Color (templates for Microsoft Office applications); HP Instant Delivery, which automates retrieval of Web pages that change, such as online newspapers; and Photo Recall, a digital-image database. The 895Cse has a boxy, no-nonsense look like the 812C and 882C.

BEST USE: This HP model is best suited to those who print a lot of photos and illustrations.

Dan Littman reviews printers for PC World's *monthly* Top 10 *chart.* ■

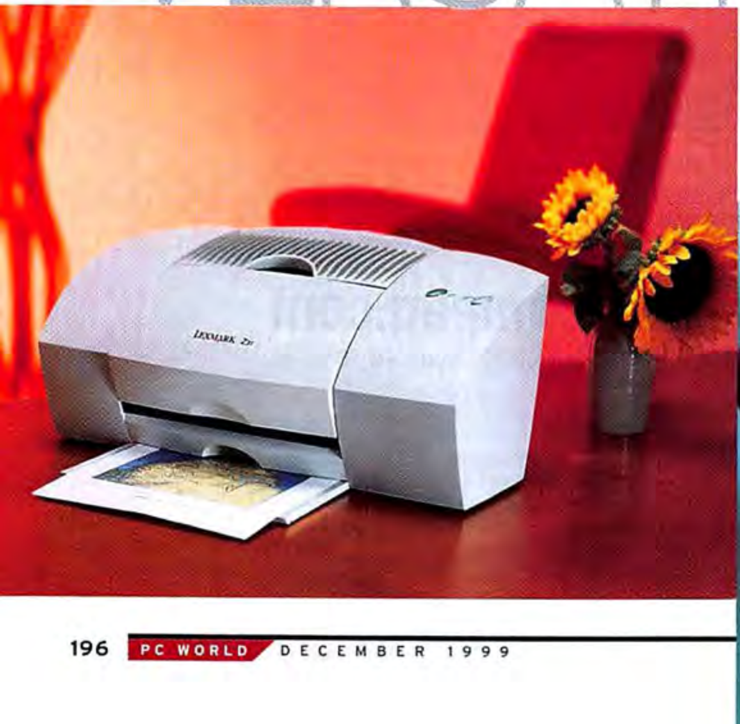
Beyond the Top 10

WE TESTED FIVE other printers that scored too low to make the chart. For write-ups, visit www.pcworld.com/dec99/color_printers. An expanded chart online details the cost of consumables—see "Printer Consumables' Costs Add Up."

- **Canon BJC-2000**
- **Canon BJC-5100**
- **Epson Stylus Color 440**
- **Epson Stylus Color 750**
- **Xerox DocuPrint C11**

VERSATILE

BARGAIN



LEFT: LEXMARK'S Z31 Color Jetprinter delivers acceptable speed and print quality for $199.

EPSON'S Stylus Color 440—just $99—is hampered by subpar speed and unimpressive output.

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>> Get the message <<

Our 75 tips will help you keep your e-mail under control.

BY JUDY HEIM, GREGG KEIZER, MATT LAKE, AND SCOTT SPANBAUER

IT'S HARD TO REMEMBER how we ever managed without e-mail, with its effortless sending, the instant gratification of a prompt response, the ease of attaching large documents, and not having to worry about the right postage. And because e-mail also encourages brief, off-the-cuff messages, we're now in touch with long-lost high school friends and second cousins, twice removed—those people we wouldn't otherwise have time to write.

But with the convenience come the headaches. We start signing up for newsletters ▶

ILLUSTRATIONS BY STEVEN SALERNO

and we make our presence known on different parts of the Internet. And voilà, in no time our in-box fills up with junk we have no time to sort out, let alone read.

Things will only get worse as Internet use continues to increase and spammers' tools for finding your address and demographic profile grow more sophisticated.

But no matter what e-mail program you use, you *can* cut both the clutter and the time it takes to read and send messages. We've assembled 75 tips to help you master a dozen tasks in America Online, Eudora, Outlook 2000, Outlook Express, Netscape Messenger, and even free Web-based e-mail services. And for those times when you want to send a quickie message without bothering with e-mail, we offer an introduction to Instant Messaging.

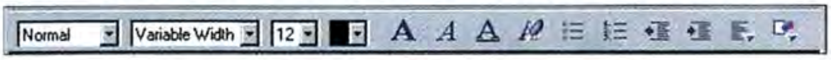
sending mail

Q>> When should I use rich text, plain text, or HTML—and how should I use it?

THESE DAYS MOST E-MAIL programs support "rich text" (different fonts, colors, and embedded images). But not all users are set up to read it, so your colorful note may look like mysterious code on your recipients' screens. Before you follow the tips below, you need to know your recipients' text-style preferences. Note: Most e-mail programs that support rich text use the Web standard, HTML.

AOL First, the bad news. "Closed community" that it is, AOL's rich text features are proprietary and work only when you send e-mail to other members. Conversely, AOL readers won't be able to see the fancy messages you send them from Eudora, Hotmail, or other e-mail program.

To send rich text e-mail to other users of AOL 3.0 or later versions, select AOL's *Mail Extras* button to add colors and photos to your message. Note: Mail Extras is active only when you are online.



MESSENGER'S CONVENIENT formatting toolbar lets you create rich text messages easily.

Eudora Relying on HTML, Eudora can send both plain and rich text messages—just format rich text with the toolbar immediately above the To: field in the message window. But since you can't guarantee that all of your recipients are able to display HTML, select *Tools•Options*, scroll down the Category icon list to find and click *Styled Text*, and then ensure that *Send both plain and styled* is selected. Click *OK*. Now Eudora sends both versions, insuring readability (and a dash of duplicity) on the receiving end.

Messenger If you don't see a formatting toolbar above the message text window, choose *Edit•Preferences*, and under Mail & Newsgroups, click *Formatting*. Under Message Formatting, check *Use the HTML editor...*, then click *OK*. Use the formatting toolbar or the various commands on the Insert and Format menus to compose simple messages with HTML characteristics. To ensure that recipients can view the message, head back to the Formatting section of Preferences and check *Send the message in plain text and HTML*. Want to send a full Web page? Bring it up in Navigator, choose *File•Send Page*, then address and send the resulting message (this will also work if your default e-mail client is other than Messenger).

Outlook 98/2000 By default, Outlook sends your mail as an HTML file, even if you don't add fancy formatting. To make plain text the default, select *Tools•Options*, choose the *Mail Format* tab, select *Plain Text* in the 'Send in this message format' drop-down list, then click *OK*. Even though you've made this change, Outlook will still reply to HTML and rich text messages in their own format. To convert your reply back to plain text before sending, choose *Format•Plain Text*.

Outlook Express Like its sibling program, Outlook Express sends mail in HTML format by default. Unless you really want recipients to get this version, which is bigger and less secure than plain text, choose *Tools•Options*, select the *Send* tab, click the *Plain Text* radio button under Mail Sending Format, then click *OK*. Also like Outlook, OE will ignore this setting when you reply to an HTML message. To send all mail as plain text by default, choose *Tools•Options*, select the *Send* tab, and uncheck *Reply to messages using the format in which they were sent*.

Q>> What's the best way to add multimedia elements?

PHOTOS, VIDEO CLIPS, and other multimedia objects can travel either as attachments (which your recipients detach from the message and view) or *inline*, as part of the message itself. Here's how you can handle these tasks:

AOL With AOL 5's You've Got Pictures service, participating film processors develop your film and e-mail you digitized copies. You can e-mail the photos to other AOLers (when you're writing the message, click the *Insert a Picture* button that looks like binoculars). Or use your AOL master account to create a new screen name, have the developers send the images to that address, and share its password with your AOL intimates.

How big can an attachment be?

While the e-mail universe has no "official" size limitation for attachments, many ISPs and e-mail administrators do control size to prevent data from clogging their systems. So check with your service provider before you attempt to send a humongous 10MB attachment.

Which multimedia files are the best candidates for compressing?

Some multimedia files, like JPEG and GIF pictures and MPEG movies, are already compressed, so space gained from zipping them is negligible. But zipped BMP pictures and word processing and spreadsheet files can shrink as much as a whopping 75 percent. If you want to send documents without compression, convert them to rich text format before sending.

If your designated recipients aren't on AOL, you'll need to send the pictures as e-mail attachments. When writing the message, click the *Attachments* button.

■ **Eudora** Eudora Pro can send and play highly compressed voice-mail attachments. When you are composing a message, choose *Message•Attach•PureVoice*. PureVoice's tiny control panel pops up. The message will be compressed as you record. To reduce the size of the attached audio file even further, select *Options•SmartRate* before recording. Recipients not using Eudora must download and install the appropriate (and free) PureVoice Player/Recorder software from www.eudora.com/purevoice.

■ **Messenger** Although Messenger does not integrate tools for creating and sending compressed audio, you can add that capability. Qualcomm's PureVoice Player/Recorder (see previous tip), while designed to plug into Eudora, also functions as a stand-alone tool. Download it from www.eudora.com/purevoice and install it. Plug a mike into the microphone port, record, and then click the *Attach* button to add the resulting file to a message in Messenger. Recipients need the free Player/Recorder to listen to your audio.

■ **Outlook 98/2000** MicroEye's ZipOut is a $15 Outlook 2000 plug-in that automatically compresses mail attachments for all types of Outlook items (the company doesn't offer an Outlook 97/98 version, but the add-in mentioned below for Outlook Express works with Outlook 97/98). You create attachments normally, and ZipOut packs the file into a .zip archive when you send the message. You can control which kinds of attachments get compressed, and skip compressing attachments to certain kinds of documents, such as tasks and appointments. Download the free trial version from www.microeye.com/zipout/ZipOut.exe.

■ **Outlook Express** While Outlook Express does not include any multimedia embellishments for messages, you can add plug-ins that will do the trick. Objective Voice Email for Windows is one such plug-in that lets you record and attach highly compressed voice mail to your Outlook Express messages. You can download the free 14-day trial version of the $30 plug-in from www.objectivevoice.com/pub/ovew61.exe. It also works with AOL, Eudora, Hotmail, Netscape Messenger, and Outlook 97/98.

Q>> How can I save copies of my sent messages *without* the attachments?

EVERYBODY WANTS to keep a paper trail of e-mail correspondence, which is why most e-mail programs give us the Sent folder. But not all outgoing messages should be saved—at least not in their entirety. For example, you probably don't want to archive huge documents attached to your mail, since you've likely got them on your hard disk, anyway. Here's how to keep a lean Sent folder:

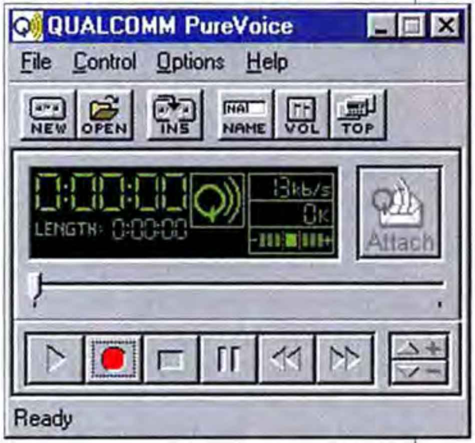
■ **AOL** When reading a message with an attachment, click the *Download Later* button to add the file to your Download. Then drag the message's heart icon to a folder in your filing cabinet (access it by selecting *My Files•Personal Filing Cabinet*) to save it with your incoming mail. Just the message will be saved, and you can download the attachment separately later.

■ **Eudora** First, make sure you're saving copies of outbound mail: Choose *Tools•Options*, click the *Sending Mail* category, and check the *Keep copies* box; click *OK*. Then, periodically open the *Out box* and double-click any message with an attachment (marked with a paper clip). Click the file name in the header's Attached line to highlight the file, then press **<Delete>**. Answer *Yes* to the next dialog.

■ **Messenger** Messenger can't delete an attached file without also deleting the message. To delete both, click the *Sent* folder, highlight the message, then press **<Delete>**. Your only other option is to select *Edit•Preferences*, then click the *Copies and Folders* item under Mail & Newsgroups. Under 'When sending a mail message, automatically', clear all the boxes to prevent Messenger from retaining any attachments—and also, unfortunately, copies of any sent messages.

■ **Outlook 98/2000** Outlook doesn't offer a setting that saves a copy of your missives in the Sent folder sans attachments. That doesn't mean you have no control over the Sent folder. If you know you don't need to keep copies of messages you send, choose *View•Options*, uncheck the *Save sent message to* option, and click *Close*. To strip attachments from a message already in the Sent folder, open the message, right-click the *Attachment* icon, and choose *Remove*.

■ **Outlook Express** As with Outlook, there's no simple way to keep Outlook Express from saving copies of all those attachments you've sent out. To stop saving copies of any outgoing messages—with or without attachments—choose *Tools•Options•Send* and uncheck *Save copy of sent messages in the Sent Items folder*. Then, to save individual messages in the Sent Items folder, just before you send a message, choose *File•Copy to Folder*, select the *Sent Items* folder, and click *OK*.



THE PUREVOICE recorder built into Eudora lets you embed highly compressed voice recordings in your message.

Q>> How can I encrypt messages to keep them private?

WHETHER YOU'RE USING your employer's e-mail account for personal use (c'mon, admit it—everybody does it) or are conducting confidential business ▶

over your ISP's mail server, privacy is a great concern. Here's how to use encryption to ensure your privacy:

■ **AOL** The quickest way to encode e-mail on AOL is with BPS SoftWare's $20 PowerMail, an AOL mail add-on. In order to decode the messages, your recipients will need to use the free PowerMail Decoder, which you can e-mail to them with a password. To download a trial version of PowerMail, use the AOL keyword **BPS**.

■ **Eudora** Since Eudora Pro supports plug-ins, you can add the popular encryption tool PGP (Pretty Good Privacy). Download the PGP freeware package at web.mit.edu/network/pgp.html and install it in your Eudora-equipped computer. PGP will then add several icons to the toolbar and several commands to the Edit•Message Plug-ins menu. Be sure to share your encryption code or "public key" with your recipients.

■ **Messenger** Built-in encryption is one of Messenger's attractions, but you must first obtain a digital ID in order to use it. Select *Communicator•Tools•Security Info*. Click the *Yours* link under Certificates and follow the on-screen instructions. (The ID costs $15 per year.) You must also retrieve the digital ID of each recipient to whom you're sending encrypted messages. Once that's done, click the *Message Sending Options* tab (the last item in the column at the left of the To: field), and check the *Encrypted* box.

■ **Outlook 98/2000** Outlook doesn't have its own encryption tool. To encrypt a message, select its window's *View•Options*, check *Encrypt message contents and attachments*, and click *Close*. You will also need to purchase a digital ID from a third-party certificate authority; choose Outlook's *Tools•Options•Security* and click the *Get a Digital ID* button. It's a direct link to Verisign, which offers a free 60-day trial digital ID certificate. A full-year registration for this encryption tool is $15.

■ **Outlook Express** To encrypt an Outlook Express message, your recipient must have a personal digital ID. Once that party sends you a digitally signed message, you can send them responses using their encryption key by clicking the

web mail— free and easy

WEB-BASED E-MAIL ACCOUNTS are all the rage. For one thing, they're free. Also, they allow you the flexibility of having an address where friends can send you mail even when your work or primary address is no longer valid (because you've changed employers, say). Even happy owners of regular POP3 e-mail accounts check their e-mail on the Web when they travel, by visiting Hotmail, Net@ddress (with its popular usa.net domain), Yahoo's free e-mail service, or a welter of domains administered by IName—including AltaVista, Excite, and technologist.com. But these Web-based services have issues, snags, and problems that their POP3 cousins never dreamed of—many of which can be handled with the help of a well-timed tip.

JOE JONES@
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I'm not here right now...

Net@ddress, Yahoo Mail When you're away from the office, there's no excuse for keeping your correspondents on tenterhooks. Set up an autoresponder to explain your absence. For usa.net subscribers, click *Basic Services*, then *Vacation Reply*. Set the dates you'll be away and your autoreply message. Yahoo Mail subscribers, follow the *Options* and *Vacation Autoresponder* links and fill out the form.

Fancy stationery

Hotmail, Net@ddress Feel like gussying up plain e-mail? That's an option in Hotmail and usa.net messages. These services provide a fistful of decorative borders you can select from the Stationery list boxes. These are located at the bottom of Net@ddress's addressing options and underneath Hotmail's message form. The names of these stationery schemes don't reveal much—so pick one and click the preview button to get an idea of what it looks like. For your designs to come through properly, the recipient's e-mail must support HTML messages.

Incoming alert

Hotmail, Net@ddress, Yahoo Mail, others Checking your Web-based e-mail account and finding nothing is a real nuisance—especially if you maintain several accounts. A $20 downloadable program—Ristra Mail Monitor—solves this problem. It can poll multiple Web e-mail accounts and alert you when new mail arrives. It also provides links to the log-in page of any account that has new mail, so you can open it in a new browser window with a mouse click. A 14-day trial version is available from welcome.to/ristra.

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Yahoo Mail Yahoo Mail provides a free service that enables you to download e-mail to read in POP3 e-mail software such as Eudora or Outlook. To turn on this option, click *Options•POP Access and forwarding*. Choose the *POP Access* option and click *Submit*. Then configure your e-mail software to poll pop.mail.yahoo.com and smtp.mail.yahoo.com for incoming and outgoing mail.

Hotmail in Outlook Express

Hotmail can work like a POP3 account for Outlook Express 5 users. To turn on this ability in OE 5, select *Tools•Accounts*. In the Internet Accounts dialog box, select *Add*, then *Mail*. Follow the instructions, and at the appropriate time, enter your Hotmail address and password.

Sync up address books

Hotmail If you've added Hotmail as an account in Outlook Express, you can synchronize the address books you maintain between the two

Encrypt button in the message window's toolbar. However, if you don't have an ID of your own, you won't be able to read encrypted messages in your Sent Items folder or receive encrypted mail. To purchase yours (or to download Verisign's free 60-day trial version), select *Tools•Options*, choose the *Security* tab, and click the *Get Digital ID* button. Next, choose a certificate vendor and follow its instructions for downloading and installing the ID. It's likely, however, that the other party is using PGP. For details on downloading, installing, and using this free utility, see web.mit.edu/network/pgp.html.

receiving mail

Q>>Can I prioritize messages in my in-box?

WITH DOZENS OF ENTRIES to read, how can you find the ones you need to deal with right away and ignore the spam and the not-so-urgent? Here are some tricks for doing this.

- **AOL** AOL doesn't let you set up rules to filter mail; instead, prioritize e-mail by setting up a separate screen name to receive business mail. Head to *My AOL•Screen Names* and click *Create a Screen Name*. Use the keyword **Mail Controls** to restrict the account to e-mail from selected correspondents only.
- **Eudora** Select *Tools•Filters*, click *New*, and select the appropriate Header criteria ('From: contains gkeizer@pcworld.com', for example, prioritizes that sender's mail). In the Action section, choose ▶

services. In Outlook Express, select *Tools•Address Book*. Click *Synchronize Now*, and the address book entries will sync up.

Jump-start contact lists

Net@ddress Don't manually key in all the contact info for your e-mail pals into your address book. You can export and import contact lists in .csv and .ldif formats. First, export your e-mail software's contact list into one of those formats, then log in to your usa.net account. Click the *Address Book* link, then the *Import/Export* button. Next to the Address Book form, click the *Browse* button, and navigate your hard disk till you find the .csv or .ldif file that you've exported. Select that file and click the *Import Address Book* button.

Clear space

Hotmail, Net@ddress, Yahoo Mail With space at a premium under these services, it's wise—even a necessity—to clear your Web-based e-mail folders often. (Your limit: 2MB at Hotmail, 3MB at Yahoo, and 5MB at usa.net.) In Hotmail, files in the Trash Can folder don't count toward your space allowance—and they're cleared automatically several times a week; usa.net empties its trash after three days. But if you want to free up valuable space in a heavily trafficked mailbox in either Yahoo Mail or usa.net, just click the *Folders* link and then click the *Empty* option next to the Trash folder.

From Hotmail to hard disk

Hotmail If you've added Hotmail as a service to Outlook Express (see tips above), you can archive messages from your Hotmail account to hard disk. To do this, drag messages from the Hotmail in-box into any other folder in Outlook Express.

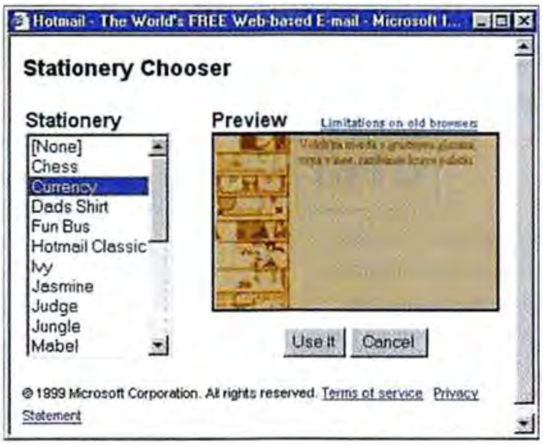
Can the spam

Hotmail, Net@ddress, Yahoo Mail Web-based e-mail is, let's face it, slow to load and process. You must also count kilobytes to stay within your mailbox allowance. These factors make unsolicited mail even more irritating than it already is. To block spam, look for key phrases in the subject lines or body of messages ('take Credit Cards' and 'ACT NOW', say) and note the e-mail addresses. Then follow these instructions:

Hotmail: Under *Filters*, select either *Block Senders List* or *Incoming Mail Filters*. Under Block Senders, enter suspect e-mail addresses. Under Incoming Mail Filters, send messages containing up to ten suspect phrases to the Trash Can. Click the *Apply Filters* button.

Net@ddress: Under Basic Services, select *Junk Mail Blocker*. Check the box next to *Also use the Net@ddress precompiled list of known junk mailers*. Then filter suspect messages and move them to either the deleted or Junk Mail folder.

Yahoo Mail: Select *Options*, and in the Mail Management column, choose *Block Addresses* or *Filters*. Under Block Addresses, enter the addresses of repeat offenders. Under Filters, select *SpamGuard* and enter options for Body (the contents of an e-mail message) that delete messages containing phrases such as 'take Credit Cards'. Repeat these steps for other addresses and phrases.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HOTMAIL'S Stationery Chooser allows you to dress up your e-mail with a variety of decorative borders.

Read Web mail without a browser

ZinCheck Mail allows you to access Web-based e-mail accounts, such as Hotmail, AngelFire, Mailcity, Goplay, and Yahoo, without using a browser. It allows you to log in and check for mail and read, reply to, forward, and delete mail. It can sit in your system tray and monitor multiple accounts for new mail simultaneously. ZinCheck 2.4 beta is available for free at FileWorld and at www.zinchak.com. **—Matt Lake**

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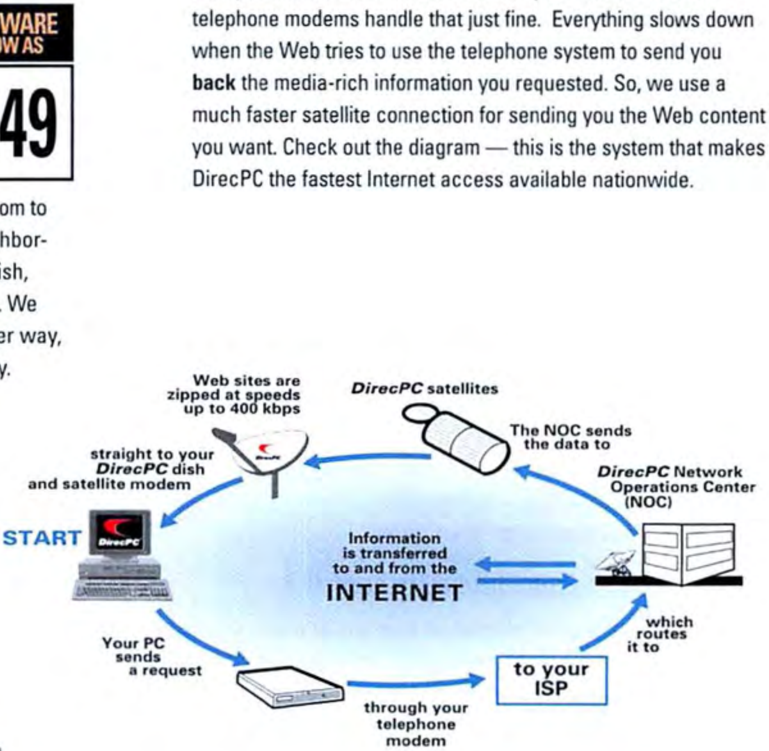
The engineers at Hughes figured out that the real bottleneck in the speed of the Internet wasn't the request **out** to the Web — telephone modems handle that just fine. Everything slows down when the Web tries to use the telephone system to send you **back** the media-rich information you requested. So, we use a much faster satellite connection for sending you the Web content you want. Check out the diagram — this is the system that makes DirecPC the fastest Internet access available nationwide.


START
Your PC sends a request
through your telephone modem
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which routes it to
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The NOC sends the data to
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Price of Service Plan (Without ISP)	$19.99/Month	$34.99/Month	$109.99/Month
Hours of Service (Availability)	24 Hours a Day	24 Hours a Day	24 Hours a Day
On-Line Time (Hours of usage for Turbo Internet)	25 Hours /Month	100 Hours/Month	200 Hours/Month
Additional Hourly Rate (Including ISP) Additional Hourly Rate (Without ISP)	$1.99/Hour $.99/Hour	$1.99/Hour $.99/Hour	$1.99/Hour $.99/Hour
DirecPC Services			
Turbo Webcast: Broadcast delivery of popular Websites to your PC's hard drive	Included	Included	Included
Turbo Newscast: Broadcast delivery of up to 30,000 Usenet Newsgroups to your PC's hard drive	Included	Included	Included
Turbo Internet: Fully interactive access to the Internet at speeds up to 400Kbps	Included in Online Time	Included in Online Time	Included in Online Time
Free E-mail Accounts	1	1	4
Networking (Number of Seats)	N/A	N/A	4

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Make Priority from the drop-down list, and in the field that appears, select from *Highest* to *Lowest*. Close the Filter window and answer *Yes* to the 'Save changes to Filters?' dialog. To sort any mailbox's messages by priority, click the *Priority* column.

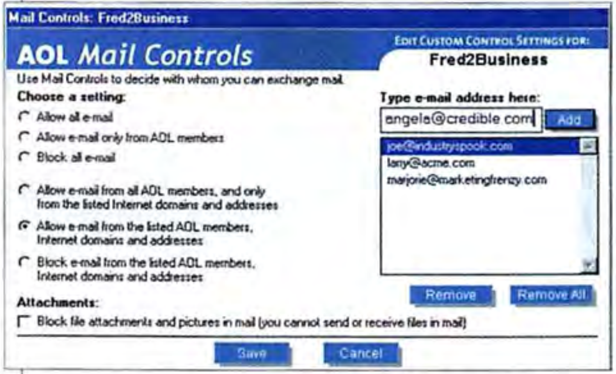
■ **Messenger** To prioritize messages as they arrive, select *Edit•Message Filters*, click *New*, and set up the appropriate criteria (*subject contains* **PC World Tips**, for instance). In the next sequence, choose *Change priority* and select from the six ranking options. Name the filter (top field) and click *OK*. You can now sort on Priority by clicking that column in the header display.

■ **Outlook 98/2000** The "message flags" tool in Outlook prevents important messages from languishing at the bottom of your Inbox. To flag a message for follow-up or other action, right-click the message, choose *Flag for Follow Up*, and then in the 'Flag to' list, select the action you want to remember to take and click *OK*. Set a due date for the follow-up action in the same dialog box, and Outlook will give you a pop-up reminder.

What's a quick way to recognize spam?

While most spam headers give themselves away with teaser headlines such as 'Get rich quick', 'Hot XXX Girls', and 'Free vacations', a quicker clue is the e-mail address. Most often it will be a series of numbers such as 123000x@spam.net or a name you don't recognize. Also, watch out for a proliferation of exclamation points in the subject line. That's a sure sign of an amateurish mass marketer.

■ **Outlook Express** Though Outlook Express 5's message flags lack Outlook's reminders and follow-up categories, they nevertheless call attention to important mail. To flag a message for follow-up, first select it, then choose *Message•Flag Message*. To view flagged messages at the top of your Inbox, click the Flag column heading to sort the list by flag status. Outlook Express 4 lacks this message-flagging feature.


Mail Controls: Fred2Business

AOL Mail Controls

EDIT CUSTOM CONTROL SETTINGS FOR: Fred2Business

Use Mail Controls to decide with whom you can exchange mail

Choose a setting:

○ Allow all e-mail
○ Allow e-mail only from AOL members
○ Block all e-mail
○ Allow e-mail from all AOL members, and only from the listed Internet domains and addresses
● Allow e-mail from the listed AOL members, Internet domains and addresses
○ Block e-mail from the listed AOL members, Internet domains and addresses

Type e-mail address here: angela@credible.com

joe@industryspook.com
larry@acme.com
marjorie@marketingfrenzy.com

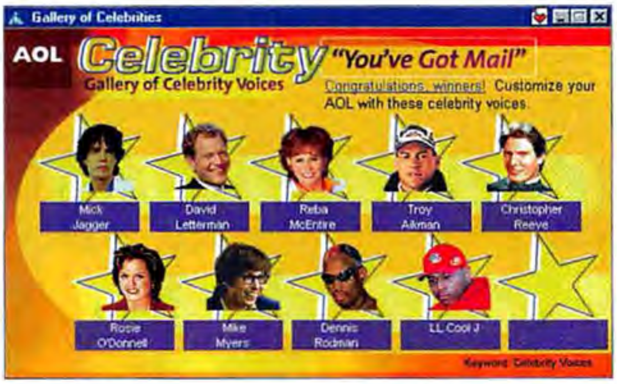
Attachments:

☐ Block file attachments and pictures in mail (you cannot send or receive files in mail)

AMERICA ONLINE'S Mail Controls window has settings to help you block spammers or allow mail only from specified addresses.

Q >> How can I control spam?

HERE'S HOW to manage the single most irritating aspect of e-mail—call it junk mail, unsolicited mail, or even digital luncheon meat.


Gallery of Celebrities
AOL Celebrity "You've Got Mail"
Gallery of Celebrity Voices
Congratulations, winners! Customize your AOL with these celebrity voices.
Mick Jagger
David Letterman
Reba McEntire
Troy Aikman
Christopher Reeve
Rosie O'Donnell
Mike Myers
Dennis Rodman
LL Cool J
Keyword: Celebrity Voices

REPLACE THE GENERIC "you've got mail" alert in AOL with the sounds of Mike Myers, David Letterman, or other celebrities.

■ **AOL** There's a reason AOL gives you four to six aliases in addition to your main screen name (or handle). Use one screen name for receiving e-mail, and another for posting on message boards and hanging out in chat rooms. Keep the screen name you use to receive mail out of the AOL directory. That part is easy since AOL does not automatically list your screen name. Only if you fill in all or part of the My Member Profile in the My AOL menu will your screen name appear in the directory. To block e-mail from specific Internet addresses, domains, or AOL members, type the keyword **Mail Controls**. Click on *Set Up Mail Controls* at the bottom of the screen and follow the screen prompts.

■ **Eudora** For any received spam, right-click the message header and select *Make Filter* from the pop-up menu. In the Action section, check *Delete Message (Transfer to Trash)*. Leave all other options as you see them. Click *Create Filter*.

■ **Messenger** To create an antispam rule, choose *Edit•Message Filters*. Click *New*, name the filter, and set the filter rule to read 'the *sender* of the message *is*', followed by the complete e-mail address of the spammer. Set the action (after 'then') to *Delete* and click *OK*.

■ **Outlook 98/2000** Select *Tools•Organize*, choose *Junk E-mail*, click both *Turn on* buttons, then close the Organize panel to display junk mail in gray. When you encounter offending mail in your Inbox, right-click it and choose *Junk E-mail*, then select one of the junk mail subcategories to put the sender on your junk list.

■ **Outlook Express** To turn away messages from a particular sender, open a message from that person, right-click the address following From, and choose *Block Sender*. Next time a message arrives from the sender's address, OE 5 will automatically move it to the Deleted Items folder. In OE 4, choose *Tools•Inbox Assistant*, click *Add*, then type the soon-to-be-banished e-mail address in the From field. Check *Delete off server* and click *OK* twice.

Q >> How can I customize alerts for incoming mail?

MOST E-MAIL PROGRAMS let you decide how they announce the arrival of new mail. Many people prefer their own sound effects to the default alerts that come with the programs. Here's how to set those:

■ **AOL** Type the keyword **celebrity voices** to make AOL announce new mail using the voices of celebrities like Mike Myers (as "Austin Powers"), David Letterman, or Reba McIntire, among others. Or use the keyword **files** and type **you've got mail** to search the music section of the library for alternate sounds. Once you download the ones you want, install them by going to Windows' Control Panel (select *Start•Settings•Control Panel*). Double-click the *Sounds* icon. In the Sound Properties dialog box's Events list, scroll to the America Online section. Select an event, click the *Browse* button, and navigate to the ▶

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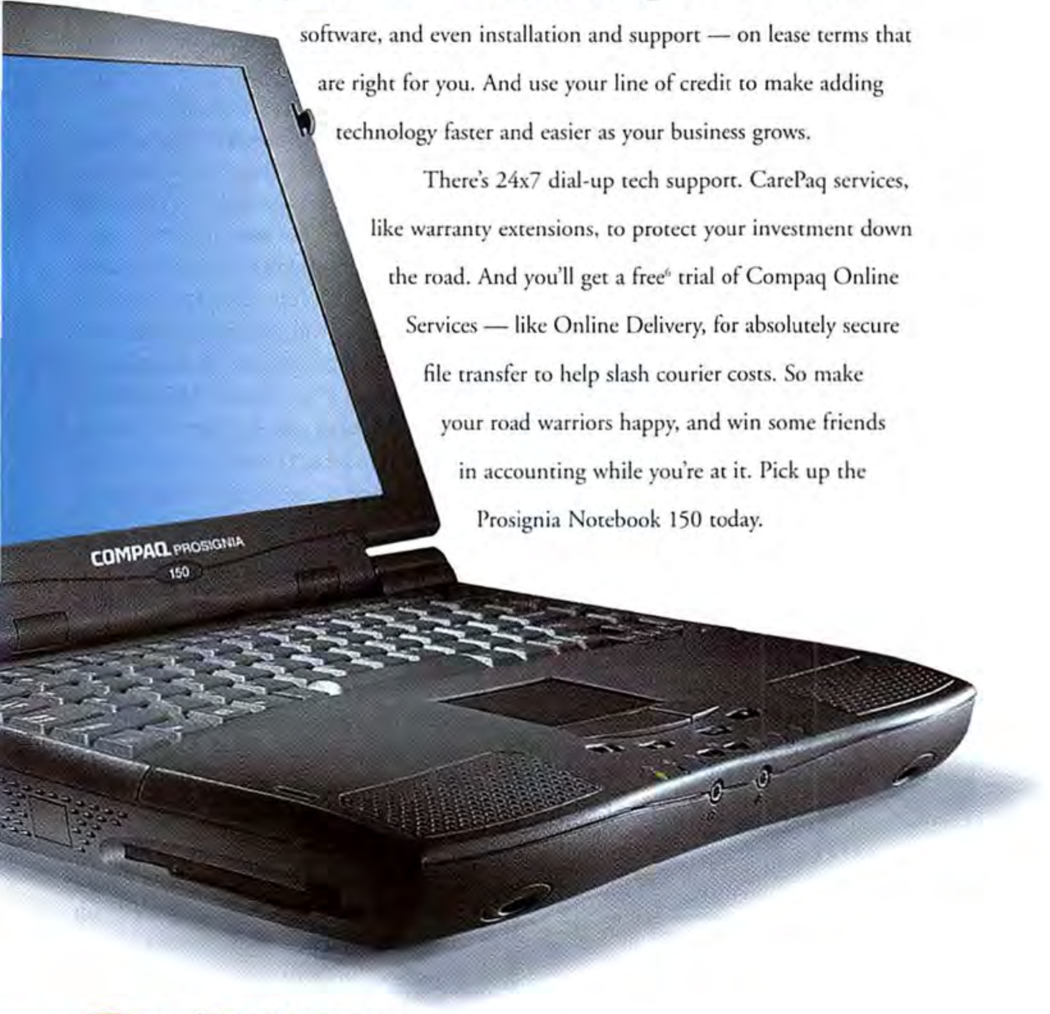

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AOL folder. Click a .wav file to link it to the selected event. Click *OK*.

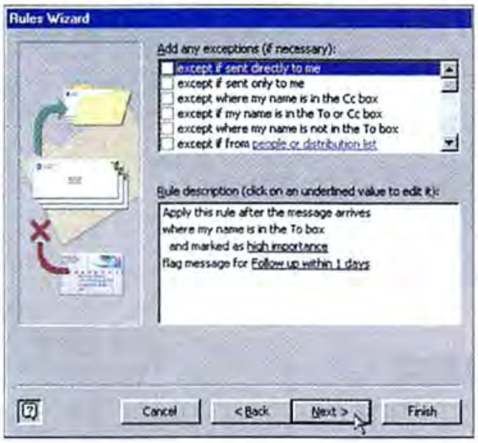
- **Eudora** Eudora can tell you in several ways that mail's arrived; the most noticeable is its audio alert. Choose *Tools•Options*, scroll down the category list, and click the *Getting Attention* icon. Uncheck all boxes except 'Play a sound'. Click the unnamed gray rectangle below that option, and pick any .wav file currently on your system.
- **Messenger** Messenger plays an audio alert when new mail arrives, but for more advanced alerts, open the Communicator Utilities folder (in the Netscape Communicator folder in the Start menu) and click *Netscape Mail Notification*. Configure this utility by right-clicking the *Envelope* icon in the system tray. Choose *Options* and work your way through the tabs for its various settings. Finally, drag a shortcut of Mail Notification to the Start menu's StartUp folder so it runs each time you start your computer.
- **Outlook 98/2000** To have Outlook notify you of important incoming messages, choose *Tools•Rules Wizard*, click *New*, select *Notify me when important messages arrive*, and click *Next*. Check the conditions you want the rule to look for when it scans incoming mail, click *Next* again, then check the actions you want Outlook to take. Click *Next* again to add any rule exceptions, click *Next* one last time, name the rule, and click *Finish*.
- **Outlook Express** Outlook Express plays a sound by default each time a new message arrives in your in-box (to turn it off, choose *Tools•Options*, click the *General* tab, and uncheck *Play sound when new messages arrive*). To change the sound, double-click *Sounds* in the Windows Control Panel, scroll down to New Mail Notification and click *browse* to find the sound you want. Click *OK* when done. To flag important incoming messages in OE 5, choose *Tools•Message Rules•Mail*, scroll to and check the conditions the rule should look for, check the action you desire, describe and name the rule if you want, and then click *OK*. OE 4's Inbox Assistant doesn't offer such additional alert options for incoming mail.

managing the address book

Q>> What's the easiest way for me to add contacts to my address book?

SO IT'S TIME to convert the little black book to an electronic version. Do you have to do all that data entry? Not necessarily.

- **AOL** When you open a message, click the *Add Address* button to add the sender's contact information to the address book. You can also drag and drop names from the AOL address book into the Send To box to address messages.
- **Eudora** To add the sender's contact info to your address book, highlight the message header or open the message. Select *Special•Make Address Book Entry* or press **<Ctrl>-K**. You're given a chance to rename the listing before the name is added to the address book.
- **Messenger** Right-click the message header or click anywhere within the message body in the preview pane. Select *Add Sender to Address Book* from the pop-up menu. Verify the information you've inserted, add any extra info of your own (including any details on the Contact and Notes tabs), and then pick the address book in which to insert this item (the top field). Click *OK*.
- **Outlook 98/2000** Open a message, right-click the name or e-mail address that appears in the From line, and choose *Add to Contacts*. Enter any additional information you can glean from the message in the Contact dialog box, then click *Save and Close*.
- **Outlook Express** Right-click a message in the message list and choose *Add Sender to Address Book*. In OE 4 you must first open the message, then right-click the From address and choose *Add to Address Book*. You can also fill your Address Book with names and addresses listed on public servers. To do so, select *Tools•Address Book*, choose *Edit•Find People* (*Edit•Find* in OE 4), select the service you want to search from the 'Look in' list, enter search criteria in the fields provided, and click *Find Now*.



Rules Wizard

Add any exceptions (if necessary):

☐ except if sent directly to me
☐ except if sent only to me
☐ except where my name is in the Cc box
☐ except if my name is in the To or Cc box
☐ except where my name is not in the To box
☐ except if from people or distribution list

Rule description (click on an underlined value to edit it):

Apply this rule after the message arrives
where my name is in the To box
and marked as high importance
flag message for Follow up within 1 days

TO HELP ENSURE THAT only important messages—not spam—find their way into your Outlook in-box, specify rules for all incoming mail in Rules Wizard.

Q>> How do I create groups?

E-MAIL GROUP LISTS are handy if you regularly send messages to more than one person—the 15 people in your department, for example. And don't you have a group of friends you always forward jokes to? (They're not called spam when *you're* the one sending them.)

- **AOL** Create a mailing list by clicking *Mail Center•Address Book*. In the pop-up box, click *New Group*. Name the group, then type the addresses in the address box, separating each one by a comma—*laurie@thecompany.com*, *pete@isp.com*, for instance. An icon for the group will be created. To address a message to the group, click its icon in the address book.
- **Eudora** Open the address book (select *Special•Address Book* or **<Ctrl>-L**) and click *New*. Enter a name for the list, then ▶

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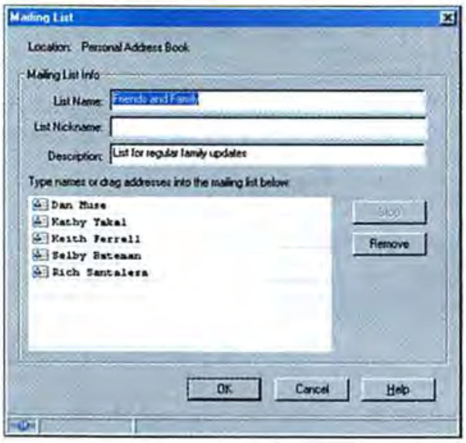
[1] *PC World* Cover Story: Special Report on Reliability and Service - 11/98.

click *OK*. Make sure that the *Address(es)* tab is front and center at the right, and then enter either the complete address or the Eudora nickname of each recipient. Separate each entry with a comma or press **<Enter>** after each name or address. The easiest way to add addresses is to copy and paste them from individual nickname entries in the address book.

■ **Messenger** Open the address book (**<Ctrl>-<Shift>-2** or *Communicator•Address Book*) and click the *Create a New List* icon. Name the list; you can leave blank the fields list nickname, or alias, and list description. Move the Mailing List window aside so you can see the address book, too, then simply drag names from the latter and drop them onto the former. Click *OK*.

■ **Outlook 98/2000 and Outlook Express** To create a mailing list, choose *Tools•Address Book* (or **<Ctrl>-<Shift>-B**), then *File•New Group* (or **<Ctrl>-G**). To add group members who are already in your address book, click *Select Members*, highlight member names in the resulting dialog box, click *Select* to add them to the list, then click *OK*. To add someone to the list and your Address Book, click the *New Contact* button, then either fill in the fields on the new contact's Properties dialog box tabs and click *OK*, or simply enter a name and e-mail address in the provided fields at the bottom of the group's Properties dialog box and click *Add* (or *OK* in OE 4). Enter a name in the Group Name field and click *OK* to finish.



Location: Personal Address Book

Mailing List Info

List Name: Friends and Famil

List Nickname:

Description: List for regular family updates

Type names or drag addresses into the mailing list below

Dan Muse
Kathy Yakal
Keith Ferrell
Selby Bateman
Rich Santalesa

NETSCAPE MESSENGER lets you create mailing lists easily, based on names in your address book.

organizing messages

Q>> How can I sort my mail?

YOU WEREN'T planning to keep all those messages in your in-box for eternity, were you? The best way to organize messages is to put them in separate folders. Keep your in-box lean—it'll make scanning for new or urgent messages a lot easier.

■ **AOL** To set up folders in which to organize AOL mail, click *Mail Center* and select *Read Offline Mail*. Click either *Incoming/Saved Mail* or *Copies of Mail That You've Sent*. Click the *Add Folder* button and type a name for the folder. You can drag and drop messages into appropriate folders while you're offline.

■ **Eudora** Watch out for misleading labels. Eudora can be confusing with its two kinds of storage categories: mailboxes, which *can* contain messages, and folders, which cannot. Folders only further organize mailboxes by collecting several under one label. Create a new mailbox by selecting *Mailbox•New*. Enter a name and click *OK*.

■ **Messenger** Right-click any existing folder in the Explorer-like list found at the far left of Messenger's display, and choose *New Subfolder* from the drop-down menu. Give the subfolder a name and then click *OK* to create a new folder nested under the original. You can shuffle folder organization in this view by dragging and dropping.

■ **Outlook 98/2000** To create a subfolder in your Outlook Inbox, choose *File•New•Folder*, enter a name for the folder, and then click *OK*. Outlook will ask if you would like a shortcut to the folder added to the Outlook bar. If you click *Yes*, Outlook will add the shortcut to the My Shortcuts section. If you'd like to move a shortcut to a different section of the Outlook bar, drag it and hold it over the target section's label until the section expands, and then drop it where you want it in the section's list of shortcuts.

■ **Outlook Express** To create a new folder, select *Local Folders* (*Outlook Express* in OE 4) or any of its subfolders in OE's Folders pane, then choose *File•Folder•New* (*File•Folder•New Folder* in OE 4). Name the new folder, select the existing folder you want to put it in, and then click *OK*. ▶

instant messaging

True, e-mail messages provide more immediacy than snail mail. But for more instant gratification, check out an "instant messaging" program, which offers real-time "conversations." The most widely used IM programs are ICQ and AOL Instant Messenger, both owned by America Online and each boasting upwards of 40 million users. Then there's Microsoft's MSN Messenger, which is gaining ground but lags far behind ICQ and AIM. Other IM programs keep popping up, too. See below for a list of some of our favorites (they're all free downloads). For more information about IM programs, visit www.pcworld.com/nov99/chat.

PROGRAM	URL
ICQ	www.icq.com
AIM	www.aol.com
MSN Messenger	www.msn.com
Yahoo Messenger	messenger.yahoo.com
Ding!	www.activerse.com
LiveList	www.onlive.com
PeopleLink	www.peoplelink.com

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rules and filters

Q>> How do I forward messages to specified folders?

YOU SAY YOU'RE tired of moving messages to their appropriate folders, one by one. So let your e-mail program do it for you as soon as the mail arrives.

AOL AOL doesn't automatically let you sort mail with filters into folders.

Eudora Use Eudora's filters to deposit some messages in separate mailboxes. Create a filter (choose *Filters* from the Tools menu, then click *New*); specify the criteria in the Header: field (*From:*, or perhaps *Subject:*); complete the next two fields; and under Action, select *Transfer To.* Click the gray rectangle to the right and pick the destination folder.

Keep it private.

Looking up your Web e-mail on other people's PCs can be hazardous to your privacy. Before you log in on someone else's PC, check the Increased Security radio button on Hotmail or Net@ddress to ensure that people using the browser after you can't see the pages you've read. And flush the browser's cache when you have finished your reading.

Messenger Select *Edit•Message Filters,* then click *New* and specify the match criteria for the rule ('the *sender* of the message *contains @pcworld.com*', for example). Set the next line to read 'then *Move to folder*' followed by the desired folder from the drop-down list. Name the filter in the top field. Click *OK.*

Outlook 98/2000 Once you've created additional folders, it's a snap to move incoming messages to them automatically. Follow the steps for customizing alerts for incoming mail (page 210), and choose either *Move new messages from someone* or *Move messages based on content* as the type of rule you're creating.

Outlook Express To move certain incoming messages to a folder, choose *Tools•Message Rules•Mail,* check the conditions you want the rule to look for, and check *Move it to the specified folder* in the list of actions. Click the *specified* link in the Rule Description list, and browse to the folder of your choice. Click *OK* three times to finish. In OE 4, choose *Tools•Inbox Assistant,* click *Add,* select and/or type in the criteria you want to look for, check *Move To,* click the *Folder* button, select the folder you want messages moved to, then click *OK* three times to finish.

Q>> How can I create an automatic reply when I'm away?

WHILE YOU'RE GETTING that nice tan in Tahiti, your friends and colleagues think you're ignoring them or you've disappeared. Here's how to set them straight:

AOL Unfortunately, AOL does not offer an autoreply mechanism.

Eudora To respond automatically to mail, create a message holding a stock reply and leave the To: field empty. Select *File•Save As Stationery* to name and save the message. Choose *Tools•Filters* and click *New.* Select *To:* in the Header drop-down list and *is* in the next field; type your e-mail address in the third. Select *Action•Reply with:* from the drop-down list that appears to the right, then pick the stationery file you just built. As long as your PC is on and Eudora is open—and you've set up Eudora to retrieve mail automatically—the reply is sent to all inbound messages.

Messenger Messenger can't generate automatic replies, but a third-party tool can do the trick. Download AutoReply (www.locutuscodeware.com), a shareware utility that generates automated responses. Register this $15 program, and you can set it to respond to incoming mail from up to five POP3 accounts.

Outlook 98/2000 Take a deep breath. First, choose *File•New•Mail Message,* enter the autoreply text, then select *File•Save As* and enter a file name. Choose *Outlook Template (*.oft)* in the 'Save as type' drop-down list, click *Save,* and close the message window without saving the message again. Next, choose *Tools•Rules Wizard* and click *New.* Select *Move new messages from someone,* click *Next,* uncheck *from people or distribution list,* check *where my name is in the To box,* and click *Next* again. Now uncheck *move it to the specified folder,* scroll down to and check *reply using a specific template.* Click the *a specific template* link in the 'Rule description' window, select *User Templates in File System* from the Look In drop-down list (in Outlook 98, you'll have to browse to the \Program Files\Microsoft Office\Templates\Outlook folder), select the template you just created, and click *Open.* Click *Next* again and select any exceptions to the rule. Click *Next* once more, name the rule, and click *Finish,* then *OK.* Whew!

Outlook Express Choose *File•New•Mail Message* (*Compose•New Message* in OE 4) and enter the autoreply text. Select *File•Save As,* enter a file name, ensure the 'Save as type' drop-down list has *Mail (*.eml)* selected, click *Save,* and close the New Message window. In OE 5, choose *Tools•Message Rules•Mail* and click *New* if this isn't your first rule. Check the conditions for autoreplies, check *Reply with message* as the rule's action, then click the *message* link and browse to select the outgoing .eml message file you just created. Click *OK* twice. In OE 4, choose *Tools•Inbox Assistant,* click *Add,* enter or select the criteria for autoreplies, check *Reply With,* browse to and double-click the .eml file you created, then click *OK.* ■

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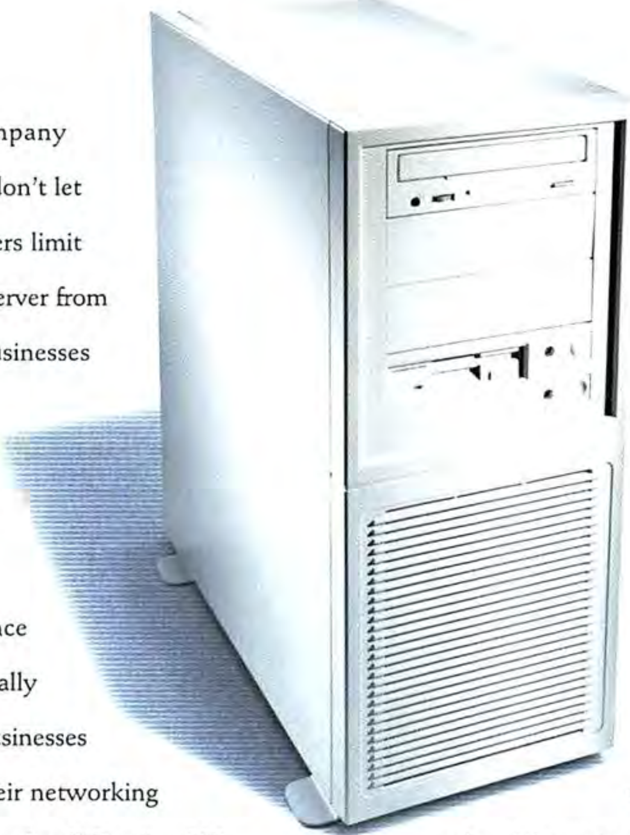

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6GB hard drive[◊]	6GB hard drive[◊]	14GB hard drive[◊]
24X var.[°] speed CD-ROM	4X var. speed DVD-ROM	4X var. speed DVD-ROM
8MB ATI RAGE Pro AGP graphics	8MB 3D AGP graphics	8MB ATI RAGE Pro AGP graphics
15" XGA TFT display	14.1" XGA TFT display	15" XGA TFT display
—	56K 3Com Eclipse Lite modem[‖]	56K 3Com Eclipse Lite modem[‡]
5-yr./3-yr. Micron Power℠ limited warranty	5-yr./3-yr. Micron Power limited warranty	5-yr./3-yr. Micron Power limited warranty
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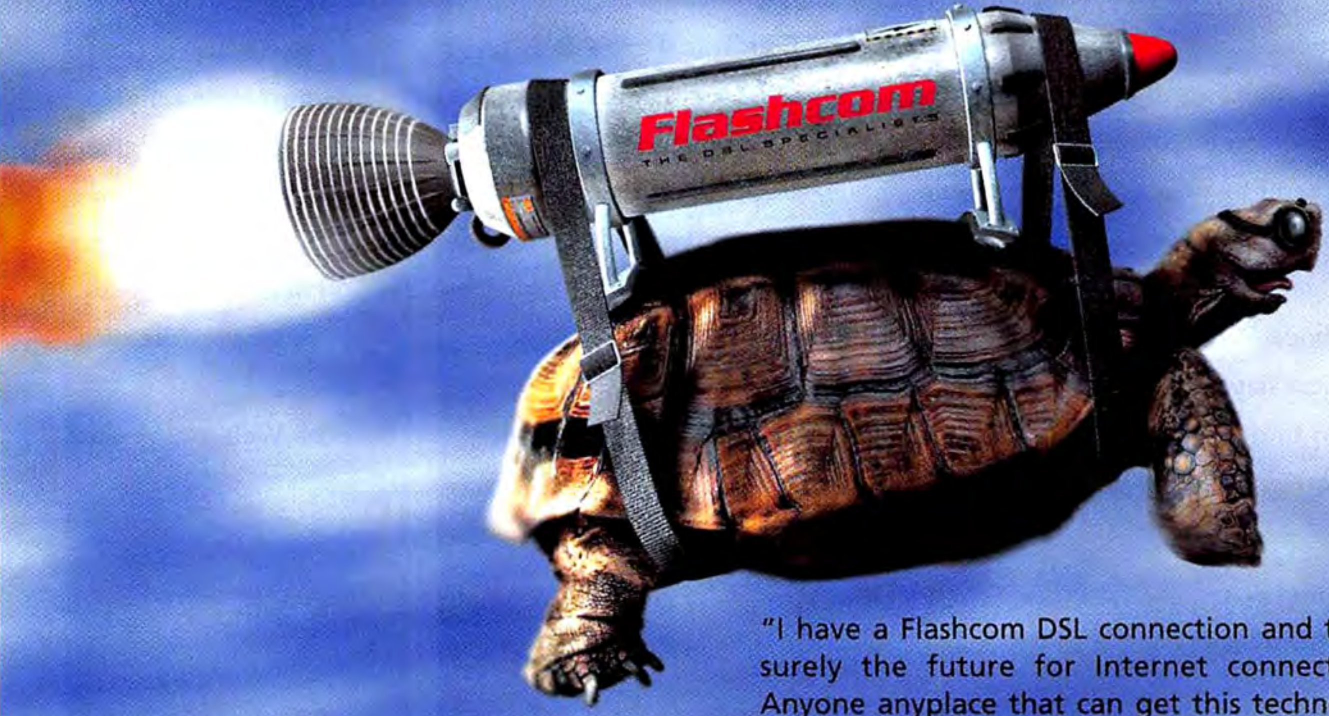

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PC MAGAZINE

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Attention Shoppers!

BY ELIZABETH CRANE

How can you find the best deals online? Let these shopping agents do the grunt work.

ILLUSTRATIONS BY ROBERT ZIMMERMAN

I'M NOT THE WORLD'S MOST ENTHUSIASTIC SHOPPER.

I can never bring myself to buy anything because I always worry that somebody, somewhere, has the identical item on sale for less money.

START **at the beginning.** For a full range of shopping bots, check out BotSpot (www.botspot.com/s-shop.htm) or SmartBots.com (www.smartbots.com).

So I let my clothes turn into rags before going to the store to buy new ones. Heck, I've been known to send people IOUs at Christmas. It's a problem I need to tackle, which is why I jumped at the chance to comparison-shop the Web for *PC World*.

As you've undoubtedly heard, online shopping is heating up. According to a recent survey conducted by Jupiter Communications, a research firm in New York City, 74 percent of people who shop online said that better prices would drive them to spend their dollars on the Web instead of through stores and catalogs.

Ken Cassar, an analyst in Jupiter's Digital Commerce Group, says "81 percent of this group went online with an intended purchase [in mind]." But what's really interesting, he adds, is that "80 percent of the same group went to more than one site before making a purchase."

I can relate to that—going from site to site looking for the best deal so I don't have to worry that I paid too much. But typing in those URLs and keeping track of prices can be a drag. That's where special search tools come in handy.

A WORLD OF BOTS

SHOPPING BOTS (short for *robots*) are software agents that prowl the Web in search of bargains. You plug in the name of the product you want, and the bot returns a list of the best prices it finds. If bots do their job properly, you won't have to go digging through different sites comparing prices. And like regular search engines, they're free to use. Whatever you want—a laptop, a CD, an airline ticket—bots claim they'll sniff out the best prices.

To test how well bots worked across different product categories, I went shopping. My list of goodies covered books, electronics, music and video, toys, and clothing. I looked for widely available items like 3Com's Palm V, and rarer quarry like an early edition of J. D. Salinger's *Catcher in the Rye*. Finally, I shopped at brick-and-mortar stores to see if bots really found outstanding deals. Except with regard to apparel, they did.

There are, as you might expect, several different kinds of shopping bots clanking around the Internet. The general-purpose shopping bots, such as Bottomdollar.com (www.bottomdollar.com), MySimon (www.mysimon.com), and Yahoo Shopping (shopping.yahoo.com), span a vast range of shopping categories—apparel, books, home and garden, music, health and beauty, PCs, gifts, and more. Other bots are product-specific. For example, BookFinder (www.bookfinder.com) finds only books—lots of them. For more about bots that focus on computers, see "Where to Get the Best PC Deals Online," www.pcworld.com/sep99/pc_deals.

Shoppers seeking collectibles or used goods can use bots like Bidder's Edge (www.biddersedge.com) and BidFind (www.vsn.net/af) to scour online auctions. Some general-purpose bots such as Bottomdollar.com, Yahoo Shopping, and DealTime (www.dealtime.com) let you search auctions and classifieds, too.

TRY **try again.** Perform the search again after about 2 minutes if you don't find what you're looking for the first time. The problem might be the server, not your search words.

Another important distinction between shopping agents is less obvious. Some comb the entire Web on the fly; others search their own databases of products. Bots that fall into the first group actively search merchants' sites and attempt to deliver up-to-the-minute prices. On the other hand, bots like CNet Shopper (www.shopper.com) rely on more limited databases for which participating companies include and update (when they remember to) their product information and pricing. These bots tend to be faster because they draw from a centralized well of data; and their merchants may be more reputable, since the bot controls which merchants appear in its database. This type of bot may return fewer matches, however, and the prices it finds may not be the latest and greatest.

HOW THEY WORK

SOME BOTS, SUCH AS the Yahoo-owned Shopfind (www.shopfind.com), will ask you to type keywords in a single field (*talking teletubby*). Others, like MySimon, have you click through categories to find the product area you want ("Toys and Collectibles"); then you start the search in that category. After you punch in your commands, bots scurry off to search the Web

{ Consumer Electronics

THERE'S NO SHORTAGE of shopping bots covering consumer electronics. Bottomdollar.com, CNet Shopper, DealTime, MySimon, Planet Retail, and WebMarket all maintain separate Consumer Electronics categories. How you search varies from bot to bot. At Bottomdollar.com, for instance, you enter a keyword, whereas at MySimon you may specify the manufacturer, the model name, and the minimum and maximum prices you're willing to pay. CNet Shopper or their databases and come back with a list of matches, including prices and links to merchants' sites. You can then compare the prices to find the best deal.

During my shopping spree, I searched for deals on two or more items in each of five categories. The accompanying charts show results for one product in each category and list only the shopping bots that gave me the most matches and options.

The verdict? Shopping bots don't always find exactly what you want, nor do they consistently uncover the best deal. They streamline the process of finding goods online, but you shouldn't expect too much. I started out using 20 bots and by the end of my mission, I found three to be the most useful: MySimon, Bottomdollar.com, and Yahoo Shopping.

WHEN bots fail. No matches? Don't give up. Do a nonbot search on a shopping site (say, Amazon.com) or on your good old search engine to make absolutely sure that what you're looking for is not available.

Unfortunately, most bots don't include tax and shipping charges in the prices they list. So the lowest price isn't always the best deal. And when sites do include shipping information, it's not always accurate. WebMarket (www.webmarket.com), for instance, goofed twice.

Some bots—CNet Shopper, MySimon, and Planet Retail (www.planetretail .com) among them—list matches gleaned from sponsoring merchants before any other matches; other bots list only matches from sponsors—something to be aware of.

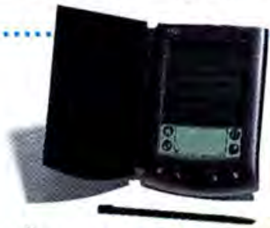
Yahoo Shopping and Excite Shopping (www.excite.com/shopping) work differently. Yahoo initially searches only the companies in its own mall. If it can't find what you want there, it gives you the option of turning it loose on the entire Web. Excite lets you choose from the get-go whether to search Excite's mall or the Web. On an all-Web search, these bots often produce overwhelming lists of hits. But if you stick with the mall, you can't ensure you're getting the best price.

If you're looking for a widely available product, you should generate torrents of matches. If you're looking for a hard-to-find gizmo, you may have a hard time getting any matches at all. In general, I'd have preferred to receive accurate shipping costs and the skinny on product availability up front. Regrettably, most shopping bots provide neither.

No single agent can do it all. Some bots are better at finding one type of product than another; and a bot that had a terrible time finding what I wanted might strike gold for you.

By the time you read this, several customized services will do more than standard bots can. Visit Active Research (www.activeresearch.com), Frictionless Commerce (www.frictionlesscommerce.com), Price Alliance's Shopping Lane (www.shoppingln.com), ShopServe.com (www.shopserve.com), and Soliloquy (www.soliloquy.com).

Active Research, for instance, is the force behind MySimon's Buyers Guides. You indicate how important various criteria are to you—price, brand, dual tuner (for buying a TV, say). The service then searches for matches based on your specifications. However, these sites' features were not available when I went shopping.



OBJECTIVE
3Com Palm V

OFFLINE PRICE
$449 at The Good Guys

SHOPPING BOT	Exact matches	Price[1]	Comments
Bottomdollar.com www.bottomdollar.com	6	$380 ($9)	PRO: Identifies number of sites searched and total number of matches. CON: Single-keyword searches can produce an avalanche of mismatches.
MySimon * www.mysimon.com	18	$348 ($11)	PRO: Slick interface, lots of product subcategories, lets you set price specs. CON: Some sites listed aren't online merchants, heavy on sponsor listings.
Shopfind www.shopfind.com	27	$380 ($10)	PRO: Supereasy search tool, colored icons indicate accuracy of matches. CON: Not so great for electronics, no indication of how many matches were found.
WebMarket www.webmarket.com	13	$360 (free)	PRO: Good range of electronics categories, matches sorted by relevance. CON: Produced lots of matches for things I didn't need.
Yahoo Shopping shopguide.yahoo.com	13	$380 ($10)	PRO: Tons and tons of subcategories, lets you browse by brand. CON: Doesn't identify number of matches found on the Web, many mismatches.

* Best Bot in this category.

[1] Lowest price found by each bot; shipping cost appears in parentheses.

exclusively handles computer products and electronics, so its results are extremely focused. It provides shipping costs, in-stock details, and even a column for noting whether the merchant's site ships internationally. But because the site relies on a database of products and prices updated by participating merchants, the offerings and prices may not be up-to-date.

I hunted for a Hitachi Hi8 650A camcorder and a 3Com Palm V. The searches produced radically different results. For starters, the Palm V is ubiquitous, so the bots returned lots of matches; finding the rarer Hitachi proved more of a challenge.

Bottomdollar.com, MySimon, Shopfind, WebMarket, and Yahoo Shopping each delivered some accurate matches for the Palm V. But every bot also returned matches for Palm V accessories I didn't need. Yahoo Shopping found 9 matches within its own mall, only one of which was for the unadorned Palm V. When it combed the Web, the bot found hundreds of unrelated matches; buried among these were 12 listings for the PDA itself.

I also tried a few shopping bots that troll online auctions, including Bidder's Edge (www.biddersedge.com) and BidFind (www.vsn.net/af). Both of these, however, retrieved so many matches for the Palm V that wading through all of them would have taken hours. I couldn't even tell ▶

PHOTOGRAPH: KEN SMITH

CHOOSE your words carefully. Don't get too specific when you enter search words. Sometimes merchants don't list products by exact model name. So if you try to find your item using a specific name, such as Hitachi Hi8 650A, you may get fewer hits; in this case, you might have better luck using Hitachi Hi8.

how (if at all) the results were organized.

MySimon found the cheapest price on a Palm V—$348 plus $11 shipping. That deal saved me almost $100 over the retail price quoted by The Good Guys.

The Hitachi camcorder was more elusive. Bottomdollar.com, Excite Shopping, MySimon, and Yahoo Shopping each unearthed a few matches. Shopfind located one merchant, while CNet Shopper, Infospace (www.infospace.com), Planet Retail, Roboshopper (www.roboshopper.com), and WebMarket struck out.

Using a specific model name can prove ineffective at sites that seek only exact keyword matches. To increase your odds of success, try broadening your attack. After *Hitachi Hi8 650A* returned no matches, I searched for *Hitachi Hi8 650*, and picked up a few. Widening the search to *Hitachi Hi8* let me see other available models and allowed me to compare features in detail.

THE PLACES BOTS GO

A SITE LIKE MySimon, on the other hand, is ideal for extremely specific searches. Follow the links, from Consumer Electronics to Camcorders, and then from the resulting lists choose the type (Hi8), manufacturer (Hitachi), and model (650A) of camcorder you want.

Many of the matches the bots returned were links to seedy-looking merchants, whose fast-sell look and feel reminded me of an electronics emporium in a tourist hotbed.

I purchased the lowest-priced Hitachi 650A I found ($387) through 1-877-CAMCORDER (www.877.camcorder.com), a merchant MySimon uncovered. Unfortunately, the company began hounding me on the phone, insisting that I call to discuss my online order. I had to verify my credit card number, and I discovered that the company had strict return policies: I couldn't return the camcorder unless it was defective; and even in that case, I would only be permitted to exchange the product for something else.

The bots ultimately saved me a few dollars off retail—I could have bought the camcorder at a local store for $399 plus tax. But I also learned a lesson: A bot's results are just the first step. After you isolate some good prices, check out the merchants. If a bot churns out unfamiliar sellers, you might want to do more research before you buy. Or ignore the no-name stores from the outset and go with a vendor you know something about.

Rare Books and Bestsellers

ALL THE GENERAL-PURPOSE bots have categories devoted to books. Both Bottomdollar.com and MySimon permit you to search by author, title, and format (hardcover, paperback, or audio); and MySimon also lets you search by ISBN number. Besides these do-everything bots, there are a handful of book-specific bots, including BookBlvd (www.bookblvd.com) and BookFinder (www.bookfinder.com).

I shopped for J. K. Rowling's best-seller *Harry Potter and the Chamber of Secrets* and for an early edition of J. D. Salinger's *The Catcher in the Rye*. I found that shopping with either the general-purpose bots or the book-specific bots is a breeze if you're hunting for a widely available book (like the popular *Harry Potter* volume on my list).

But if you're looking for a rare book (like my early-edition *Catcher)*, the general-purpose bots are likely to have a harder time delivering results. Such bots tend to search only major booksellers, which don't carry rare, used, or collectible books.

The *Harry Potter* book I wanted was available virtually everywhere, and most bots found prices that fell within a couple of dollars of each other. BookFinder, MySimon, and PriceScan had the most hits (17, 13, and 12 respectively). If you want to pinch pennies, check all the bots' offerings. Every price ▶

Harry Potter

OBJECTIVE

Harry Potter and the Chamber of Secrets, hardcover

OFFLINE PRICE

$13 at Barnes & Noble

SHOPPING BOT	Exact matches	Price[1]	Comments
BookBlvd www.bookblvd.com	4	$9 ($4)	**PRO:** Gives book price, shipping cost, and overall total. **CON:** Search field accepts only 25 characters, so you must abbreviate longer titles.
BookFinder www.bookfinder.com	17	$15 ($5)	**PRO:** Superb search options, presents results by list or table, lots of matches. **CON:** Tends to find superexpensive copies, no way of reorganizing results.
Bottomdollar.com www.bottomdollar.com	7	$9 ($4)	**PRO:** Allows searching by title, author, and format; permits re-sorting of results by price or merchant. **CON:** Distracting banner ads, fewer merchant sites searched.
MySimon * www.mysimon.com	13	$9 ($4)	**PRO:** Lets you search by author, title, ISBN, and format; offers re-sort options by price and site. **CON:** We couldn't locate promised reviews and author biographies.
PriceScan www.pricescan.com	12	$11 (free)	**PRO:** Lists base book price, shipping costs, and total price; allows you to sort by book price or total price. **CON:** Search procedure isn't intuitive.

* Best Bot in this category.

[1] Lowest price found by each bot; shipping cost appears in parentheses.

TO bid or not to bid? If you're shopping for something popular and current, don't bother looking at bots that search auctions: You'll be swamped with results. If you're after something old and unusual, auction site bots may be a good starting place.

PHOTOGRAPH: KEN SMITH

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32X Max CD-ROM Drive[2]	32X Max CD-ROM Drive[2]	32X Max CD-ROM Drive[2]
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ESS Solo PCI Audio	ESS Solo PCI Audio	ESS Solo PCI Audio
56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]
JBL Pro Amplified Speakers	JBL Pro Amplified Speakers	JBL Pro Amplified Speakers
Creativity Action Center	Creativity Action Center	Digital Creativity Imaging Center*
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56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]
JBL Pro Amplified Speakers	JBL Pro Amplified Speakers
Digital Creativity Imaging Center[6]	Digital Creativity Imaging Center[6]
100 MB Iomega Zip Built-In™ Drive + 1 disk	Microsoft Featured Home Collection & MS Word
Microsoft Featured Home Collection & MS Word	Microsoft Windows98
Microsoft Windows98	Compaq CV915 19" Monitor (18.0" VIA)
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	24X Max CD-ROM Drive[4]	24X Max CD-ROM Drive[4]
	ATI Mobility Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Rage LT Pro™ Hardware Accelerated 3D Graphics with 8 MB Video Memory
	56K ITU V.90 Modem (PCI)[3]	56K ITU V.90 Modem (PCI)[3]
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64 MB SyncDRAM	128 MB SyncDRAM	96 MB SyncDRAM	128 MB SyncDRAM
6.4 GB UltraDMA Hard Drive[1]	6.4 GB UltraDMA Hard Drive[1]	6.4 GB UltraDMA Hard Drive[1]	10.0 GB UltraDMA Hard Drive[1]
24X Max CD-ROM Drive[4]	6X DVD-ROM Drive[2]	6X DVD-ROM Drive[2]	6X DVD-ROM Drive[2]
ATI Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Mobility Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory	ATI Rage LT Pro Hardware Accelerated 3D Graphics with 8 MB Video Memory
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96 MB SyncDRAM: Add $100	QuikDock w/Integrated Ethernet: Add $129	Diamond Phoneline Network USB: Add $69	QuikDock: Add $99
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SHIP happens. Shipping and handling costs can dramatically raise a seemingly low price. If shipping info is not listed somewhere obvious, like next to the price of the item, you may be able to find the cost by clicking "Customer Service" or "Information" on the merchant's site. If you still can't find it, go through the order process until you get to the shipping prices, then cancel or proceed with the order.

quoted, even with shipping and handling costs included, was a couple of bucks lower than the independent bookstore price from the brick-and-mortar world. As for Amazon.com, the bots found the discount cybergiant all right, but never with the lowest price. Thanks to MySimon, I paid two bucks less for my hardback copy of *Harry Potter and the Chamber of Secrets* than I would have at Amazon.com.

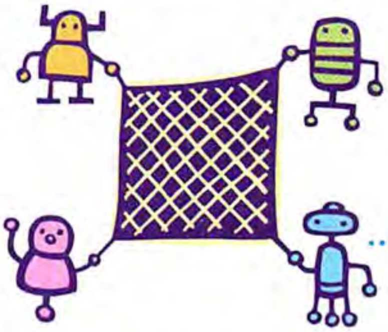
As for *The Catcher in the Rye*, only BookFinder found an early edition—the others found mass-market paperbacks and related publications. Like any other book bot, BookFinder lets you search by title and/or author and to specify hardback or paperback, but it also allows you to check boxes for first edition or signed copy, and used or new; set price limits; select how many results you want per page; and enter extra keywords. If you're picky about the condition of the book, you can use this last feature to limit your search to copies listed as being in fine or very fine condition.

THE RIGHT BOT FOR THE JOB

BOOKFINDER HAS three main downsides: It organizes results into seven subdivisions reflecting the seven search engines it uses to look for matches; it cuts off results from any of these as soon as the matches in that subdivision reach 25; and it offers no way to re-sort results (by price, for example), so you have to scroll through all the results to find the best deal.

After browsing BookFinder's matches and losing a lengthy debate with my better judgment, I passed up the $6800 first-edition hardback and instead bought an early edition for $50 plus $5 shipping. For me, the online experience beat the used bookstores in the real world, too: I called half a dozen local shops and none of them had an early edition of *Catcher* in stock.

If you're looking for a widely available book, you should shop around using the general-purpose bots as well as the book-specific sites. But if you're on a quest for a rare class of book, skip the general bots and go straight to BookFinder. As is the case with most bots and in most product categories, finding shipping costs is up to you.



{Toys and Collectibles

CAST a wide net. No one magic shopping agent can find the best deals on everything. Use several bots to find what you're looking for, then compare the information.

I NEVER FOUND A toy-specific shopping bot, but Bottomdollar.com, Excite Shopping, MySimon, Planet Retail, WebMarket, and Yahoo Shopping all have sections devoted to toys and collectibles. My mission? To track down a Talking Tinky Winky Teletubby and a Flamingo Barbie.

The bots delivered lots of matches, and with the exception of WebMarket, they did their job well—though it took me a while to hone my search queries. In the case of my Talking Teletubby, the bots found an item I couldn't get at any retail store in San Francisco during early fall. As this story went to press, however, Talking Tinky Winky Teletubbies are jammed cheek by jowl on the shelves of my local Toys 'R' Us.

Bottomdollar.com and Planet Retail let you do a general keyword search once you arrive at the Toys and Collectibles area. MySimon and Excite Shopping list separate subsections within Toys for Barbies, Beanie Babies, Furby, Star Wars, and the like. These options can really help you ▶

OBJECTIVE

Talking Tinky Winky Teletubby

OFFLINE PRICE

$30 at Toys 'R' Us

SHOPPING BOT	Exact matches	Price[1]	Comments
Bottomdollar.com * www.bottomdollar.com	3	$25 (free)	**PRO:** Searches lots of toy merchants, lets you sort by price or merchant. **CON:** Way too many mismatches, lacks information on promotions.
Planet Retail www.planetretail.com	1	$25 ($5)	**PRO:** Nifty narrowing-down process, allows you to specify a maximum price. **CON:** Found lots of other Teletubby items—all from one store.
Shopfind www.shopfind.com	2	$25 ($11)	**PRO:** Easy to navigate; searches many toy merchants. **CON:** No way of organizing list, so I had to dig to find the exact toy I wanted.
WebMarket www.webmarket.com	5	$25 ($5)	**PRO:** Lets you sort results by merchant, toy category, or availability. **CON:** Some inaccurate pricing and shipping costs listed, no way to sort by price.
Yahoo Shopping shopguide.yahoo.com	1	$30 ($7)	**PRO:** Extensive subcategories; exact match found in Yahoo mall. **CON:** Churned out pages and pages of links to various Teletubby merchandise I didn't want.

* Best Bot in this category.

[1] Lowest price found by each bot; shipping cost appears in parentheses.

PHOTOGRAPH: KEN SMITH

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DROWNING by numbers. If your search turns up a flood of matches, use whatever sort options are available to organize them—usually you can sort by price or by vendor. If the bot doesn't have sort options, start over and refine your search to limit the results.

zoom in on the item you're looking for.

Bots found a narrower range of prices for toys than for other products. Without access to shipping costs, I had no way of knowing which match was the best deal. (WebMarket listed shipping prices, but the actual charges turned out to be a dollar higher.) In this case, burrowing into merchant sites paid off. My Teletubby purchase was spurred by free extras and a break on shipping—neither of which showed up in my search results. Using Bottomdollar.com to get there, I bought my Teletubby for just $25 at KBkids.com (www.kbkids.com). Shipping was free and I got a free Furby Buddy to boot.

While shopping for Barbie, I entered *Flamingo Barbie* in Excite Shopping's Toys category, instructing it to search the entire Web. Big mistake. My search pulled up two stores and way too many EBay auction listings. My hopes rose when WebMarket found the doll at EToys (www.etoys.com) for $80, but the site itself listed the item at $100—lower than at my local Toys 'R' Us, but not a steal.

According to Heather Young, WebMarket's public relations specialist, the company strives to make the prices it delivers consistent with merchants' prices. However, WebMarket doesn't take responsibility for any discrepancies that turn up during searches. "We refer the customer to Inktomi, the company responsible for WebMarket's underlying search engine technology," says Young.

In any case, I circled back to Excite Shopping's list of merchants and bought the doll for a total of $107 (with tax and shipping)—$12 better than at Toys 'R' Us.

In general, shopping bots find a fair number of matches for popular toys and well-known brands. But as always, final pricing depends on the shipping costs, so be prepared to go from site to site to calculate the final tally.

{Clothing and Accessories

GET past advertisers. Big bot sites like MySimon pull up search results by listing their sponsors' sites first. Re-sort the results by clicking on the appropriate column heading—such as Price or Vendor.

CLOTHING ISN'T AMONG the consumer goods best served by shopping bots, so don't be surprised if you get no matches for seemingly common apparel (like Levi's). Many bots that have product categories omit apparel altogether. MySimon, PlanetRetail, WebMarket, and Yahoo Shopping are exceptions. The best of the lot are MySimon and Yahoo. MySimon lets you tunnel down to men's clothing and select the kind of apparel you want—shirts, shorts, T-shirts, whatever.

Yahoo's men's section is even better. It offers underwear, tall sizes, young men's, shoes, and more.

The first clothing item on my shopping list was a pair of women's black leather gloves. I started my quest at MySimon. First I homed in on its Gloves area; once there I keyed in the word *leather*. I got matches for work gloves, baseball gloves, leather wallets, and a few leather dress gloves. Bottomdollar.com found sports and medical gloves, but no regular ones.

Yahoo Shopping sent me through its typical Russian nesting doll of categories: Apparel & Accessories•Women•Accessories•Gloves•Leather. Then it retrieved matches for seven costly pairs of gloves it discovered in its own mall, followed by over 200 matches for *leather* and *glove* drawn from the Web at large.

Next I tried Shopfind. After getting eight accurate matches, all I had to do was choose between fur-lined and acrylic-lined gloves at similar prices. That's a decision I could handle—for $30 (plus $8 shipping), I went with the fur. But just because the bot found a good deal doesn't mean I lived happily ever after: I never received the gloves. According to the merchant, my order didn't go through, so I canceled my purchase. In any case, Nordstrom had a similar pair for $56 plus tax.

Next on my shopping list was a pair ▶

OBJECTIVE

Women's black leather gloves

OFFLINE PRICE

$56 at Nordstrom

SHOPPING BOT	Exact matches	Price[1]	Comments
MySimon www.mysimon.com	3	$79 ($8)	**PRO:** Many men's and women's clothing subcategories. **CON:** Returned matches for all kinds of gloves, despite being asked for "black leather gloves."
Planet Retail www.planetretail.com	4	$79 ($8)	**PRO:** Good search options within apparel category. **CON:** Listed multiple instances of each search result, making for 13 pages of results instead of 1.
Shopfind * www.shopfind.com	8	$30 ($8)	**PRO:** Easy to use–no need to wade through categories. **CON:** No way to refine a search, so you get lots of mismatches.
WebMarket www.webmarket.com	4	$79 ($8)	**PRO:** Nice interface, good range of subcategories; search by men's/women's, price, and specific brand if available. **CON:** Ridiculous number of repeat matches.
Yahoo Shopping shopguide.yahoo.com	7	$32 ($5)	**PRO:** Matches for gloves were right on when searching its own mall. **CON:** Doesn't let you specify price, so it found some very expensive matches.

* Best Bot in this category.

[1] Lowest price found by each bot; shipping cost appears in parentheses.

PHOTOGRAPH: KEN SMITH

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of Levi's 501 jeans. For this part of the apparel hunt, I tried all the bots that had clothing categories. I searched for *Levi's* and found Levi-related products but no 501 jeans; *Levi's 501* yielded only a few matches. I also tried two auction sites, Bid Find and Bidder's Edge, which found used Levi's, but not new ones.

I was puzzled, so I went to AltaVista's regular search engine and typed in *Levis jeans 501 new for sale*. Within minutes I found three sites selling new 501s, one of which proved to be my best cyberdeal. I ordered the jeans from Levis 501 Warehouse.com (www.levis501warehouse.com) for $46 (with tax and shipping).

But if you've bought jeans recently, you already know that the lowest online price didn't beat the lowest offline price by a long shot. The same 501 jeans were advertised for $32 plus tax at a local discount department store. For now, it seems, shopping bots may not get you the best deal on jeans or clothes in general.

{Music and Videos

WHERE'S a stock boy when you need one? Most bots won't tell you whether the product you want is actually in stock. So don't assume the product is available just because a bot lists it. The only way to find out is to go to the merchant's site.

THE WEB IS LOADED with music and video sites, so I figured that finding old sci-fi movies or well-known CDs would be fairly easy with the help of bots. And it is—as long as you want a popular recent item. Bottomdollar.com, MySimon, Planet Retail, WebMarket, and Yahoo all have video/movie categories. To search, go to the category you want; enter the title of the desired movie title, album name, or album performer in the search field; and hit *Go*.

But when it comes to low-cost items like current CDs and videotapes, bots can save you only a few dollars at best. And as with books, if you want something rare, general-purpose bots are not the way to go. They usually troll big online stores, which don't stock many out-of-the-ordinary items. For rare music and video, you might have better luck trying auction bots or well-known auction houses, like EBay (www.ebay.com) or Onsale (www.onsale.com).

OBJECTIVE

The Day the Earth Stood Still videocassette

OFFLINE PRICE

$15 at Fox Video

I wanted to get copies of the classic sci-fi movie *The Day the Earth Stood Still*, the *Apocalypse Now* documentary *Hearts of Darkness*, and Olivia Newton-John's *Greatest Hits, Volume 3* CD.

BOT MILEAGE MAY VARY

ALL THE BOTS found *The Day the Earth Stood Still* easily, at prices around $12. Yahoo Shopping, once it let me broaden my search to encompass the entire Web, pulled up the largest number of matches and the best price, $10.

Hearts of Darkness proved harder to find. MySimon did best, spotting five sites and the lowest price. Yahoo located three, and Bottomdollar.com bottomed out. Once again, I had to figure out the shipping info myself, but the lowest price on MySimon's list, $11, turned out to include shipping. I saved $3 off the retail price at my local Tower Records.

If the bots had trouble finding rare documentaries, they had an even thornier time finding Olivia Newton-John's third greatest hits collection (yes, there are three). MySimon and Planet Retail let you select the Music category and then search by title and/or artist. When I searched for *Olivia Newton-John Greatest Hits Volume III*, bots couldn't find it because at some merchants' sites, it was listed as "Vol. 3." At Planet Retail, when I searched for Newton-John's greatest hits I got no matches, but when I searched by her name alone I got plenty, including some of her greatest hits albums. MySimon found a great $15 price, but after I walked through the entire ordering process, the merchant added tax at the last click, sending the price above $18—higher than I had anticipated. Still, I saved about four bucks off Tower Records' $22 price tag.

My advice: If you're searching for popular movies and artists and you want to save a little money over the regular street price, shop around using various bots. If the item you want is less common, you may be better off browsing auction bots and auction sites—if you're willing to take the time to monitor their progress.

SHOPPING BOT	Exact matches	Price'	Comments
Bottomdollar.com www.bottomdollar.com	3	$13 ($3)	**PRO:** Lets you search by VHS, DVD, or laserdisc; finds exact matches and good prices. **CON:** Not great at finding less-popular items, distracting ads.
Planet Retail www.planetretail.com	4	$12 ($3)	**PRO:** Great movie search format; includes details on availability. **CON:** Some results were dead links; inconsistent product information.
PriceScan www.pricescan.com	1	$15 ($5)	**PRO:** Uncluttered search field, lists all stores it tried. **CON:** Searches only by movie title; search process isn't very intuitive.
Shopfind www.shopfind.com	3	$11 ($4)	**PRO:** Checks a decent number of merchants. **CON:** Doesn't say how many total matches it found, searches pulled up some nonmovie results.
Yahoo Shopping * shopguide.yahoo.com	9	$10 ($1)	**PRO:** Snappy interface, divides searches into 13 genres. **CON:** Lots of matches, but it doesn't always find the lowest prices.

* Best Bot in this category.

'Lowest price found by each bot; shipping cost appears in parentheses.

Elizabeth Crane, a San Francisco–based freelance writer, is considering using bots for her holiday shopping this year—but she can't promise friends and family that they'll stop seeing IOUs. ■

PHOTOGRAPH: KEN SMITH

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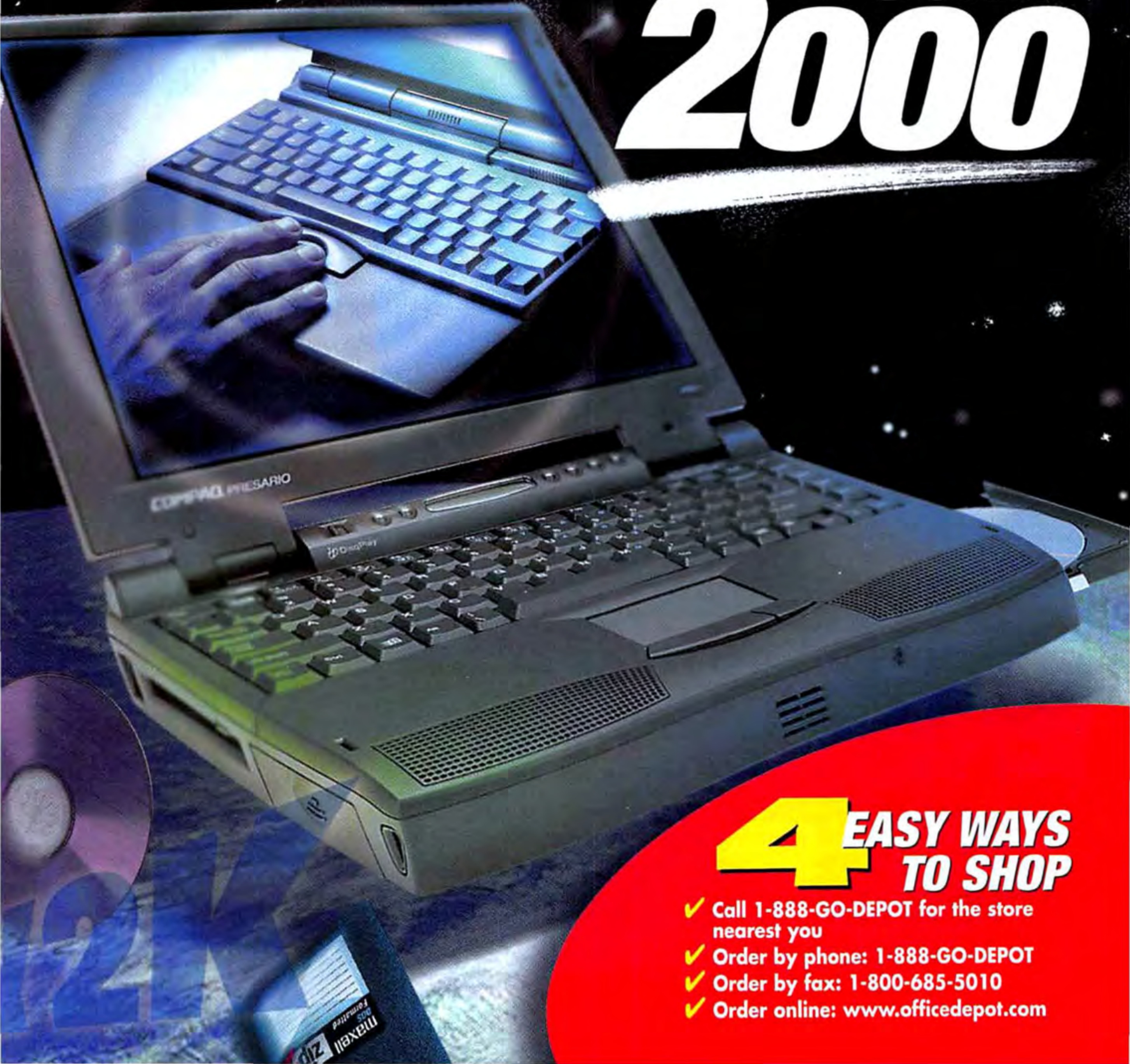
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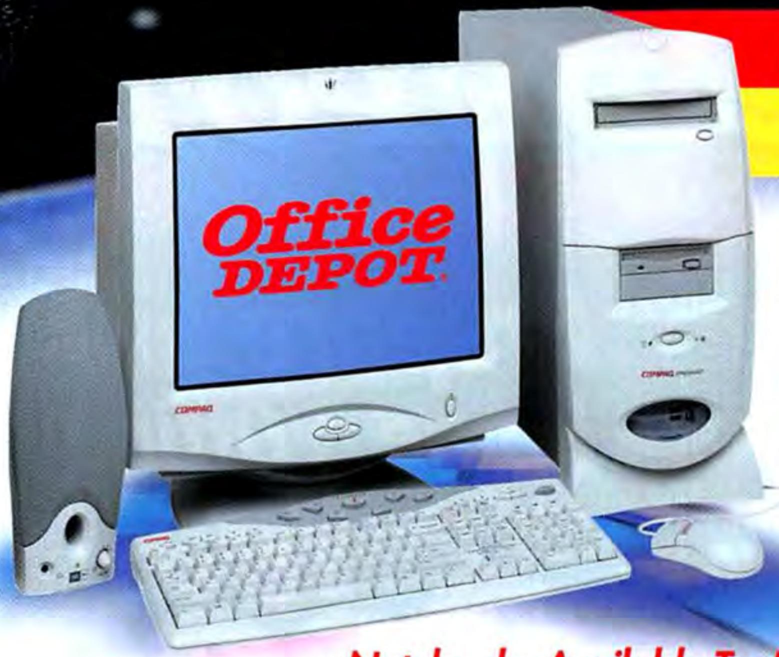
- ✓ Order online: www.officedepot.com



COMPAQ
"BUILT FOR YOU"...

pentium® III

celeron™ PROCESSOR

AMD Athlon PROCESSOR

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AMD and Athlon are trademarks of Advanced Micro Devices, Inc.

...Notebooks Available Too!

Created by You... for YOU!

Step 1. Choose Your Processor

- Intel® Pentium® III 450MHz
- Intel® Pentium® III 500MHz
- Intel® Pentium® III 550MHz
- Intel® Pentium® III 600MHz
- Celeron 466MHz
- Celeron 500MHz
- AMD-Athlon® 600MHz
- AMD-Athlon® 700MHz

Step 2. Choose Your Features

Memory

☐ 64MB100 MHz SyncDram
☐ 96MB100 MHz SyncDram
☐ 128MB100 MHz SyncDram
☐ 192MB100 MHz SyncDram
☐ 256MB100 MHz SyncDram
☐ 384MB100 MHz SyncDram*
☐ 512MB100 MHz SyncDram*
☐ 768MB100 MHz SyncDram*

* Only available on 5700T P3 models

Additional Features

☐ 1Mbps PCI phone line home networking card
☐ 10/100 NIC - Ethernet PCI *(New) Accton*
☐ Iomega 100MB Zip BUILT-IN™ Drive
☐ Iomega 250MB Zip BUILT-IN™ Drive
☐ CDRW (4x/2x/24x)*
☐ Office Professional upgrade • SBE Required

* Only available on Pentium 5700N Celeron models

Hard Drives

☐ 6.00GB (5400RPM) UltraDMA Hard Drive
☐ 10.4GB (5400RPM) UltraDMA Hard Drive
☐ 13.0GB (5400RPM) UltraDMA Hard Drive
☐ 13.4GB (7200RPM) UltraDMA Hard Drive
☐ 20.0GB (7200RPM) UltraDMA Hard Drive
☐ 28.0GB (7200RPM) UltraDMA Hard Drive
☐ 34.0GB (5400RPM) UltraDMA Hard Drive
☐ 56.0GB (7200RPM) UltraDMA Hard Drive

CD-ROM

☐ 32x (max speed) CD-ROM
☐ 10x (max speed) DVD-ROM
☐ CDRW (4x/2x/24x)

Modems

☐ 56K ITU V.90 Modem†
☐ 6.0MBPS Max Digital Modem†

†Actual download speeds may vary

Audio

☐ ESS Solo PCI Audio
☐ Sound Blaster Live Audio

No audio card option on 5700N

Graphics

☐ Voodoo 3 1000 16V Graphics*
☐ 32MB Creative Labs 3D Blaster TNT2 Ultra Accelerator
☐ Voodoo 3 3500 16V Graphics*

No graphics card option on 5700N

Speakers

☐ JBL Pro Amplified Speakers with Dynamic Bass Response
☐ JBL Pro Premium Powered Speakers with Subwoofers
☐ Klipsch v.2 400 Speaker System (THX Certified)

Step 3. Choose Your Monitor

CV Series

☐ Presario CV 575 15" Monitor (13.8" VIA, without speakers)
☐ Presario CV 715 17" Monitor (16.0" VIA, without speakers)
☐ Presario CV 915 19" Monitor (18.0" VIA, without speakers)
☐ Starburst CV 1115 21" Monitor (20.0" VIA, without speakers)

MV Series

☐ 17" Compaq V720 (15.9" VIA, without speakers)
☐ 19" Compaq V910 (18.0" VIA, without speakers)
☐ 21" Compaq V1000 (20.0" VIA, without speakers)

FP Series

☐ FP720 15" Flat Panel Monitor (without speakers)

Sony Series

☐ Trinitron 17" Monitor (16.0" VIA, without speakers)

V Series

☐ V1000 21" Monitor (20.0" VIA, without speakers)

Recommended Configurations:

Business Owner

- Intel® Pentium® III Processor 600MHz
- 128 100MHz SyncDRAM
- 20.0GB (7200 RPM) Hard Drive
- 32X (max speed) CD-ROM
- 56K Data/Fax Only Modem
- ESS Solo PCI Audio
- Voodoo 3 1000 16V Graphics
- Iomega 100MB Zip BUILT-IN™ Drive
- 10/100 NIC – Ethernet PCI Accton
- CV915 19" Monitor (18.0" Viewable Image Area)
- JBL Pro Amplified Speakers (shipping not included)

Gamer

- AMD® Athlon™ 700MHz
- 128 100MHz SyncDRAM
- 13.4GB (7200 RPM) Hard Drive
- 10X (max speed) DVD-ROM
- 56K Data/Fax Only Modem
- CDRW (4x/2x/24x)
- Sound Blaster Live Value
- Creative Labs 3D Blaster TNT Ultra
- CV715 17" Monitor (15.9" Viewable Image Area)
- Klipsch v.2 400 Speaker System (THX Certified, shipping not included)

Home

- Intel® Celeron™ Processor 466MHz
- 64 100MHz SyncDRAM
- 6.0 GB (5400 RPM) Hard Drive
- 32X (max speed) CD-ROM
- 56K Data/Fax Only Modem
- CV715 17" Monitor (15.9" Viewable Image Area)
- JBL Pro Amplified Speakers (shipping not included)

See a store associate for current pricing

Shipping not included. Available in store only. Product availability and prices are subject to change.

Some options may not be available on specific configurations

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Create Your Own 21st Century Office!

A) OFFICE ARENA

A desk collection that fits the way you live and work

Hard Rock Maple/Blackstone Laminate

600-250-455 ....699.99

B) MOBILE COMPUTER CART

Ideal for a small office or dorm room

- Black and Granite finish
- Assembly required

600-887-447......................99.99

Also available in Oak and Alder

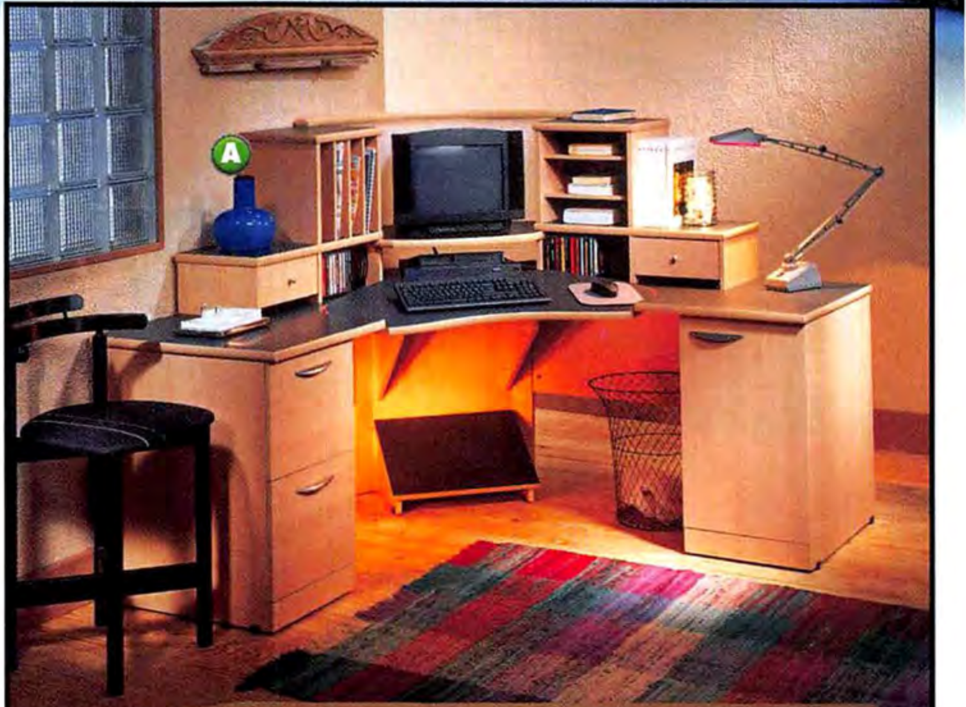
C) DESK WITH HUTCH

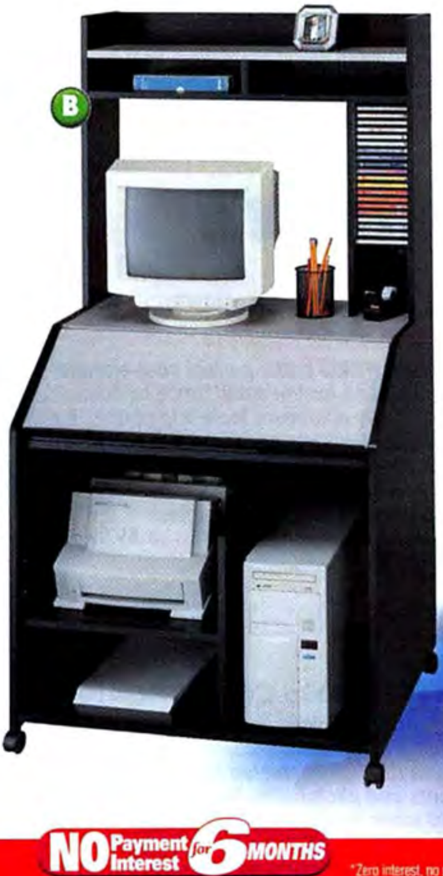
Compact workcenter fits almost anywhere

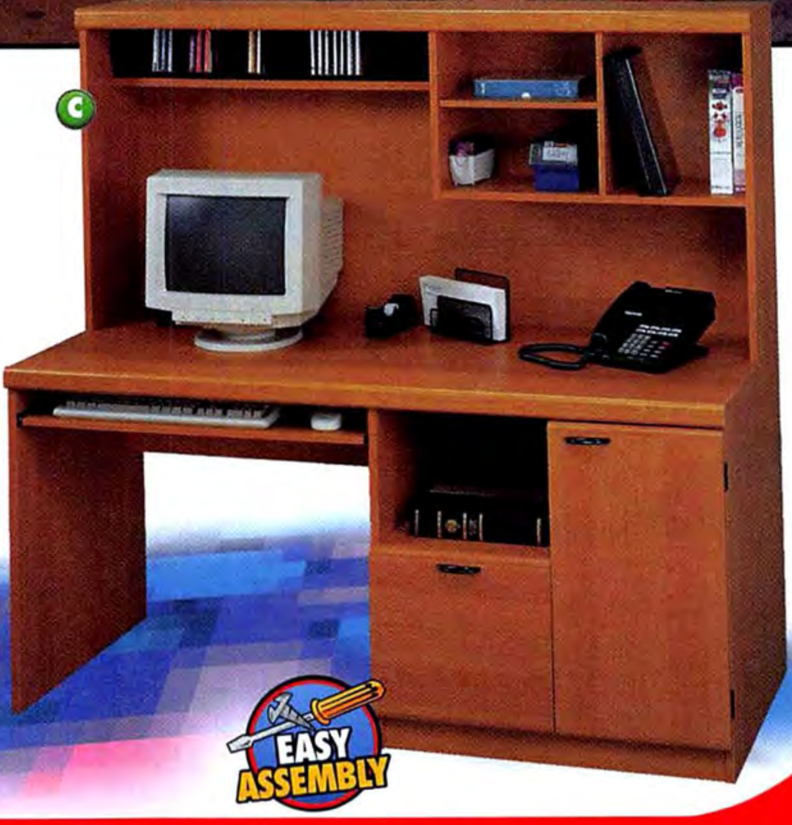
- Assembly required

Alder Laminate

600-922-122 ....199.99







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*Zero interest, no payments on Computers, Business Machines and Furniture purchases of $299 or more made with the Office Depot "Technology Card" – a consumer credit card offered through Monogram Credit Card Bank of Georgia. The purchase price must be paid in full within the 6 month period; otherwise, interest (accruing on the purchase price from the date of purchase) will be charged to customer's account. As of January 1, 1999, APR is 22% (rate may vary); 18% in CO, IA, ME, NC, WI. A min. monthly financial charge. of $1.00 may apply; 50¢ in IA.

Great Values on *Printers* and *Scanners*

A
$30 Mail-In Rebate

B
$30 Mail-In Rebate

C
$30 Mail-In Rebate

Printers

Canon

A) BJC-1000 COLOR BUBBLE JET™ PRINTER

Office Depot's lowest priced inkjet printer

Perfect for the home or small office, the BJC-1000 will handle your work load without glitches and gives you the solid, capable printing performance you need.

- Print Speed — black 4 ppm/color 0.6 ppm
- Resolution — 360 x 360 dpi in color/720-360 dpi in black
- Capacity — 50 sheets

600-161-774 .... **49.99 (After Rebate)**
79.99 - 30.00 Mail-In Rebate = 49.99

HEWLETT PACKARD
Expanding Possibilities

B) DESKJET 612C COLOR INKJET PRINTER

HP's lowest priced inkjet printer ever

Whether it's spectacular photos or elegant type, your projects have to look their best. The HP DeskJet 612C printer makes sure they will.

- Optional photo quality
- 5 ppm black/2.5 ppm color
- Black — 600 x 600 dpi
- Color — 600 x 300 dpi

600-983-413 .... **99.99 (After Rebate**
129.99 - 30.00 Mail-In Rebate = 99.99

Scanners

C) VISIONEER 6100B COLOR SCANNER

36-bit technology at your fingertips

The Visioneer 6100B is the perfect cost-effective scanning solution for the small office or home. You can scan almost any document including photos, business cards, memos, booklets or magazines and lift or remove the top of the scanner to scan thick books or objects.

- 600 x 1200 dpi optical resolution
- Faster results with one pass scan process

600-505-546 .... **69.99 (After Rebate)**
99.99 - 30.00 Mail-In Rebate = 69.99

HEWLETT PACKARD
Expanding Possibilities

D) SCANJET 3200c COLOR SCANNER

The HP ScanJet 3200c is so effortless to use you'll be scanning in minutes. Exclusive HP software guides you through each step to create colorful documents and photos. The high resolution produces clear, non-grainy color photos.

- 600 x 1200 dpi resolution
- Scan photos, text, drawings and more
- Make color copies at your desk

600-121-915 .... **99.99**

Faxes and Color All-In-Ones

brother.

A) PPF-770 PLAIN PAPER FAX MACHINE

Our lowest priced plain paper fax

Step up to a plain paper fax machine from Brother. The PPF-770 gives you all the benefits of plain paper faxing at an affordable price. No more thermal paper rolls or copying your faxes onto plain paper.

- Transmission speed — 6 seconds-per-page
- 48-number speed dial
- Memory stores up to 20 pages

600-336-122 .... 129.99

Panasonic

B) KX-FPW111 2-LINE PLAIN PAPER FAX

Your fax machine has never been more versatile. Two lines allow you to be on call and receive a fax simultaneously or transfer an incoming fax to your fax unit with extension line transfer. You won't miss a beat even with high volumes of incoming faxes.

- 28-page document memory
- Caller ID compatible†
- Auto phone/fax switching, jog dial

600-152-511 .... 179.95

†Caller ID service required from your local telephone company.

Print Scan in COLOR

C
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C) WORKCENTRE 470CX COLOR ALL-IN-ONE

Work faster, easier, and more economically with the all-in-one office partner from Xerox. You get a color printer, fax, personal copier, scanner, and award-winning software. Printer cable included.

- Plain Paper Fax — 6 seconds-per-page, 14.4Kpbs modem, up to 40 pages of memory, 300 x 300 dpi
- Color Printer — 6 ppm black/ 3 ppm color, 1200 x 1200 dpi
- Color Scanner — 300 x 300 dpi
- Copier – 5 cpm black, 600 x 300 dpi

600-994-492 .... 299.99

HEWLETT PACKARD
Expanding Possibilities

OFFICEJET R-SERIES COLOR ALL-IN-ONES

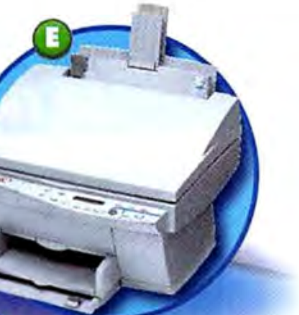
HP's user-friendly PrecisionScan technology makes it easier to scan text, photos, or line art. Versatile flatbed design simplifies copying and scanning books, magazines, or other flat objects. Full-featured digital copying functions eliminate trips to the copy center—even for reductions, enlargements, or color copies.

- Color printer — 8.5 ppm color/11 ppm black, 600 dpi
- Color scanner — 600 x 2400 dpi optical (9600 enhanced)
- Color copier — 600 x 2400 dpi optical black and color
- Photo-quality output with HP PhotoREt II color layering technology

D) R-40 600-189-825................................ 499.99

E) R-60 w/ Auto Document Feeder 600-189-781... 599.99

F) R-80 with Auto Document Feeder and Plain Paper Fax 600-189-816 .... 799.99



Print Copy Scan in COLOR

DVD goes a step Beyond!

Why DVD?

- Improved picture quality over VHS
- CD-quality sound
- Movies available in wide-screen format
- Multiple language options

A
Panasonic
DVD

Panasonic

A) DVD PLAYER WITH REMOTE DVD-A115

Television never looked or sounded so good! The Panasonic DVD system features Advanced Virtual Surround Sound, Hi-Speed Smooth Motion Scan, Outputs for dts® and Dolby Digital® Decoders. 96KHz/24-bit D/A Converter enhances DVD audio performance.

109-641 .... 279.99

B
Photo CD Gallery
DVD

RCA

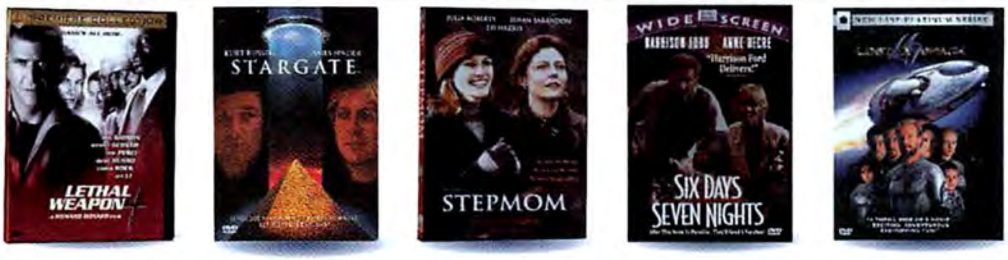
B) DVD PLAYER WITH REMOTE DVD-5220P

The RCA DVD Player 5220P plays movies from CD-size discs and has been designed with an unsurpassed picture quality. It features: 10-bit D/A conversion, high-resolution video performance, 96KHz, 24 bit audio D/A, and dolby digital surround sound. This system includes stereo audio/video cables, S-video connector cable and an AC power cord.

952-777 .... 249.99

5 FREE DVD Movies By Mail

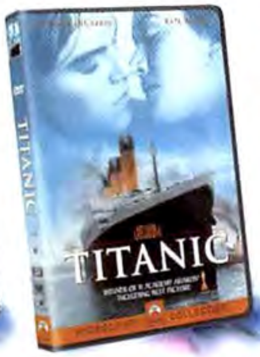
With ANY DVD Player Purchase†...


LETHAL WEAPON 4
STARGATE
STEPMOM
WIDE SCREEN
SIX DAYS SEVEN NIGHTS

†Offer good with the purchase of Philips DVD Player DVD825 (912-151), RCA DVD Player RC5220P (952-777) or Panasonic DVD Player DVD-A115 (109-641). Must include original sales receipt for DVD player and original UPC from DVD player carton. Proof of purchase materials must be received by 1/31/00. See store for details.

...and **13 FREE DVD** Rentals from **Blockbuster®** With **ANY DVD Player** Purchase†

207-111 .... 19.99



175-051 .... 24.99

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SPECIAL EDITION

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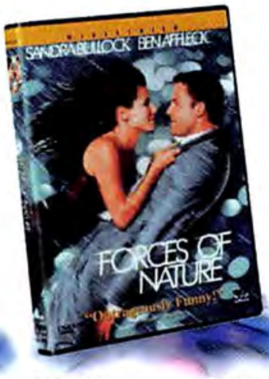
SANDRA BULLOCK BEN AFFLECK
FORCES OF NATURE

207-081 .... 24.99

Office DEPOT®

Digital Photography From Start To Finish!

HEWLETT PACKARD
Expanding Possibilities

A) HP C200 DIGITAL CAMERA

Capture your holiday memories with this HP C200 Digital Camera. It offers 1 megapixel (1152 x 872) resolution, 24-bit color, 2x Digital Zoom, 8MB Compact Flash Photo Memory, and a 1.8" Color Viewfinder.

600-200-831 ....299.99

B) HP PHOTOSMART P1000

HP PhotoSmart digital cameras and printers enable users to capture and print high-quality digital photos directly from their digital cameras, accepting input directly from CompactFlash (Type I and II) cards, as well as from SmartMedia cards, bypassing computers altogether.

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B
Memory Inserts Directly Into Printer
Print Directly From HP C200 Digital Camera

C) HP S20 PHOTOSMART SCANNER

The HP PhotoSmart S20 is the perfect scanner for getting the best image quality from 35-mm slides, film strips, and photos. Easy to use, the S20 scans 35mm negatives at 2400 optical dpi and photos at 300 dpi. S20 software lets you optimize and enhance photos like a real photo lab with automatic or manual adjustment of size, color, exposure and sharpness.

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D) PHOTOSUITE III

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D
PhotoSuite III
Platinum Edition
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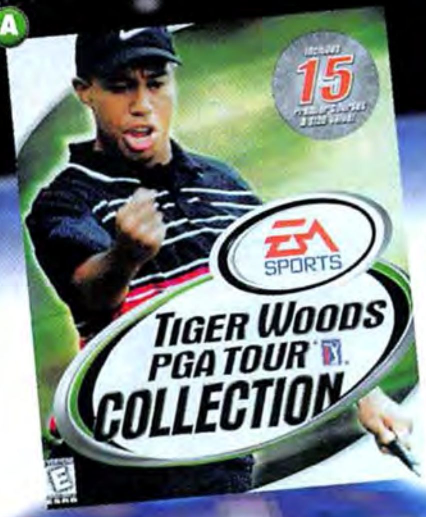
Great Software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EA SPORTS
TIGER WOODS PGA TOUR COLLECTION

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CD-ROM
DEER HUNTER
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REAL AS IT GETS 3D ACTION
WizardWorks OUTDOORS
RP

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LucasArts Entertainment Company Presents
STAR WARS
EPISODE I
THE PHANTOM MENACE
THE ADVENTURE BEGINS

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B) DEER HUNTER 3
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C) STAR WARS EPISODE 1: THE PHANTOM MENACE
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D) WORLD BOOK 2000
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39.99 - 9.99 Instant Rebate - 30.00 Mail-In Rebate = FREE

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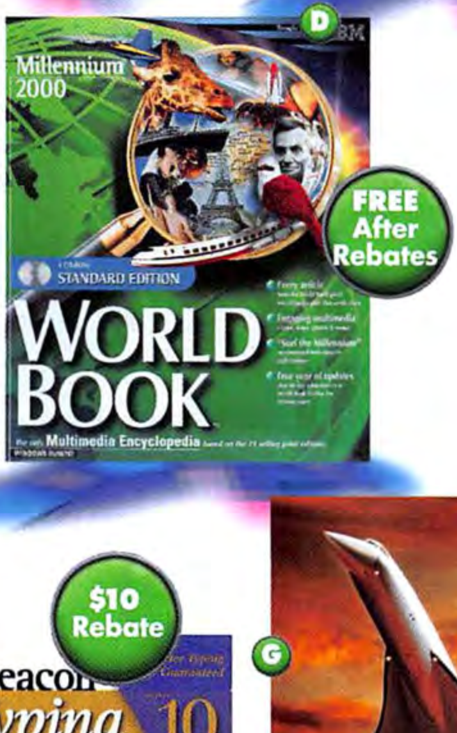
G) MICROSOFT FLIGHT SIMULATOR 2000
222-841 ....49.99


D
IBM
Millennium 2000
STANDARD EDITION
WORLD BOOK
Multimedia Encyclopedia
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E
The Learning Company
NEW! 8.0
Learn To Speak SPANISH
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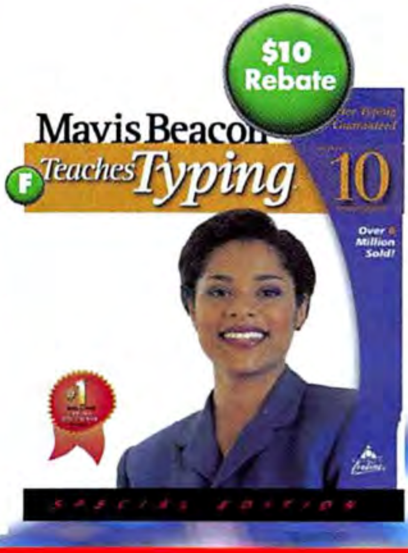
$50 Rebate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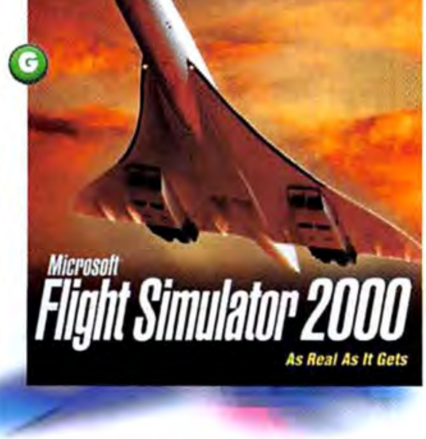
F
Mavis Beacon Teaches Typing
10
Over 6 Million Sold!
SPECIAL EDITION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As Real As It Gets

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$50 Upgrade Mail-In Rebate offer good with purchase Of Microsoft Office 2000 Premium. For existing MS Office users. Proof of ownership required. Offer expires 12/31/99. See box for details.

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Premium
What Productivity Means Today
Upgrade Version

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SYMANTEC
NORTON
2000
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The fast, safe way to identify Y2K threats to your critical applications and data

Is Your PC Ready For Y2K?

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992-975 ....49.99

C) NORTON ANTIVIRUS 2000 6.0
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39.99 - 20.00 Upgrade Mail-In Rebate = 19.99

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$20
Upgrade
Rebate
SYMANTEC
NORTON
AntiVirus2000
VERSION 6.0
The #1 anti-virus software
Automatic Internet and email protection with easy updating

Maximize Your Productivity

D) QUICKEN BASIC 2000
995-776 ....19.95 (After Upgrade Rebate)
29.95 - 10.00 Upgrade Mail-In Rebate = 19.95

$10 Upgrade Mail-In Rebate offer good for current users of Quicken 99 Basic. Proof of ownership required. Offer expires 7/31/00.

E) MS WORKSUITE 2000
223-661 ....99.99

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Balance Checkbook
Pay Bills
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Quicken
2000
Easier Budgeting
Save Time
$10
Upgrade
Rebate

E
Microsoft
Money
ENCARTA
Works
Streets & Trips 2000
Microsoft
Works Suite
2000

Do More With Your Scanner

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968-118 ....54.99

G) MS HOME PUBLISHING SUITE 2000
221-921 ....29.99 (After Rebate)
49.99 - 20.00 Mail-In Rebate = 29.99

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$20
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The World's Most Popular Paper Management Software!
PAPERPORT
DELUXE 6.0

G
Complete Web & Print Publishing Plus Powerful Photo Editing
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Microsoft
Home
Publishing Suite
2000

The Very Latest in Wireless

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MOTOROLA
Message 1 of 1
To: Dad
Finally passing calculus. Send more money.
Done
Reply
Delete
PageWriter 2000X
Stay In Touch With The Office

Introducing The "X"

MOTOROLA
Pagers

A) PAGEWRITER 2000X

Designed for the way you work and live, the Pagewriter 2000X is the most powerful handheld messaging device known! Stay in touch with the office and your family from the palm of your hand. New features like increased memory and an enhanced operating system allow you to receive special information services such as news, local weather, stock market updates and more. The "X" factor - exclusively from Office Depot - includes the Motorola Productivity Pack and Entertainment Pack. Stay organized and play games too!

983-431 .... 389.99

SkyTel
Skywriter Basic Pack $24.95/mo.

MSNBC Bloomberg FORTUNE THE WEATHER CHANNEL weather.com

Sprint.
Sprint PCS℠ The clear alternative to cellular℠.

B
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MOTOROLA
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NEXTEL
AUTHORIZED REPRESENTATIVE

B) MOTOROLA

i500+

- Nextel Direct Connect 2-way radio℠
- Text and numeric paging
- Voice mail
- Multilingual
- No roaming charges

159-181 .... 99.99

Price shown requires in-store service activation. Not available in all stores.

C) MOTOROLA

i1000+

One-touch dialing

- Expandable functionality in a sleek lightweight package
- One touch dialing
- View last 10 numbers received/sent (where Caller ID is available)

995-534 .... 199.99

Price shown requires in-store service activation. Not available in all stores.

D) QUALCOMM 1960

Browse the Internet

- Connect via your laptop
- Data capable (where available)
- Receive information updates
- Data cable required
- Voice mail

209-501 .... 99.99

AT&T

E) NOKIA 8860

Dual band/trimode phone

- Phonebook/calendar/ calculator
- Up to 2 hours talk-time
- Dialed, received and missed call indicator
- Internal Vibra Alert
- Voicemail, Caller ID

Nokia 8860

D
E
NOKIA
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Available in store only.

Office DEPOT.

Communication Tools

MOTOROLA

A) SPIRIT GT+ PROFESSIONAL 2-WAY RADIO

Two channels allow you to communicate with various groups at the same time

- Up to 4-mile range
- Lightweight, compact design
- 38 codes block out unwanted channel chatter
- Operates on frequencies reserved exclusively for business use
- Rechargeable NiMH battery

998-577	199.99

No monthly service fee.

TalkAbout™ 280

MOTOROLA

TWO-WAY FAMILY RADIO

- Up to 2-mile range with 14 channels
- Enhanced scan feature
- Incoming call alert
- 38 privacy codes

B) Maroon 814-409	119.99 (Each)
C) Black 814-427	119.99 (Each)

No monthly service required.

GARMIN®

D) eMAP DELUXE

Includes 8MB datacard and PC Interface Cable

- Powerful 12 parallel channel receiver, differential ready with detailed mapping capability
- 500 user waypoints with name and graphic symbol
- 2000 track log points with TracBack™ feature to quickly retrace tracks without stored waypoints
- Base map (North America) contains: state/country boundaries, lakes, rivers, streams, airports, cities, towns, coastline, state and interstate highways (U.S.A.) and more

210-681	299.99

OREGON SCIENTIFIC

NOAA Weather Radio

E) ALL HAZARDS WEATHER ALERT MONITOR

Automatic activation for emergency broadcasts

- Broadcasts 24-hour local weather forecasts and alerts
- Tunes all 7 NOAA weather radio channels
- Monitors U.S. Emergency Alert System
- Digital clock display and alarm with snooze feature
- AC jack for optional power adapter

904-204	39.99

A
B
C
D
E
SPIRIT GT
TalkAbout
TA280 SLK
emap
GARMIN
OREGON SCIENTIFIC
ALL HAZARDS
NOAA

Available in store only.

Electronic Navigation

Weather Alert

Go Cordless This Season

SIEMENS

2.4GHz TECHNOLOGY

If you need multiple phones in your home, an expandable Siemens Gigaset is the phone for you. As your needs grow, the extra cordless handsets can be added – up to a total of 4 – without the need for additional phone jacks. With two or more Gigaset handsets, you can make handset-to-handset intercom calls even when the outside phone line is in use. Plus, since everything works together, you'll get convenient cordless access to all system features.

- Call Waiting/Caller ID†

A) Seimens Gigaset 2410 207-891..169.99

B) Siemens Gigaset 2415 w/Digital Answering System 207-881 ......199.99

ADDITIONAL CORDLESS HANDSET AND CHARGER

- Easy to install and use
- Room monitor/intercom

C) 915-817 ....129.99 (Each)

EXPANDABLE

up to 4 handsets

SONY

D) 900MHz DIGITAL SPREAD SPECTRUM CORDLESS PHONE

Provides superior range and clarity

- Call Waiting/Caller ID†
- Lighted keypad
- Dual Battery

175-511 ....129.99

VTECH

E) 900MHz DIGITAL CORDLESS PHONE

Enhanced digital audio

- Call Waiting/Caller ID†
- Headset included
- Indicators for extension use, message waiting, out of range and more
- Auto channel search, 20-number speed dial memory

232-011 ....129.99

†Call Waiting/Caller ID service required from your local telephone company.

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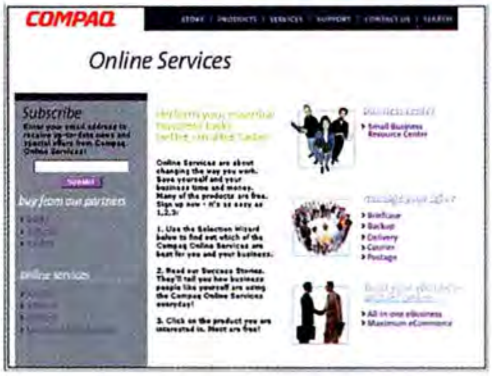

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Small businesses can build vital customer relationships needed to survive with Compaq Online Services' Web-hosted applications. Compaq's Small Business Resource Center—created in partnership with Research Triangle Park, N.C.-based Smart Online Inc.—enables entrepreneurs to start, manage, and grow their businesses online through its tools, resources, market research, and other vital business information services.

"Large businesses have extensive resources and manpower that enable them to easily engage these tools, while small businesses have traditionally had to scrape by," according to Amy Levy, an analyst for Summit Strategies Inc., a Boston-based market strategy and consulting firm. "With Smart Online, Compaq Online Services is providing growing businesses with the tools that are critical to any new business—big or small."

Businesses can use the Resource Center to access information guides with tips for domestic and international business transactions, management techniques, and legal advice. And its community tools—which include expert-hosted discussions, chat, discussion boards, e-mail, calendars, contact management, and file backup—make Compaq Online Services the most comprehensive site for establishing small businesses online. "Compaq Online Services," says Kneko Burney, an analyst for technology research firm Cahners In-Stat Group, Newton, Mass., "has all of the resources to help small and midsize businesses leverage the power of the Internet."

"Compaq Online Services has all of the resources to help small and midsize businesses leverage the power of the Internet."
Kneko Burney, analyst, Cahners In-Stat Group

Big Tools for Small Businesses

When Kerry Strike of Breteche Creek Ranch needed to differentiate the ranch's Web site from other ranch Web sites, Kerry chose Bigstep.com's eBusiness services. Without calling on Web masters and designers, Kerry quickly created a site that could be easily managed. "Our programs change seasonally, so I need constant access to the site," Strike says. This service "allows me to make alterations instead of continuing to pay a designer. I can change images whenever I want, and alter them to enhance what I've created with the templates."

San Francisco-based Bigstep.com and Compaq Computer Corporation recently forged a partnership to provide free eBusiness services to Compaq customers. The All-in-One eBusiness offering includes Web site building, hosting, and other programs—most of them free—to Compaq Online Services, available at the Compaq Online Services Web site. Small and midsize companies can build their business without requiring any HTML knowledge through simple, self-guided activities beginning with Web site creation and including catalog building, e-commerce, marketing, communications, and reporting capabilities.

All-in-One eBusiness also takes the hassle and high prices out of e-commerce-enabling a new e-business Web site. As part of the service, Cardservice International Inc. provides online merchant accounts at highly competitive rates. These partners "have done all of the things I couldn't do myself," says Andrew Wright, co-producer and director of the Emmy award-winning children's video, *The Teddy Bear Factory*. (Wright's San Francisco-based company, Premier Images, markets its videos on the Web.) "I don't have to negotiate for an online merchant account. I don't have to create a product catalog. They've done all that for me."

Compaq Online Services are dynamic services that help small and medium-sized businesses use the Internet as a tool to conduct business operations better, smarter, and faster.

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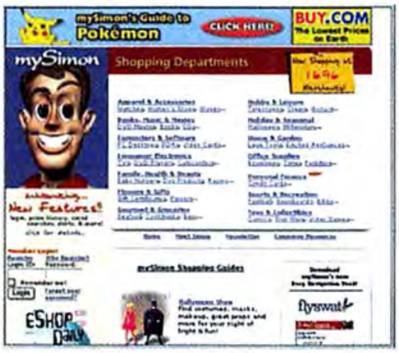
COMPAQ

mySimon: Ruling the "Shop-bot" Roost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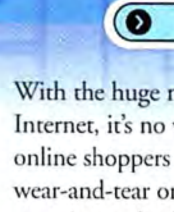
With the huge number of Web retailers crowding the Internet, it's no wonder that today's immediacy-addicted online shoppers are turning to portal-style sites to reduce wear-and-tear on their clicking fingers. After all, such sites promise to eliminate a lot of inefficient cruising while ensuring shoppers of the best buys available.



So how do you differentiate yourself in the battle for purchase-ready eyeballs?

Ask the people at Santa Clara, Calif.-based mySimon inc., and they'll tell you that it takes three ingredients: the right business model, superior technology, and a keen sense of what online buyers are really looking for.

"We give shoppers what they want: a complete shopping destination that lets them shop the way they do in the physical world, but in a fraction of the time," says mySimon CEO Josh Goldman.

According to Goldman, that means being able to compare deals on more than just price. "Other sites just give you the numbers," he notes. "We give you the other information that typically affects the decision to purchase from one source or another — how soon the retailer can ship it, what their return policy is, whether the product was made in the USA, or whatever else is part of that merchant's value proposition."

The rich content of mySimon.com also includes guides to hot product categories, personalized shopping histories, and ongoing price tracking. In addition, the site provides links to a wide range of consumer and merchant information resources.

> **"The bigger the Web gets, the more buyers and sellers are going to need aggregation services like ours."**
> Josh Goldman, CEO, mySimon inc.

Model of Independence

But mySimon's biggest competitive advantage is the sheer number of retail and auction sites it collects its information from — over 1600 at last count. That's a far greater selection than the two or three hundred most other comparison sites offer.

One reason mySimon can connect shoppers with so many supplier sites is its business model. The company is independent, so it doesn't have the close contractual relationships that bind other "shop-bots" to their parent company's strategic partners. More importantly, mySimon doesn't restrict itself only to those merchants with whom it has a partnering agreement. Merchants who want to participate in mySimon's special program can ante up to do so, but mySimon continues to add sites whether or not they "pay to play."

"Our revenue isn't dependent on big-ticket deals with a limited number of partners," says Goldman. "We can just keep signing on more merchants and delivering more value to the customer."

Technology also plays a big role in mySimon's ability to grow its merchant base. MySimon has patents pending for a variety of parallel search and artificial intelligence techniques. By using these proprietary tools, mySimon can rapidly incorporate new merchants' Web content into the site — including active bidding prices from real-time Web auctions — and present it in a way that's easy for users to understand. And with one click, they can get right to the merchant's "BUY" button.

"The bigger the Web gets, the more buyers and sellers are going to need aggregation services like ours," observes Goldman. "So we're very bullish about what the future holds for us."

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Crucial Technology: Meeting the RAM Needs of Netizens

www.crucial.com

Desktop technology never stands still. Neither do the needs and desires of the 'Net-connected users. That's why PC upgrades—especially additional RAM—have become an essential aspect of Netizenship.

So where can you go on the Web to find the best deals on quality RAM?

Micron Technology division Crucial Technology, Meridian, Idaho, believes it has the answer. The company's Web site, http://www.crucial.com, is the only place on the Web where consumers can buy DRAM upgrades for their PCs directly from the manufacturer. In fact, Micron is the largest DRAM manufacturer in the country and one of the top three in the world. In addition to providing memory modules for their own highly respected brand, Micron Technology is also a top supplier for other industry leaders, including Compaq, Dell, Gateway, HP, and IBM.

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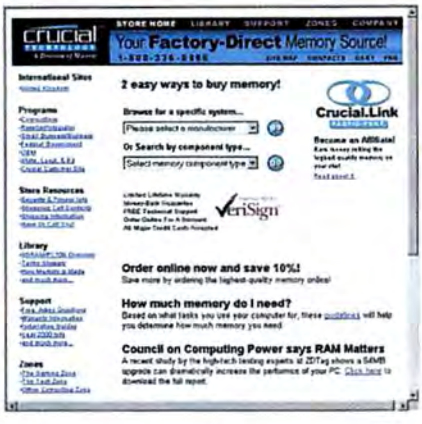
That makes Crucial a very different source from the typical reseller operation, which either slaps someone else's chip on a board, or simply re-labels preassembled modules with their own logo.

"With our approach, the customer is assured of getting the same quality as the PC manufacturers themselves demand," states Rafe VanDenBerg, Crucial marketing director. "That's something you can't find anywhere else on the Web."

VanDenBerg points out that such quality has become increasingly critical as processor speeds increase, since manufacturing tolerances have become proportionally tighter. "The new chipsets and processors have critical timing and circuit requirements that mandate precision manufacturing and design," he observes. "Since Micron works directly with the top PC manufacturers, we can assure our customers that our upgrades match the exacting specifications they need to boost their system performance."

> **"With our approach, the customer is assured of getting the same quality as the PC manufacturers themselves demand."**
> Rafe VanDenBerg, marketing director, Crucial Technology



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How much memory do I need?

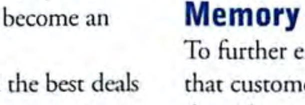
Based on what tasks you use your computer for, these guidelines will help you determine how much memory you need

Council on Computing Power says RAM Matters

A recent study by the high-tech testing experts at ZDTag shows a 64MB upgrade can dramatically increase the perfomance of your PC. Click here to download the full report.

A Guide to Memory

To further ensure that customers get the right memory upgrade for their needs, Crucial's site provides even the novice users all the information they need to know about memory and upgrading their systems. The site is most notable for its unique Memory Selector, which guides customers through a simple step-by-step interface to find the exact memory they need for nearly 8,000 different desktops, notebooks, servers, printers, and routers. The site also provides a complete reference library on memory technology, manufacturing processes, and upgrade considerations. "We've really created one of the most informative and comprehensive sites on the Web related to memory," declares VanDenBerg. "Even if you're not buying from us, it's a very educational place to browse."



In addition to maintaining its full-function Web site, Crucial—which has been selling online since 1996—offers toll-free phone, fax, and e-mail ordering. Same-day shipping and overnight delivery are also available. Consumers get free technical support and a limited lifetime warranty on all products, as well as a full 30-day money back guarantee.

Just as important as the quality and service Crucial offers are its discounts for ordering online. Consumers can now save an additional 10% by ordering through Crucial.com. Crucial also provides additional value to its enterprise customers through its online purchase programs.

"With memory pricing increasing, our online discounts provide an even greater savings opportunity for our customers," says VanDenBerg. "And the more business we conduct online, the more savings we'll be able to pass on to our customers."

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Buy your memory direct from one of the largest memory manufacturers in the world. Performance, reliability, selection *and* factory direct savings — Crucial Technology, a division of Micron.

"Thanks for a quality product at a great price. Everything is working with a noticeable increase in speed, and the price was a full 50% off the price from the OEM. You definitely have a winning web site for memory upgrade purchases!"

Roy Turnbull, Principal Engineer

Illustration by Jeremy Devine

Compare the Savings . . .

64MB Upgrades		
Compaq	Kingston	**Crucial**
Presario 5070	$286.00	143.99
Presario 1255 Laptop	$286.00	148.49
Micron Electronics	Kingston	**Crucial**
Millennia 400	$286.00	141.29
Millennia MME P200	$286.00	141.29
ClientPro VXE 200/233	$286.00	143.99
TransPort Trek2 Series	$286.00	148.49
Gateway	Kingston	**Crucial**
G6-300	$286.00	141.29
P5-200	$314.00	152.99
GP6-300	$286.00	141.29
IBM	Kingston	**Crucial**
Aptiva (2140)	$286.00	141.29
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PC 300PL (6892-50U)	$286.00	143.99
HP	Kingston	**Crucial**
BRIO 8338	$286.00	141.29
Vectra VL Series 8	$286.00	143.99
Apple	Kingston	**Crucial**
iMAC	$286.00	148.49
Power Mac 6500 Series	$222.00	161.99
Power Mac G3	$286.00	141.29
Power Mac G3 PC100	$286.00	143.99

Crucial prices reflect an automatic 10% discount for ordering online. Prices were taken from Crucial and Kingston Web sites on 10/11/99, however, they can (and do) change daily. Prices may vary according to specific system requirement.

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Inetcam: Unparalleled Streaming Video for the Web

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Bob Pullman knows a thing or two about Internet video software. As a Webcasting pioneer, Pullman first incorporated video into his company's Web site by making images captured on a hilltop in Renton, Wash., available to viewers via FTP. In those early days, he recalls, "we were limited to uploading the camera images to the server every 60 seconds."

Even today, Pullman says, "many applications for streaming video are too undependable for the money." There is one package, however, that Pullman likes: "Inetcam will do for streaming video what Ford did for automobiles," he says, "by providing high-quality streaming video at a low price."

> **"Inetcam will do for streaming video what Ford did for automobiles, by providing high-quality streaming video at a low price."**
> Bob Pullman, Pullman Inc.

Pullman calls Inetcam "the cleanest-looking software I have seen in the past 10 years. It gives me a better picture than other systems, at a fraction of the price." Today, his electronic publishing company, Pullman Inc., uses Inetcam to stream live video over the Internet from each of its four regional e-zine sites in Renton, Covington, Kentucky, Victoria, B.C., and Kingston, Jamaica.

INETCAM
Live...From Anywhere!

Inetcam, from San Diego-based Inetcam Inc., is a system that can stream video to any viewer on the Internet. Inetcam offers two complete, turnkey systems for transmitting live video from as many as four sources. Inetcam's VTS 4001 system includes the Inetcam server software, 4-Port Video Switcher, transformer, and a black-and-white camera. For full color and audio capabilities, you can opt for Inetcam's VTS 8001 package, which includes Inetcam's 4-Port Video/Audio Switcher and a color camera. The Inetcam server software—which runs on Windows 95, 98, and NT platforms—sends video to your viewers without the need for plug-ins or remote viewing software.

Unlike ordinary digital cameras, Inetcam's cameras can be set up hundreds of yards away from the host without losing image quality. This makes Inetcam more useful for event coverage or security applications. For example, Inetcam can emulate standard security video switching system functionality: It lets you view four attached video sources on one screen simultaneously, or periodically switch between active video sources.

Adjustable Features

"But the real beauty of Inetcam," Pullman says, "is that it supports video in three formats: Java, JPEG, and FTP." To stream live video from your Web site, you can embed both Inetcam's Java applets and "push JPEG" images into your Web pages, or upload them from any "Video for Windows" compatible camera or video grabbers via FTP. Viewers can adjust virtually all aspects of the images they receive, from brightness and contrast to saturation and compression levels.

Inetcam's Java applets run seamlessly on virtually any operating system, including Macintosh and Unix. Viewers need only a standard, Java-compatible Internet browser—such as Microsoft Internet Explorer or Netscape Navigator—to directly view streaming video from your site. "I tried several Web camera systems but they were all very heavy with viewing software and larger applets," says Eric Goiset, a Web site developer based in Montreal. "Inetcam's Java applets, on the other hand, are very light. It's one of the reasons I think Inetcam is the best streaming video package I have seen."

Live...from Anywhere!

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INETCAM is... A complete turnkey system of live video transmission over the Internet. There is nothing else like it! **INETCAM** requires *no* camera operator, *no* videotape, and *no* two-way software. Cameras can be set up hundreds of yards away from the host computer, and the video stream can be viewed *live* from any Web-accessible device – PC, Mac, Unix workstation ... even an LCD phone.

INETCAM systems include everything you need to start broadcasting, and a whole range of customizing accessories is also available. There is no limit to the number of cameras that can be attached to the system. Inetcam software is also available separately and can be purchased on-line at **www.inetcam.com**.

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INETCAM™

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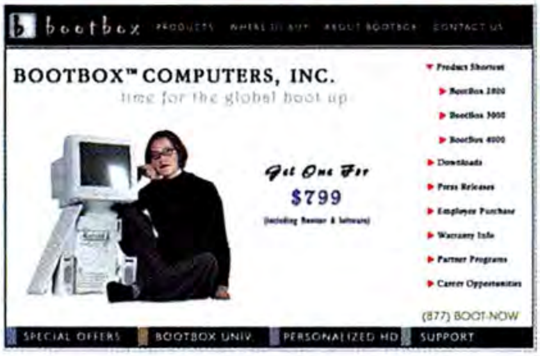
Do you seek a powerful computing experience for under $1,000? BootBox™ Computers Inc. sells complete, upgradeable systems with high-quality components—all at unbeatable prices. BootBox's computers, according to company CEO Joshua Feinstein, are ready to go right out of the box. "We want to make the consumer feel good about buying a low-cost PC," says Feinstein.

Most of the other low-cost computer systems that are on the market for consumers today are proprietary, Feinstein says. This holds true even more for the world of ultra-low-cost computing. Systems from many other companies do not include monitors, network cards, or robust processors. But each BootBox system ships with a 15-inch Samsung Sam*Tron 55E monitor and a 10/100 network interface card for use with a cable modem, asymmetric digital subscriber line (ADSL), or home/office networking.

Each of BootBox's base systems also sports an Intel processor, 56Kbps v.90 internal modem, 32-bit sound card and speakers, 8MB of AGP video, 42X CD-ROM drive, a PS/2 keyboard and mouse, and Microsoft Windows 98 SE installed. Each system also comes with 618 software titles, including the award-winning *Ability Office Suite 98, 1999 Webster's Multi-Media Encyclopedia, Kids Typing, Print Master, Animal Kingdom,* and 600 shareware and freeware games, applications, and utilities. And each BootBox comes with a free, Web-based e-mail account.

The BootBox 2000 system features a 400MHz Intel Celeron processor, 32MB of RAM, and 8.4GB of hard disk space—all for $799. BootBox's mid-level system, the BootBox 3000, has a 433MHz Intel Celeron processor, 64MB of RAM, and 10.2GB of hard disk space, and costs $899. And power users take notice: The BootBox 4000 boasts an Intel Celeron 466MHz processor, 128MB RAM, 13.1GB of hard disk space, and costs only $1,049. For the *GO DIRECT! For The Holidays!* Program, BootBox Computers Inc. is only releasing the BootBox 2000 configuration. After December 31, 1999, consumers will be able to purchase the entire line of BootBox computers.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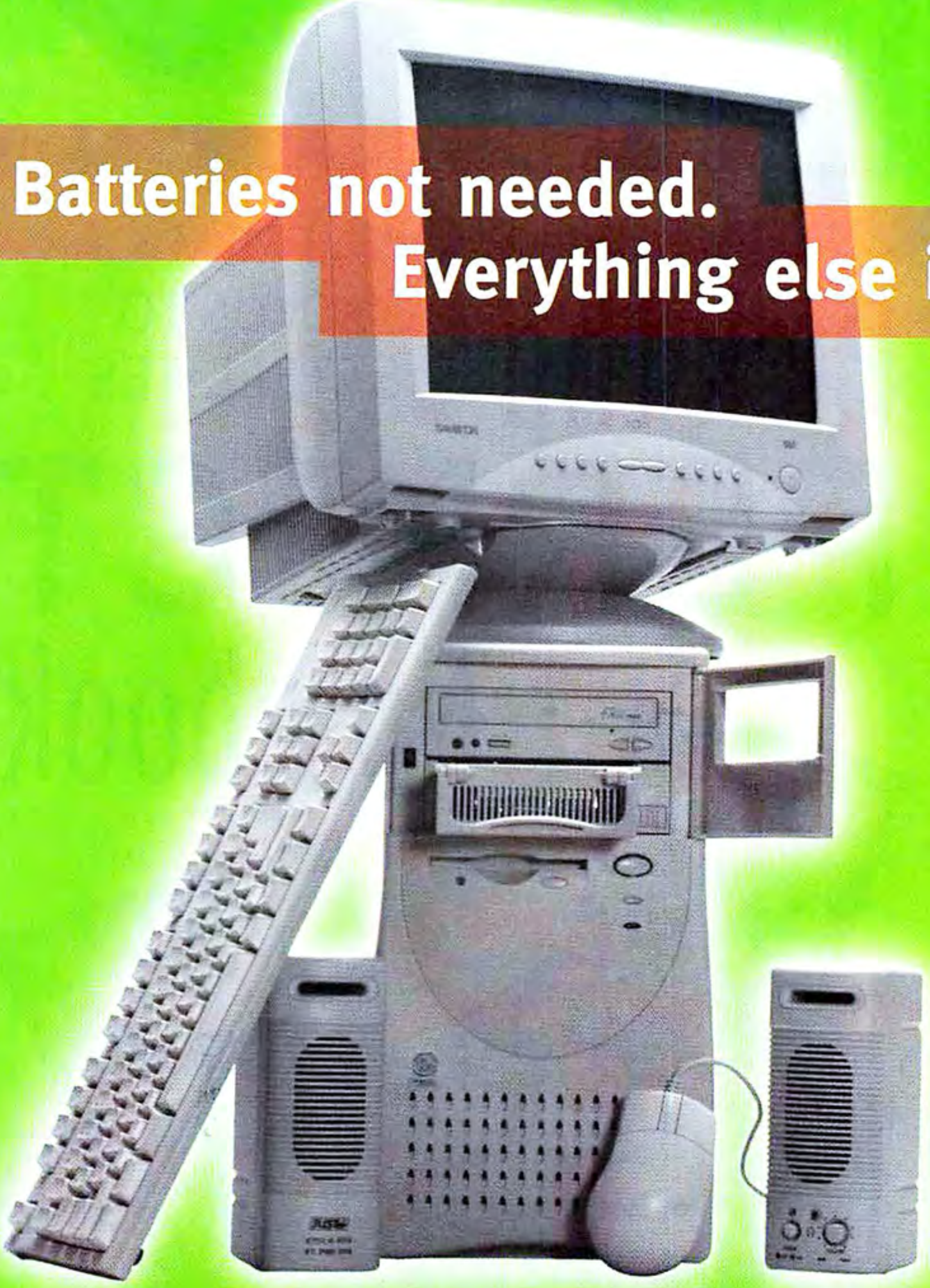

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PC WORLD

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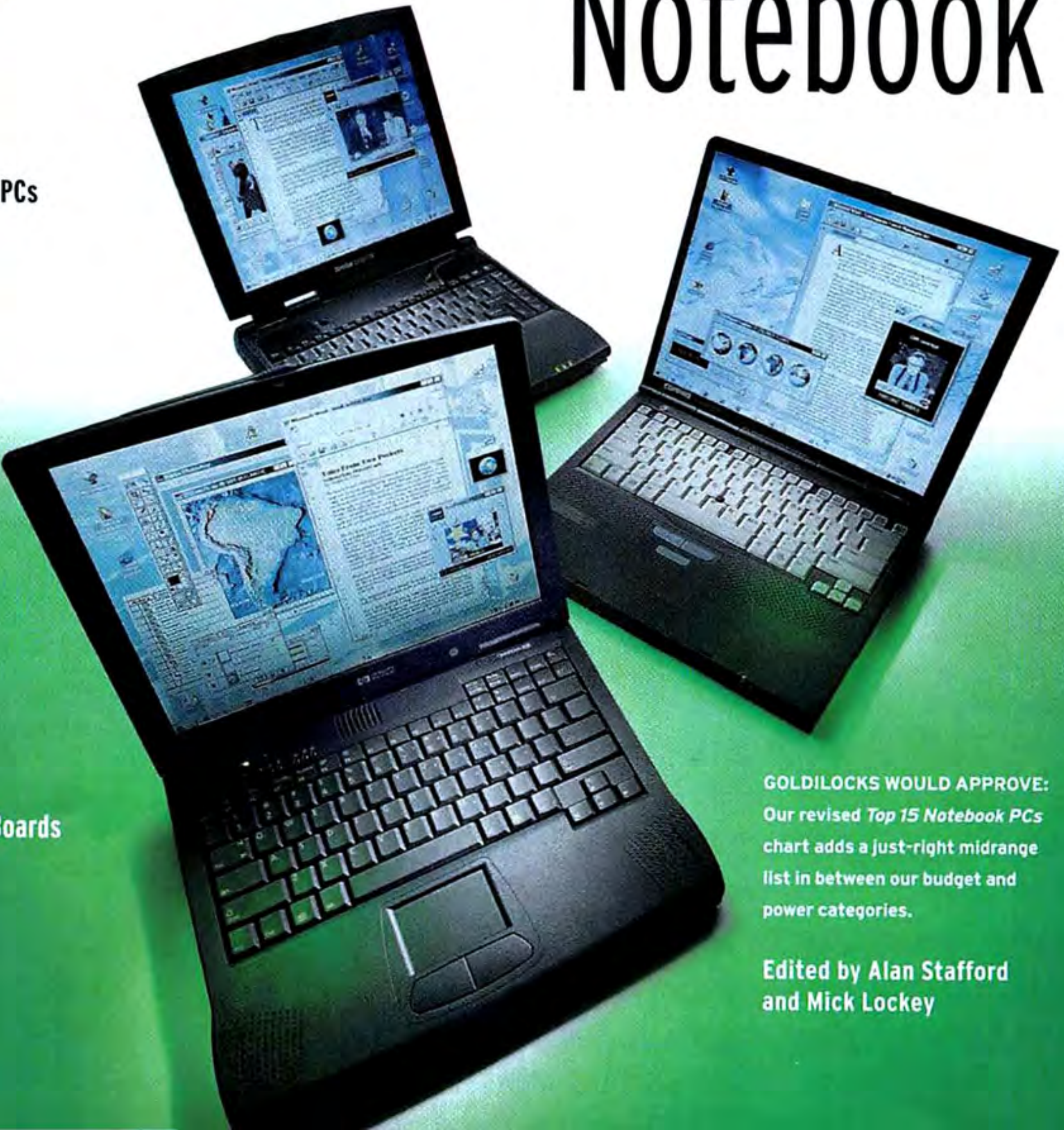


GOLDILOCKS WOULD APPROVE: Our revised *Top 15 Notebook PCs* chart adds a just-right midrange list in between our budget and power categories.

Edited by Alan Stafford and Mick Lockey

FOR MOST OF US, purchasing the right PC involves a tough negotiation between what we want—scorching speed and tons of features—and the cash we're willing to shell out. That's especially true with notebook PCs, where having it all comes at an agonizingly high price. We often end up with a compromise, something between a power notebook and a bare-bones budget model. With this in mind, and taking a cue from our work PC charts, we've added a midrange notebook section. It covers laptops costing $1700 to $2699, a price range that accounts for the bulk of notebook purchases. The typical portable in this group has a 13.3-inch screen, a 6MB hard drive, 64MB of RAM, and a basic CD-ROM drive. No 15-inch displays—yet.

If price is no object, consider Gateway's impressive new Solo 9300LS laptop, which at $3374 packs a Pentium II-400 CPU, a 15-inch screen, and a jack for connecting a Dolby Surround Sound stereo system. A less costly alternative is Hewlett-Packard's OmniBook XE2. Debuting at number four on the new midrange list, the XE2 is a PII-366 system with a 13.3-inch screen and a friendly $2399 price. If your company's not footing the bill but you still need a solid system, check out Toshiba's Satellite 2595CDS, ranked number one in the budget category. It costs just $1499 yet finds room for a Celeron-400 chip and a 13.1-inch screen.

POINT YOUR browser to www.pcworld.com/top400 for late-breaking reviews of desktop computers. In PC World Online's Top 400 section, you'll find comprehensive reviews and ratings for products in 16 categories. You'll also find reviews that are not available in print.

FOR THIS month's coverage of the top 15 home computers and the 10 best color ink jet printers, check out our "Ultimate Buyers Guides" on page 158 and page 181, respectively.

ATHLON INSIDE?

OVER THE PAST couple of years, AMD has made significant inroads into the budget desktop PC market with its K6, K6-2, and K6-III processors. AMD's latest chip, the Athlon, takes on the performance PC market, where speed takes precedence over price. But are computer makers ready to use this faster-than-Pentium processor?

IBM and Compaq tell us they will offer both chip brands. Brian Dalgetty, director of product marketing for IBM's consumer division, says IBM is very positive about the Athlon and notes that Big Blue offers six machines based on it. "We want to have the highest quality solutions at the best price," Dalgetty says. "Sometimes it's Intel; sometimes it's AMD."

Hewlett-Packard spokesperson Ray Aldrich tells us that HP has been using AMD's K6-2 chips for more than a year, and that eventually the company will employ Athlons. "We want to make sure [AMD] can supply us with the quantity we need," Aldrich says.

In contrast, Dell, Gateway, and Micron inform us that they are sticking with Intel processors. Dell's Maria Krinsky states, "At this time, we have no plans to offer systems with the Athlon chip," but says that Dell is always evaluating its options.

Whereas the big dogs may be slow to adopt the Athlon, scrappier hounds are ready to play. Tom Beardmore, online evangelist for IDot.com, explains, "No knocks against Intel, but this time AMD really did its job. If you're buying this caliber of processor, you're buying it for speed. Our systems are geared for speed, speed, and nothing but speed."

RAM PRICES ROCKING

THE EARTHQUAKE that hit Taiwan in late September dealt a devastating blow to the country's economy, and its ripple effect has hit our desktop PC charts. Though only a fraction of the world's DRAM is manufactured in Taiwan, the production shutdown accelerated already rising RAM prices. As a result, several system manufacturers have raised prices of their PCs.

Prices of systems listed here were accurate in early September but may fluctuate until RAM prices stabilize. —*Joel Strauch*

Joel Strauch is a freelance writer based in the San Francisco Bay Area. Grace Aquino, Andrew Brandt, Michelle Campanale-Surkan, Mick Lockey, Kalai Murugesan, and Alan Stafford contributed to the Top 100 *this month. Testing was done by Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, and Nancy Miller of the PC World Test Center. See page 14 for contact information.* ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following information should answer most of them.

How do the charts work? Each month we test a large number of PCs, printers, scanners, monitors, graphics boards, and modems, and compare them with previously reviewed products. Only the best products land on the Top 10 charts, which are refreshed monthly. System configurations are shown as tested. Vendors may have since changed components.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 70s is above average.

What does the PC WorldBench 98 score mean? It's a measure of how fast a PC can run a mix of common business applications as compared to our baseline machine, a Gateway PMMX-200 configured with 32MB of RAM, a 2GB hard drive, and 512KB of secondary cache. A PC that scores 200, for instance, is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.

PHOTOGRAPH: MARC SIMON

TOP 10 POWER PCs

	SYSTEM: $2000 AND OVER	Month tested	★ Overall rating	Street price (9/10/99)	PC WorldBench 98 performance score [1] Faster ▶	Base configuration [2]
1	**Dell Dimension XPS T600** 800/388-8542 www.dell.com	Nov 99	90	**Average:** $2384	Very good 323	**Very good:** Pentium III-600, 128MB of RAM, 512KB L2 cache, 20.4GB hard drive, midsize tower case, Windows NT 4.0
2	**Compaq Prosignia Desktop 330** 800/345-1518 www.compaq.com	Sept 99	85	**Inexpensive:** $2161	Good 246	**Very good:** Pentium III-550, 128MB of RAM, 512KB L2 cache, 18GB hard drive, midsize tower case, Windows 98
3	Dell OptiPlex GX1p 550 800/388-8542 www.dell.com	Nov 99	85	**Inexpensive:** $2185	Good 305	**Very good:** Pentium III-550, 128MB of RAM, 512KB L2 cache, 20GB hard drive, midsize tower case, Windows NT 4.0
4	Quantex SM600 SE 800/896-4898 www.quantex.com	Nov 99	84	**Very inexpensive:** $2099	Very good 260	**Very good:** Pentium III-600, 128MB of RAM, 512KB L2 cache, 18GB hard drive, midsize tower case, Windows 98
5	Sys Performance 600A 800/613-9963 www.sys.com	Nov 99	83	**Average:** $2399	Outstanding 345	**Very good:** AMD Athlon-600, 128MB of RAM, 512KB L2 cache, two 9.1GB hard drives, midsize tower case, Windows NT 4.0
6	Axis Systems Orion 100A DVD 800/378-9014 www.axissys.com	NEW	81	**Inexpensive:** $2207	Good 241	**Very good:** Pentium III-550, 256MB of RAM, 512KB L2 cache, 22GB hard drive, midsize tower case, Windows 98 SE
7	CyberMax Enthusiast PIII-600N 800/437-4596 www.cybermaxpc.com	NEW	79	**Average:** $2299	Very good 252	**Very good:** Pentium III-600, 128MB of RAM, 512KB L2 cache, 18GB hard drive, midsize tower case, Windows 98 SE
8	NexTrend NexStar-550 877/833-8833 www.nextrendpc.com	Nov 99	77	**Inexpensive:** $2199	Good 249	**Very good:** Pentium III-550, 128MB of RAM, 512KB L2 cache, 22GB hard drive, midsize tower case, Windows 98
9	Polywell Poly 800K7-650 800/999-1278 www.polywell.com	NEW	76	**Average:** $2550	Outstanding 277	**Very good:** AMD Athlon-650, 128MB of RAM, 512KB L2 cache, 22GB hard drive, midsize tower case, Windows 98 SE
10	IBM PC 300PL 800/426-7255 www.ibm.com/pc	Aug 99	76	**Average:** $2359	Good 232	**Good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, midsize tower case, Windows 98
	Best Buy	Percent of overall rating ▶		Price: 15 percent	Performance: 20 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 267.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] For more information about all of the products listed i this table, select number 904 on the product information card or visit www.pcworld.com/productinfo.

THREE PENTIUM III-600 systems, including CyberMax's new Enthusiast PIII-600N, make this month's power list. But Intel had better watch its back. Joining an Athlon-600 PC on the Top 10 is the new Athlon-650–based Polywell Poly 800K7-650, which charges onto the chart by virtue of pure speed.

1 DELL DIMENSION XPS T600

WHAT'S HOT: The Dimension XPS T600 earned a PC WorldBench 98 score of 323, making it one of the fastest Windows NT boxes to pass through our labs. The T600 offers both a CD-Rewritable drive and an Iomega Zip 100 drive, and it comes network ready with a 3Com network card. The extremely flat Dell UltraScan P780 Trinitron screen displays sharp text and images.

WHAT'S NOT: Case design and interior layout could be better: The case's side panel, secured by thumbscrews and squeeze latches, requires fiddling to remove or replace correctly. Inside, some long cables partially block access to the RAM and expansion slots. The sound quality of the Altec Lansing ACS340 subwoofer-and-satellite system is merely adequate.

WHAT ELSE: Dell's thorough documentation includes a well-organized user manual and excellent online help. Color-coded ports and matching cables make setup a breeze. Dell's QuietKey keyboard and the Microsoft IntelliMouse are quiet and easy to work with. The PC ships with Microsoft Office 2000 Small Business Edition.

BEST USE: The T600 makes a solid, powerful centerpiece for any small office.

2 COMPAQ PROSIGNIA DESKTOP 330

WHAT'S HOT: A score of 246 on our PC WorldBench 98 tests is a little above average for a PIII-550 machine running Windows 98. The system includes great multimedia extras: an Iomega Zip 250 drive, a Diamond NVidia Vanta graphics board, and a Sound Blaster Live card. The 19-inch Compaq S900 monitor offers impressive display quality: Text and images remain crisp even at 1600 by 1200 resolution.

WHAT'S NOT: Some front bezel pieces—the floppy drive faceplate and the eject button, especially—were loose on the unit we saw. Along with one open drive bay, you'll find just one free ISA, one open PCI, and one open combination slot inside.

WHAT ELSE: The Prosignia Desktop 330 ships with Microsoft Office 97 Small Business Edition and Norton AntiVirus Deluxe software and a vast 18GB hard drive

Extra features	Design and expandability	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [3]
Very good: Diamond Viper V770 graphics board with 32MB of SDRAM, 17-inch monitor, 2X CD-RW drive, V.90 modem, network card, Iomega Zip 100 drive	**Good:** network ready, flat-screen monitor; 3 open drive bays, 3 open slots	**Outstanding**	**Good/ Good**	24/7, toll-free	3/1	–
Good: Diamond NVidia Vanta graphics board with 16MB of SDRAM, 19-inch monitor, 12X-52X CD-ROM drive, V.90 modem, Iomega Zip 250 drive	**Very good:** easy-on-the-eyes monitor; 1 open drive bay, 3 open slots	**Fair**	**Fair/ Good**	24/7, toll-free	3/1	645
Good: STB NVidia TNT graphics board with 16MB of SDRAM, 17-inch monitor, 17X-40X CD-ROM drive, network card	**Good:** can detect chassis intrusion; 2 open drive bays, 6 open slots	**Outstanding**	**Good/ Outstanding**	24/7, toll-free	3/3	–
Very good: NVidia RIVA TNT2 Ultra graphics board with 32MB of SDRAM, 19-inch monitor, 6X DVD-ROM drive, V.90 modem, network card	**Good:** well laid out interior; 6 open drive bays, 4 open slots	**Good** [4]	**Good** [4]**/ Good**	24/7, toll-free	3/1	646
Outstanding: Matrox Millennium G400 DH graphics board with 32MB of SGRAM, 17-inch monitor, 17X-40X CD-ROM drive, network card, UltraDMA RAID card	**Good:** impressive fit and finish; 4 open drive bays, 3 open slots	[4]	**Fair** [4]**/ Good**	24/7,[5] toll-free	Varies [6]/5	647
Outstanding: Diamond Viper V770 graphics board with 32MB of SDRAM, 19-inch monitor, 6X DVD-ROM drive, 4X CD-RW drive, V.90 modem, Iomega Zip 100 drive	**Very good:** big, sharp monitor; 2 open drive bays, 4 open slots	[4]	**Good** [4]**/ Outstanding**	24/7, toll-free	3/3	648
Very good: 3dfx Voodoo3 3000 AGP graphics board with 16MB of SDRAM, 21-inch monitor, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Good:** well-designed interior; 5 open drive bays, 4 open slots	**Fair** [4]	**Good** [4]**/ Good**	24/7, toll-free	3/1	649
Very good: Diamond Viper V770 graphics board with 32MB of SDRAM, 17-inch monitor, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Good:** tool-less, though cryptic, case removal; 1 open drive bay, 2 open slots	[4]	**Poor** [4]**/ Good**	24/7, toll-free	3/3	650
Very good: Diamond Viper V770 graphics board with 16MB of SDRAM, 19-inch monitor, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Good:** case comes off easily without tools; 3 open drive bays, 4 open slots	[4]	**Fair** [4]**/ Fair**	24/7,[7] toll-free	3/5	651
Very good: 3dfx Voodoo3 2000 graphics board with 16MB of SDRAM, 19-inch monitor, 17X-40X CD-ROM drive, network card, Iomega Zip 100 drive	**Satisfactory:** network ready; 2 open drive bays, 5 open slots	**Good**	**Good/ Good**	24/7, toll-free	3/1	–
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[5] Reduced to 9 hours on weekdays after the first year.

[6] Six years on CPU and main RAM, three years on other parts.

[7] Reduced to 10 hours on weekdays, 4 hours on Saturday after the first year.

that will hold them—and just about anything else you want to install. The solidly constructed keyboard is a pleasure to use. **BEST USE:** The Prosignia hits the target for small-business users who won't settle for inferior, integrated components.

3 DELL OPTIPLEX GX1P 550

WHAT'S HOT: The OptiPlex is tops in case design. A button on the front of the PC releases the side panel, which swings up and off. A removable daughterboard chassis at the bottom of the tower contains the system's expansion slots, and the power supply rotates up and out of the way to provide access to RAM slots. The GX1p 550's PC WorldBench 98 score of 305 is slightly above average for a PIII-550 system running Windows NT. The STB NVidia TNT graphics card also packs loads of power, and images on the Dell M770MM display look sharp at all resolutions.

WHAT'S NOT: Unlike the online help, the hard-copy manual lists only basic system info. The speakers, mounted on the display, sound thin and brassy, though you can control volume with a wheel built into the monitor's side.

WHAT ELSE: A button wired to the motherboard and located under the side panel detects chassis intrusion. The Microsoft keyboard is comfortable, once you get used to the ergonomic design. There's no removable storage beyond the floppy drive, but expansion room is plentiful.

BEST USE: The OptiPlex is an ideal workstation for power users, especially if easy interior access is crucial.

WHO GOES THERE?
A button under the Dell OptiPlex GX1p 550's side panel detects panel removal.

4 QUANTEX SM600 SE

WHAT'S HOT: Achieving a PC WorldBench 98 score of 260, the Quantex whizzed through our benchmark tests as the fastest Pentium III system we've tested running Windows 98. It comes fully loaded at an attractive price, with lots of RAM and hard disk space, a DVD-ROM drive, and an NVidia RIVA TNT2 Ultra video card that can handle MPEG decoding. The Altec Lansing ADA 305W satellite-and-subwoofer system supports Dolby ProLogic Surround Sound controlled via a USB cable, and the combo makes ▶

PHOTOGRAPHS: KEN SMITH

both music and movies sound great. The case interior is spacious and well laid out—all cables are tucked out of the way, and components are easy to access.

WHAT'S NOT: Technically, you don't need tools to open the case, but three thumbscrews plus an old-school, all-metal wraparound enclosure don't facilitate entry. Labels for the rear ports are inconveniently located on a separate diagram pad.

WHAT ELSE: The clear documentation includes a helpful setup poster, but no hardcopy software manuals. Although the DiamondTron monitor yielded razor-sharp text in our tests, colors looked slightly faded and we noticed a dark patch in the lower left corner. The system offers three open internal and three open external drive bays, but it has few options for additional adapter cards, with only one free PCI slot and three open ISA slots (three PCI slots are filled with a modem, a network card, and a sound card).

BEST USE: The SM600 SE would make a solid addition to just about any office.

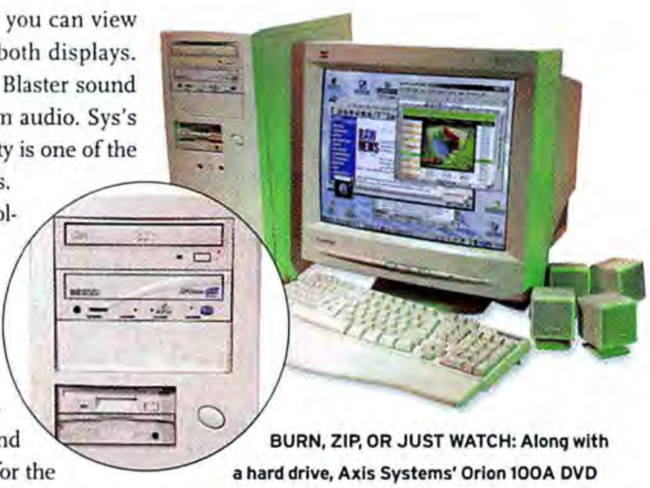
5 SYS PERFORMANCE 600A

WHAT'S HOT: The Sys uses a 600-MHz AMD Athlon chip to rack up a record-breaking PC WorldBench 98 score of 345, easily beating comparable Pentium III systems running Windows NT. Two 9.1-GB hard drives connect to a Promise UltraDMA 66 PCI card in a RAID configuration to speed up certain disk-intensive operations. Plug two monitors into the Matrox Millennium G400 DH (dualhead) video card and you can view your desktop across both displays. Creative Labs' Sound Blaster sound card delivers premium audio. Sys's five-year labor warranty is one of the longest in the business.

WHAT'S NOT: Faded colors and fuzzy text on the Sys Technology SPM17 MS display sandbag the computer's graphics potential. A single, laser-printed setup sheet and component manuals for the CD-ROM drive and monitor make up the minimal hardware documentation. After the first year, Sys cuts tech support from 24 hours daily to 9 hours on weekdays.

WHAT ELSE: You need a screwdriver to get inside the all-metal case, but the side panel detaches quickly and easily slides back on—the fit and finish are impressive. The soft-touch keyboard comes with a removable wrist rest.

BEST USE: With a better monitor (or two), the Sys would make a killer 2D graphics workstation—you can keep your work on one monitor and your tools on the other.



BURN, ZIP, OR JUST WATCH: Along with a hard drive, Axis Systems' Orion 100A DVD gives you several storage options, including a CD-RW drive, an Iomega Zip 100 drive, and a DVD-ROM drive.

6 AXIS SYSTEMS ORION 100A DVD

NEW **WHAT'S HOT:** The Orion packs a Zip 100 drive, a 6X DVD-ROM drive, and a 4X CD-RW drive. The ViewSonic G770 19-inch monitor displays clear text and graphics even at 1600 by 1200 resolution. Driven by a Creative SoundBlaster Live audio card, the classy Cambridge SoundWorks 1000 speaker system provides terrific surround sound. DVD video playback is great, even with other programs running.

WHAT'S NOT: The system's PC WorldBench score of 241 is a few points below average for a Pentium III-550 system running Windows 98. To remove the case, you must take the top off first, then the side panels.

HOOKED A BIG ONE: CyberMax's Enthusiast PIII-600N comes with a 21-inch monitor, so it requires a graphics card with a heaping helping of video RAM, such as 3dfx's Voodoo3 3000 (inset).

WHAT ELSE: The ergonomic Microsoft Natural Keyboard allows smooth typing. Rear ports are labeled but not color-coded.

BEST USE: The Orion would make a great presentation system, thanks to its formidable multimedia features.

7 CYBERMAX ENTHUSIAST PIII-600N

NEW **WHAT'S HOT:** Though middle-of-the-pack for a PIII-600 running Windows 98, the Enthusiast's PC WorldBench 98 score of 252 is still impressive. The spacious, well-designed interior offers expansion room galore, with four open slots and five free drive bays (a Zip 100 drive takes up an already filled bay). The Altec Lansing speakers crank out respectable sound, and if you hook them up to the system's USB port, you get easy-to-use on-screen controls. The PC ships with a comprehensive system manual.

WHAT'S NOT: The solid metal case comes off as one piece, and replacing it can be hard. In our tests, the 6X DVD-ROM drive with software decoder wouldn't play movies until we changed the resolution to 800 by 600 (most players change resolutions automatically), and playback slowed a bit when other applications were running.

WHAT ELSE: The CyberMax AT 398 21-inch monitor, powered by a 3dfx Voodoo3 3000 graphics card, blurs at the maximum 1600 by 1200 resolution, but text and images look crisp at lesser resolutions. At this price, CyberMax bundles Corel ▶

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BEST USE: This powerful multitasker suits small offices requiring a big screen.

8 NEXTREND NEXSTAR-550

WHAT'S HOT: With a PC WorldBench score of 249, the NexStar is the fastest PIII-550 running Windows 98 that we've tested. NexTrend supplies Microsoft Office 97 Small Business Edition and an Office training CD-ROM so you can get the most out of the suite. The Microsoft IntelliMouse and ergonomic keyboard are easy to use.

WHAT'S NOT: The interior is cramped and messy; cables block access to RAM slots. NexTrend offers only a sparse user manual and no software help. The QIC JS-600 satellite-and-subwoofer package musters mediocre sound. Text is fuzzy at high resolutions on the Cybervision C70 monitor, with some distortion at the edges of images.

WHAT ELSE: You can remove the case without tools, once you figure out how to do it (neither the manual nor the case gives any clues). The curved top prevents you from stacking peripherals on it. The PC comes with a Zip 100 drive, and discs slide easily into the trayless DVD-ROM drive.

BEST USE: It's a versatile home office machine with power for business and multimedia for pleasure.

9 POLYWELL POLY 800K7-650

NEW **WHAT'S HOT:** The Polywell earns an excellent PC WorldBench 98 score of 277, though that's a few points shy of the scores of other Athlon-650 systems we've looked at. The case interior features neatly bundled wires that allow easy access to all components. The Poly offers ample expansion room, too, with four open slots and three open drive bays (one of the filled bays holds a Zip 100 drive).

WHAT'S NOT: The 19-inch DecaView G400 monitor produces fuzzy text and dull colors at all resolutions but is fine for most tasks. The silver case looks like it was painted at Uncle Bubba's Body Shop.

WHAT ELSE: The one-piece cover opens without tools, but you must remove the entire thing to gain access to the interior. The Aiwa TS-CD40 speakers aren't constructed of the finest materials, but they deliver adequate sound. Video playback on the 6X DVD-ROM drive is smooth, even when opening other applications, but movies would not start automatically in our tests. Polywell bundles Lotus SmartSuite 97 with the 800K7-650.

BEST USE: Even with a mediocre monitor, this powerful system should be able to drive any small office for quite some time.

POLY WANTS POWER: Polywell's Poly 800K7-650 toasts a few Pentiums with its Athlon-650 CPU.

10 IBM PC 300PL

WHAT'S HOT: An Iomega Zip 100 drive facilitates hassle-free backups and file transfers. The system's PC WorldBench 98 score of 232 is better than average for a Pentium III-500–based machine running Windows 98. Big Blue bundles its own ViaVoice dictation software and Lotus SmartSuite with the system.

WHAT'S NOT: We had varying degrees of success reaching representatives during our anonymous calls to tech support. When we did get through, the technicians were generally knowledgeable but sometimes impatient.

WHAT ELSE: This midsize tower from IBM includes a built-in ethernet connection. It offers two open bays and five open expansion slots.

BEST USE: The PC 300PL would work well as a presentation PC or multimedia development system for business users in a networked office. ▶

What's Inside Windows 98 SE?

TECH TREND YOU MAY HAVE NOTICED that many new PCs now ship with the second edition of Windows 98. Windows 98 SE includes the latest versions of Internet Explorer 5 and NetMeeting 3 (videoconferencing software) as well as Windows Media Player 6.1 (for enhanced multimedia file playback). But if these files were all that the update included, you could just download them via the Internet instead of paying for an upgrade. Windows 98 SE provides improvements that do more than save you the trouble of going online.

For one, the Internet Connection Sharing feature offers built-in support for multiple PCs using a single connection to the Net. Optimizations for hardware such as the Pentium III processor allow you to get more out of newer CPUs and motherboards—for example, faster boot times and improved graphics and audio performance. And USB and IEEE 1394 enhancements support newer devices such as USB modems and digital camcorders.

But don't downplay the significance of saving download time. Whenever a new OS version comes out, an automatic benefit is getting all the latest updates (such as Service Pack 1, which includes security and Y2K patches) and utility versions (such as DirectX 6.1 for multimedia technologies) in one neat package. For more info about Windows 98 SE, including how to order the upgrade (for $20), go to www.microsoft.com/windows98.

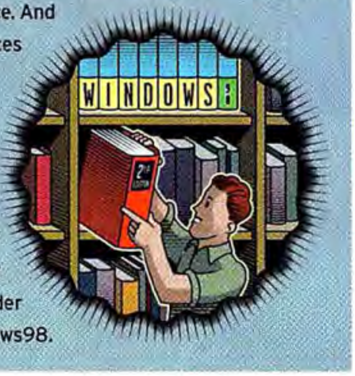

ILLUSTRATION: PETER HOEY

ALSO NEW THIS MONTH

WE EVALUATED the following systems along with the others, but they didn't score high enough to reach the *Top 10 Power PCs* chart. For write-ups, visit PC World Online (www.pcworld.com/t10pcs).

- ◆ **ABS Ultimate WorkStation 2**
- ◆ **NEC PowerMate 2000**
- ◆ **Tiger K-Series Extreme 600**

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TOP 10 MIDRANGE PCs

	SYSTEM: $1200 TO $1999	Month tested	★ Overall rating	Street price (9/10/99)	PC WorldBench 98 performance score[1] Faster ▶	Base configuration[2]
1	Dell Dimension XPS T500 800/388-8542 www.dell.com	Apr 99	92	**Average:** $1849	Very good 234	**Very good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 27GB hard drive, midsize tower case, Windows 98
2	Micro Express MicroFlex-5B 800/989-9900 www.microexpress.net	Sept 99	89	**Inexpensive:** $1499	Very good 234	**Very good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 18GB hard drive, midsize tower case, Windows 98
3	Dell Dimension L500c 800/388-8542 www.dell.com	Nov 99	88	**Inexpensive:** $1349	Good 214	**Good:** Celeron-500, 64MB of RAM, 128KB L2 cache, 13GB hard drive, minitower case, Windows 98 SE
4	Gateway GP6-466c 800/315-2536 www.gateway.com	Oct 99	87	**Very inexpensive:** $1264	Good 207	**Good:** Celeron-466, 64MB of RAM, 128KB L2 cache, 20.4GB hard drive, midsize tower case, Windows 98
5	Quantex M500 800/896-4898 www.quantex.com	Sept 99	86	**Inexpensive:** $1499	Very good 230	**Good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, midsize tower case, Windows 98
6	Micron Millennia Max 600 800/642-7667 www.micronpc.com	NEW	83	**Expensive:** $1871	Outstanding 250	**Good:** Pentium III-600, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, midsize tower case, Windows 98 SE
7	CyberMax Enthusiast 500 800/437-4596 www.cybermaxpc.com	May 99	83	**Inexpensive:** $1499	Very good 236	**Good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 13.6GB hard drive, midsize tower case, Windows 98
8	Axis Systems Orion 100C DVD 800/378-9014 www.axissys.com	Oct 99	83	**Very inexpensive:** $1278	Good 210	**Good:** Pentium III-450, 128MB of RAM, 512KB L2 cache, 10.2GB hard drive, minitower case, Windows 98
9	NEC PowerMate VT 300 888/863-2669 www.nec-computers.com	Aug 99	82	**Average:** $1748	Very good 231	**Good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, minitower case, Windows 98
10	Kingdom Pinnacle 500 800/385-3436 www.kingdomcomputers.com	Oct 99	82	**Very inexpensive:** $1247	Very good 231	**Good:** Pentium III-500, 128MB of RAM, 512KB L2 cache, 13GB hard drive, midsize tower case, Windows 98
	Best Buy	Percent of overall rating ▶		Price: 17 percent	Performance: 18 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 267.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] For more information about all the products listed in this table, select number 905 on the product information card or visit www.pcworld.com/productinfo.

IT TAKES A BRAWNY Celeron system to crack the midrange Top 10 these days. Four Celeron-equipped systems battled a phalanx of well-entrenched Pentium III-500s for positions on this month's chart. They even jousted with one powerful Pentium III-600 machine that dove under the $1999 price limit. Two of the Celerons, a 500-MHz model and a 466-MHz unit, emerge victorious, capturing third and fourth place.

1 DELL DIMENSION XPS T500

WHAT'S HOT: The XPS T500's PC WorldBench 98 score of 234 is a couple of points above average for a PIII-500 system running Windows 98. The easy-open case conceals a tidy interior. Dell received an Outstanding rating for reliability in our latest reader surveys. The 8X DVD-ROM drive comes with a hardware decoder card and plays movies very smoothly. Don't worry about running out of space, either: The T500's huge hard drive makes storing large files a nonissue.

WHAT'S NOT: The Dell M780 17-inch monitor maxes out at 1280 by 1024 resolution, where smaller text appears somewhat blurry. (Text looks sharp and legible at lower resolutions.)

WHAT ELSE: This reasonably priced Dimension comes with an Iomega Zip 100 drive and Microsoft Office 2000 Small Business Edition. Color-coded, labeled, and icon-marked ports plus a good assortment of component manuals and an illustrated setup guide make getting up and running a snap.

BEST USE: The Dell Dimension XPS T500 is a terrific choice for growing businesses that require excellent service.

2 MICRO EXPRESS MICROFLEX-5B

WHAT'S HOT: Text and images on the excellent 17-inch Impression 7VX monitor remain crisp all the way up to the maximum 1600 by 1200 resolution. Software-decoded DVD video plays smoothly, even while other applications crank away in the background. Like the top-ranking Dell, the MicroFlex earns a PC WorldBench score of 234, comparable to that of a Top 10 power PC.

WHAT'S NOT: Though Micro Express may have intended the MicroFlex's corrugated side panel to make the system easier to open, it has the opposite effect. Poorly labeled connectors on the rear of the

Extra features	Design and expandability	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [3]
Good: STB NVidia TNT 3D graphics board with 16MB of SDRAM, 17-inch monitor, 8X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Very good:** tidy interior with plenty of space; 3 open drive bays, 2 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1	–
Good: ATI Rage 128GL graphics board with 16MB of SDRAM, 17-inch monitor, 5X DVD-ROM drive, V.90 modem	**Outstanding:** large interior with ample room; 4 open drive bays, 6 open slots	[4]	Fair [4]/ Outstanding	24/7, toll-free	4/4	652
Good: integrated Intel 810 graphics with 4MB of display cache, 17-inch monitor, 17X-40X CD-ROM drive, V.90 modem, network card	**Good:** small interior, but power supply swings out; 1 open drive bay, 3 open slots	Outstanding	Good/ Good	24/7, toll-free	3/1	–
Good: integrated ATI Rage 128VR graphics with 8MB of SDRAM, 17-inch monitor, 6X DVD-ROM drive, network card, Iomega Zip 100 drive	**Good:** motherboard too small for case; 4 open drive bays, 2 open slots	Good	Good/ Outstanding	24/7, toll-free	3/3	653
Very good: Joytech S3 Savage4 graphics board with 16MB of SDRAM, 19-inch monitor, 6X DVD-ROM drive, V.90 modem, Iomega Zip 100 drive	**Outstanding:** sturdy case with roomy interior; 5 open drive bays, 5 open slots	Good [4]	Good [4]/ Good	24/7, toll-free	3/1	654
Good: Diamond Viper V770 graphics board with 16MB of SDRAM, 17-inch monitor, 8X DVD-ROM drive, V.90 modem	**Good:** unique rail locks down cards; 5 open drive bays, 4 open slots	Good	Fair/ Outstanding	24/7, toll-free	Varies [5]/3	655
Good: STB Velocity 4400 graphics board with 16MB of SDRAM, 19-inch monitor, 6X DVD-ROM drive, V.90 modem	**Very good:** lots of expansion room; 6 open drive bays, 4 open slots	Fair [4]	Good [4]/ Good	24/7, toll-free	3/1	656
Good: integrated Intel 740 graphics with 8MB of SGRAM, 17-inch monitor, 6X DVD-ROM drive, V.90 modem	**Very good:** inexpensive expandability; 4 open drive bays, 4 open slots	[4]	Good [4]/ Outstanding	24/7, toll-free	3/3	657
Good: Diamond Viper V550 graphics board with 16MB of SDRAM, 17-inch monitor, 14X-40X CD-ROM drive, V.90 modem	**Good:** USB port on front of case; 2 open drive bays, 3 open slots	Good	Good [4]/ Outstanding	24/7, toll-free	3/3	658
Good: APAC Voodoo Banshee graphics with 16MB of SGRAM, 17-inch monitor, 17X-40X CD-ROM drive, V.90 modem, network interface, LS-120 drive	**Good:** case requires tools to open; 2 open drive bays, 2 open slots	[4]	Fair [4]/ Fair	Varies, [6] toll-free	Varies [5]/1	659
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[5] Five years on CPU and main RAM, three years on other parts.

[6] 12.5 hours on weekdays, 8 hours on Saturday.

IT'S A STRETCH: The Gateway GP6-466c's bottom three slot openings don't extend to any slots.

PHOTOGRAPHS: KEN SMITH

machine may frustrate first-time computer owners during installation.

WHAT ELSE: The system offers a large interior that provides ample expansion room, including four open drive bays, six free card slots, and three open memory sockets. The MicroFlex-5B ships with a generic manual in print and on CD-ROM, a quick-start setup guide, and adequate documentation for the 5X DVD-ROM drive and monitor.

BEST USE: Offices that make heavy use of multimedia for presentations, videoconferencing, or training will appreciate the system's great sound and video.

3 DELL DIMENSION L500C

WHAT'S HOT: The Dell L500c's PC WorldBench 98 score of 214 is just 3 points shy of the highest Celeron score we've seen. We had no trouble getting inside this minitower's stiff plastic case, and ports on the rear are color-coded.

WHAT'S NOT: The L500c's use of integrated components saves space but limits the performance of its otherwise solid peripherals. For instance, the 17-inch Dell M780 monitor displays clear text and images at most resolutions, but the integrated Intel 810 graphics processor restricts the monitor to 24-bit color and 1280 by 1024 resolution, where text becomes a bit fuzzy. If you want to upgrade the graphics, you'll be limited to PCI cards.

WHAT ELSE: The L500c's extensive documentation lacks hardware information. The keyboard suffers from minor flexibility, though keystrokes are solid. The interior is small, but the power supply swings out so you can access motherboard components easily. The easy-to-configure Harman/Kardon HK195 speakers reproduce most sound faithfully.

BEST USE: A good workstation for a small office on a budget, the $1349 L500c is enhanced by Dell's excellent reputation for reliability and service.

4 GATEWAY GP6-466C

WHAT'S HOT: The GP6-466c ships with many corporate accoutrements but sells for just $1264, a remarkably low price ▶

for a business-oriented system. Gateway doesn't scrimp on hardware and software to arrive at that price, either: Hardware extras include an Iomega Zip 100 drive and a network card, and its above-average software bundle consists of Microsoft Office 97 Small Business Edition and several utilities. The GP6-466c's PC WorldBench 98 score of 207 is a touch better than average for a Celeron-466 model.

WHAT'S NOT: Inside the midsize tower's case, we were surprised to find relatively limited room for expansion. The motherboard Gateway uses for the GP6-466c is far too small for the surrounding space. Consequently, the motherboard doesn't extend to the bottom of the case, and the bottom three expansion slot openings don't lead to any slots.

WHAT ELSE: Gateway's excellent documentation and setup guides offer solid troubleshooting info and many useful diagrams. The high-quality 17-inch EV700 monitor supplies on-screen controls, and Cambridge SoundWorks SBS52 speakers pump out rich sound.

BEST USE: The Gateway GP6-466c gives small to medium-size businesses an inexpensive networkable alternative to premium systems.

5 QUANTEX M500

WHAT'S HOT: You'd be hard-pressed to find a better-appointed multimedia powerhouse. The 6X DVD-ROM drive, Aureal Vortex2 sound card, and Joytech S3 Savage4 graphics board make the M500 a capable authoring station. And after work it's fine for watching movies, thanks to the accompanying 19-inch DiamondTron flat CRT monitor.

WHAT'S NOT: Quantex's warranty on the M500 covers labor for just one year. In our anonymous calls to Quantex's tech support line, representatives frequently gave incomplete answers.

WHAT ELSE: The M500's PC WorldBench 98 score of 230 is exactly average for a Pentium III-500 system running Windows 98. Quantex throws in an Iomega Zip 100 drive.

BEST USE: The M500 makes a fast presentation system or a choice executive workstation for the Big Cheese.

IT'S A FLAT WORLD: Quantex's $1499 M500 sports a 19-inch flat-screen DiamondTron CRT monitor.

6 MICRON MILLENNIA MAX 600

NEW **WHAT'S HOT:** The Millennia's mammoth case opens easily—push down a handle on the back, and the side panel slides off (just push the handle again to reattach the panel). The 8X DVD-ROM drive starts movies automatically and plays them smoothly, even with other applications running in the background. Micron includes a well-illustrated user manual and CD-ROM–based reference materials with the system.

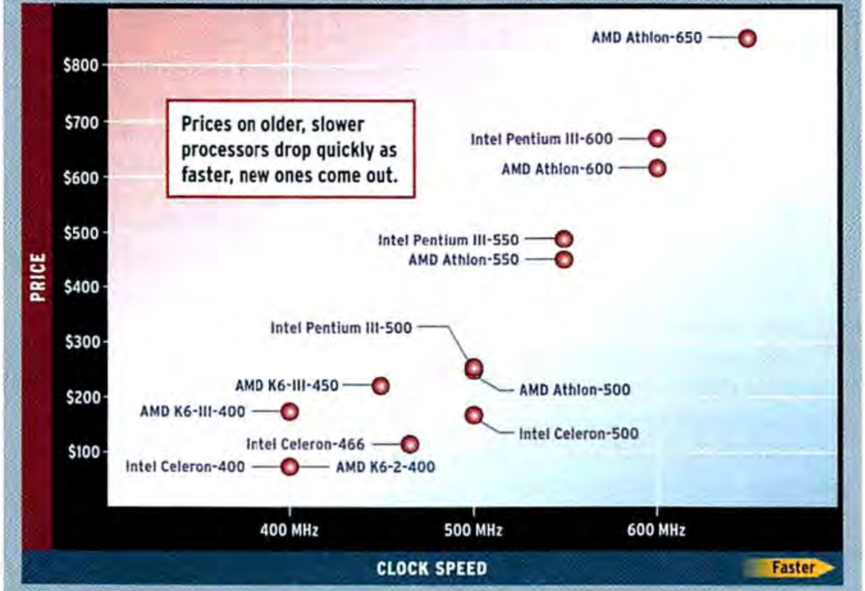
WHAT'S NOT: The case's concave top makes it tough to set items on top of it. And despite the huge interior, cables obstruct access to the RAM slots. The 17-inch Micron 700VX monitor produces bright colors but slightly blurry text, and it can attain a maximum resolution of only 1280 by 1024—at a very low 60-Hz refresh rate. (Upgrading to a sharper Trinitron monitor costs $99.) The Advent AV009 three-piece speaker set musters only weak volume—that's especially true of the satellite speakers.

WHAT ELSE: The Millennia's PC WorldBench 98 score of 250 is plenty fast, though average for a PIII-600 machine. Despite the keyboard's flimsiness, you can type smoothly and quietly on it. The system ships with Microsoft Office 2000 Small Business Edition. Accessing expansion cards for upgrades is a breeze: Just loosen a thumbscrew on the metal rail, and you're in.

BEST USE: The Millennia Max 600 easily fills the bill as a powerful, bare-bones multimedia system that you can upgrade painlessly as your needs change. ▶

CPU Prices: The High Cost of Performance

TECH TREND **SUPERCHARGING YOUR PC doesn't come cheap. AMD's new 650-MHz Athlon chip, for example, costs five times more than a 500-MHz Intel Celeron. Likewise, Intel's Pentium III-600 costs four times more than the Celeron-500, but runs common business applications only about 14 percent faster. Here's a sampling of recent CPU prices.**



Note: All prices are for chips sold in bundles of 1000 units as of September 10, 1999.

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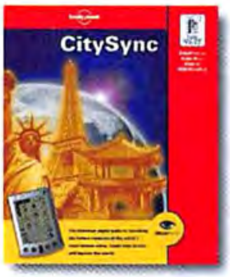

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7 CYBERMAX ENTHUSIAST 500

WHAT'S HOT: The Enthusiast posts the second-highest PC WorldBench 98 score on the midrange chart. Though it lacks a dedicated MPEG decoder board, this powerful system renders DVD movies smoothly and vibrantly—even with several applications running simultaneously in the background. The Altec Lansing ADA 305 Digital PowerCube speakers and subwoofer lend lifelike sound effects to games and DVD movies.

WHAT'S NOT: We waited and waited—up to 55 minutes—for tech support and had to call three times before reaching a live technician. When we finally got through, the staffers, though courteous, tended to miss our tougher questions.

WHAT ELSE: The Enthusiast comes with a large bundle of office and reference software, including Corel's WordPerfect Suite 8, Compton's World Atlas, and Compton's Encyclopedia. Its case cover is a bit tricky to remove and replace.

BEST USE: At $1499, the CyberMax Enthusiast 500 is a great choice for budget-oriented small offices that use multimedia applications frequently.

8 AXIS SYSTEMS ORION 100C DVD

WHAT'S HOT: Though the Orion comes without an MPEG decoder card, its 6X DVD-ROM player works well, automatically changing the monitor's resolution to the best setting for video or computer signals. The 17-inch ADI CM700 monitor displays crisp images. Excellent documentation includes detailed diagrams and a thorough troubleshooting section.

WHAT'S NOT: With a score of 210 on our PC WorldBench 98 tests, the Orion 100C DVD is considerably slower than many comparable Pentium III-450 machines. Manipulating the case cover requires manual dexterity and the removal of four screws.

WHAT ELSE: The Orion's $1278 price tag might appeal to budget-conscious buyers searching for an expandable multimedia machine. But if you want audio, you'll have to spend more—the system doesn't include speakers at this price.

BEST USE: The Orion 100C DVD makes a solid presentation system.

9 NEC POWERMATE VT 300

WHAT'S HOT: This PowerMate is a hair faster than most comparably equipped Pentium III-500 systems running Windows 98, as evidenced by its PC WorldBench 98 score of 231. The VT 300's minitower case features a front-mounted USB port, and the 17-inch NEC Vista Scan 7000 monitor provides USB controls and a USB port on its base. The monitor displays clear text and graphics at resolutions up to 1280 by 1024.

WHAT'S NOT: The monitor's USB connector occupies one of the system's USB ports; thus, while you gain the convenience of having a USB port within easy reach on the display, you don't increase the total number of free USB ports. The interior is cramped.

WHAT ELSE: NEC includes a V.90 PCI modem with this system. Highlighting the excellent documentation are an in-depth troubleshooting section and many illustrations and diagrams.

BEST USE: The PowerMate VT 300 is an excellent office system for the power hungry and multimedia savvy.

LIFE ON THE RAILS: Micron's Millennia Max 600 allows easy access to expansion slots. A unique metal rail holds down all the expansion cards at once; just loosen a thumbscrew and the rail pops up.

MY HORSE FOR A KINGDOM: Kingdom's Pinnacle 500 comes equipped with an LS-120 drive, which accepts both 120MB disks (made for the drive) and those ubiquitous floppy disks.

10 KINGDOM PINNACLE 500

WHAT'S HOT: The Kingdom's manuals include a thorough glossary and troubleshooting section. The attractive software bundle consists of Corel's WordPerfect Suite 8, Compton's 99 Encyclopedia Deluxe, National Geographic Trip Planner Deluxe, and a demo game pack to complement the capable graphics board. At $1247, the Pinnacle is the least expensive PC on the midrange chart.

WHAT'S NOT: Despite the stellar video card, text on the 17-inch Kingdom 771 monitor looks fuzzy even at 1024 by 768 resolution. The case requires tools to open, and the keys on the ergonomic Microsoft keyboard tended to stick in our tests.

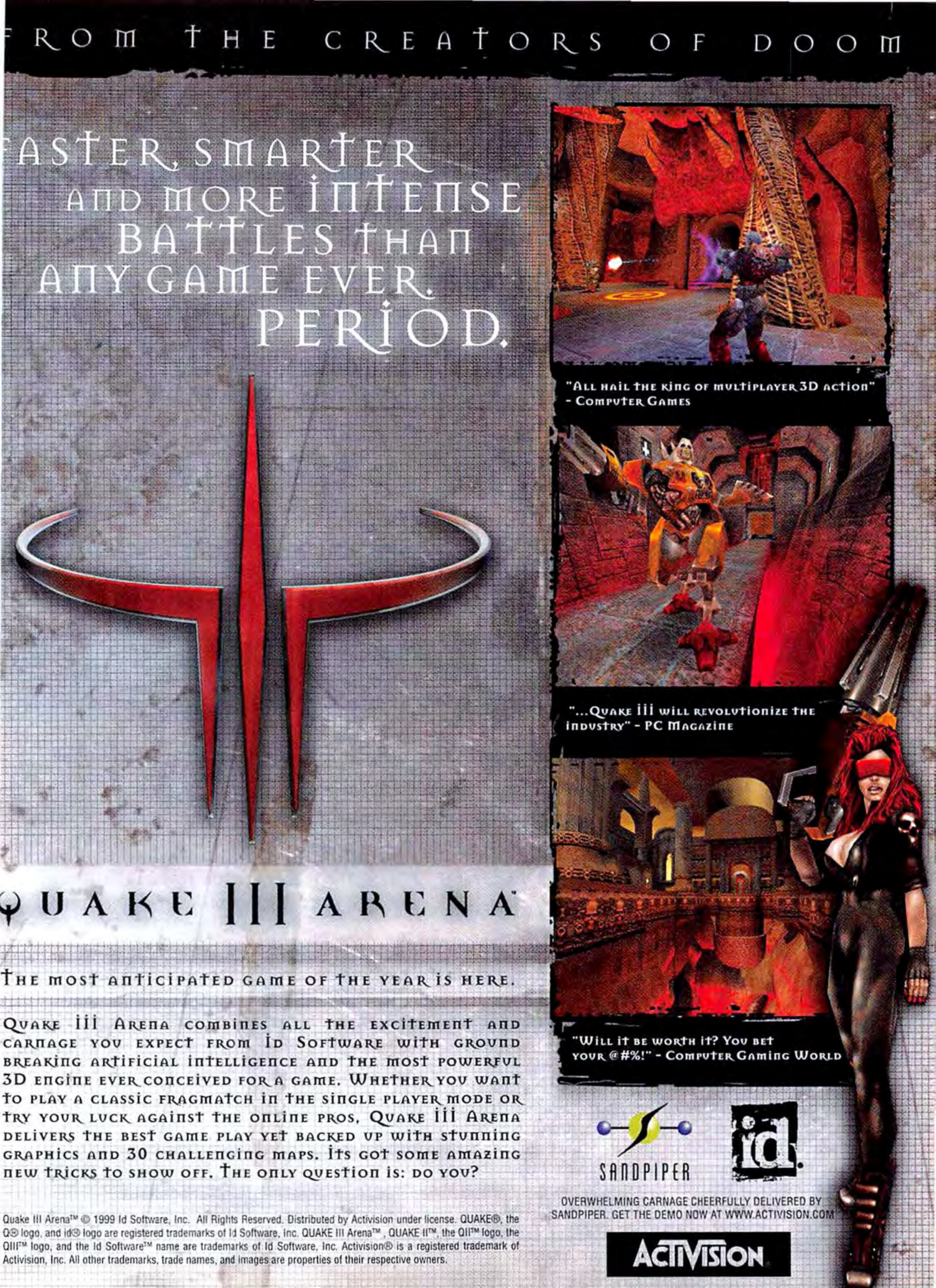
WHAT ELSE: This PIII-500's PC WorldBench 98 score of 231 is average for similarly configured systems running Windows 98. Although it ships with a V.90 modem, the Kingdom offers an integrated ethernet connector for networked offices. An LS-120 drive is also included.

BEST USE: The WordPerfect Suite, three-piece MLi 450 speaker set, and excellent graphics acceleration suit the Pinnacle to a small office environment. ▶

ALSO NEW THIS MONTH

WE EVALUATED the following systems along with the others, but they didn't score high enough to make the *Top 10 Midrange PCs* chart. For write-ups, visit PC World Online (www.pcworld.com/t10pcs).

- **Amax MicroPlex 5000 Celeron 500**
- **IBM PC 300GL Celeron 500**



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TOP 10 BUDGET PCs

	SYSTEM: UNDER $1200	Month tested	★ Overall rating	Street price (9/10/99)	PC WorldBench 98 performance score[1] Faster ▶	Base configuration[2]
1	**Micro Express MicroFlex-50C** 800/989-9900 www.microexpress.net	Aug 99	87	**Expensive:** $1199	Outstanding 222	**Good:** Pentium III-450, 64MB of RAM, 512KB L2 cache, 18GB hard drive, midsize tower case, Windows 98
2	**Dell OptiPlex GX100** 800/388-8542 www.dell.com	NEW	81	**Expensive:** $1180	Very good 260	**Satisfactory:** Celeron-500, 64MB of RAM, 128KB L2 cache, 6.4GB hard drive, desktop case, Windows NT 4.0
3	Micro Express MicroFlex-40B 800/989-9900 www.microexpress.net	Nov 99	80	**Average:** $999	Outstanding 215	**Good:** AMD K6-III-400, 128MB of RAM, 256KB L2 cache, 9.1GB hard drive, midsize tower case, Windows 98
4	Quantex M466-2c 800/896-4898 www.quantex.com	Sept 99	79	**Expensive:** $1199	Very good 209	**Good:** Celeron-466, 64MB of RAM, 128KB L2 cache, 13GB hard drive, midsize tower case, Windows 98
5	Axis Systems Orion LX/CVE Celeron 400 800/378-9014 www.axissys.com	Nov 99	79	**Inexpensive:** $878	Good 193	**Good:** Celeron-400, 64MB of RAM, 128KB L2 cache, 8.4GB hard drive, midsize tower case, Windows 98
6	Xi Computer 400A MTower 800/432-0486 www.xicomputer.com	June 99	77	**Average:** $1099	Good 199	**Very good:** Celeron-400, 128MB of RAM, 128KB L2 cache, 14GB hard drive, midsize tower case, Windows 98
7	NEC PowerMate VT 300 888/632-8701 www.nec-computers.com	Aug 99	75	**Average:** $1123	Satisfactory 181	**Good:** Celeron-366, 64MB of RAM, 128KB L2 cache, 8.4GB hard drive, midsize tower case, Windows 98
8	Sys TaskMaster 500 800/613-9963 www.sys.com	NEW	75	**Average:** $999	Very good 209	**Good:** Celeron-500, 64MB of RAM, 128KB L2 cache, 10.2GB hard drive, midsize tower case, Windows 98 SE
9	Premio Apollo II CS1 800/677-6477 www.premiopc.com	NEW	74	**Average:** $999	Very good 211	**Good:** Celeron-500, 64MB of RAM, 128KB L2 cache, 13.6GB hard drive, midsize tower case, Windows 98 SE
10	Polywell Poly 810CW-433 800/999-1278 www.polywell.com	Oct 99	72	**Average:** $1025	Good 204	**Good:** Celeron-433, 64MB of RAM, 128KB L2 cache, 10GB hard drive, minitower case, Windows 98
	Best Buy	Percent of overall rating ▶		Price: 22 percent	Performance: 13 percent	Base configuration: 10 percent

[1] A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 267.

[2] We define vertical cases as towers (taller than 20 inches), midsize towers (15.5 to 20 inches), or minitowers (shorter than 15.5 inches); and horizontal cases as desktops (5 inches or taller) or compacts (shorter than 5 inches).

[3] For more information about all the products in this table, select number 906 on the product information card or visit www.pcworld.com/productinfo.

PRICES ON THE *Top 10 Budget PCs* chart continue to creep down, with almost half the systems on this month's list now costing less than a grand. Two new machines—from Sys Technology and Premio—slide in under that limbo stick and still manage respectable showings on PC WorldBench 98 tests: The Sys TaskMaster 500's and the Premio Apollo II CS1's scores of 209 and 211, respectively, are right at average for Top 10 budget systems.

1 MICRO EXPRESS MICROFLEX-50C

WHAT'S HOT: Retaining its number-one position on the budget chart for the fourth straight month, Micro Express's Pentium II-450–based MicroFlex-50C did well enough on our PC WorldBench 98 tests to beat some systems on the midrange chart. Complement that performance with a good 17-inch monitor and great Altec Lansing ACS44 speakers, and the MicroFlex-50C comes ready to rock. With four open drive bays and six open slots, the system offers plenty of space for expansion, and the rugged case slides open easily without the aid of tools. Micro Express warrants its parts and labor for four years.

WHAT'S NOT: Most of the MicroFlex's internal components sit within plain view once you open the hood, but the hard drive bays could be easier to access. In our anonymous calls to Micro Express's support line, we found the representatives' manner abrupt and somewhat standoffish.

WHAT ELSE: The ATI Rage 128GL graphics board can send video from a DVD movie to a television set via the included S-Video or RCA cables—without any need for a separate decoder card.

BEST USE: The $1199 MicroFlex-50C makes an excellent presentation system for small-office users on a budget.

2 DELL OPTIPLEX GX100

WHAT'S HOT: The Dell OptiPlex GX100, one of the few Celeron-based Windows NT systems to NEW arrive in the PC World Test Center, exceeded expectations in our lab tests. Equipped with a Celeron-500 processor, the OptiPlex turned in a PC WorldBench 98 score of 260, which is above the average for PIII-450 systems running NT. The solidly constructed QuietKey keyboard permits smooth, soft typing. With an integrated network interface, a case lock, and

Extra features	Design and expandability	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number [1]
Good: ATI Rage 128GL graphics board with 32MB of SDRAM, 17-inch monitor, 5X DVD-ROM drive, V.90 modem	**Outstanding:** rugged, tool-free case; 4 open drive bays, 6 open slots	[4]	Fair [4]/ Outstanding	24/7, toll-free	4/4	660
Good: integrated Intel 810 graphics with 4MB of display cache, 17-inch monitor, 10X-24X CD-ROM drive, network interface	**Satisfactory:** notebook-style CD-ROM drive; no open drive bays, 2 open slots	Outstanding	Good/ Outstanding	24/7, toll-free	3/3	–
Satisfactory: Diamond Monster Fusion graphics board with 16MB of SGRAM, 15-inch monitor, 12X-40X CD-ROM drive, V.90 modem	**Good:** spacious interior, puzzling case; 4 open drive bays, 4 open slots	[4]	Fair [4]/ Outstanding	24/7, toll-free	4/4	661
Good: 3dfx Voodoo3 2000 graphics board with 16MB of SGRAM, 17-inch monitor, 6X DVD-ROM drive, V.90 modem	**Outstanding:** loads of expansion room; 6 open drive bays, 6 open slots	Good [4]	Good [4]/ Good	24/7, toll-free	3/1	662
Satisfactory: Intel 740 graphics with 8MB of SGRAM, 17-inch monitor, 17X-40X CD-ROM drive, V.90 modem	**Good:** unwieldy case; 3 open drive bays, 4 open slots	[4]	Good [4]/ Outstanding	24/7, toll-free	3/3	663
Good: Matrox Mystique G200 graphics board with 8MB of SDRAM, 17-inch monitor, 6X DVD-ROM drive, V.90 modem	**Good:** sliding front panel obscures drives; 5 open drive bays, 4 open slots	[4]	Fair [4]/ Good	24/7, toll-free	3/3	664
Good: ATI Xpert98 graphics board with 8MB of SDRAM, 17-inch monitor, 14X-32X CD-ROM drive, network card	**Good:** easy-open case; 2 open drive bays, 3 open slots	Good	Good [4]/ Outstanding	24/7, toll-free	3/3	665
Satisfactory: integrated Intel 810 graphics with 4MB of SDRAM, 17-inch monitor, 17X-40X CD-ROM drive, V.90 modem	**Satisfactory:** includes case lock; 2 open drive bays, 3 open slots	[4]	Fair [4]/ Good	24/7, [5] toll-free	Varies [6]/5	666
Satisfactory: integrated Intel 810 graphics with 4MB of display cache, 17-inch monitor, 24X-48X CD-ROM drive, V.90 modem	**Satisfactory:** orderly interior, includes case lock; 2 open drive bays, 2 open slots	[4]	Good [4]/ Fair	10/5, toll-free	3/3	667
Satisfactory: integrated Intel 810 graphics with 4MB of display cache, 17-inch monitor, 17X-40X CD-ROM drive, V.90 modem	**Good:** case removal can be difficult; 1 open drive bay, 2 open slots	[4]	Fair [4]/ Fair	24/7,[7] toll-free	3/5	668
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent			

[4] Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

[5] Reduced to 9 hours on weekdays after the first year.

[6] Six years on CPU and main RAM, three years on other parts.

[7] Reduced to 10 hours on weekdays and 4 hours on Saturday after the first year.

THE MICRO EXPRESS MicroFlex-50C retains the top spot for the fourth straight month.

PHOTOGRAPHS: KEN SMITH

Wake-on-LAN management features, this machine ships business-ready.

WHAT'S NOT: The system offers little expansion room: no available drive bays and only one open RAM slot and two free PCI slots. Its system manual covers Windows NT minimally and includes no information on the OptiPlex hardware nor any for components other than the monitor (documentation on all of these are online). The system uses a notebook-style CD-ROM drive; though excusable in a portable, weight-saving environment, it's too flimsy for a desktop system.

WHAT ELSE: Gaining access to the interior of this smallish desktop case is a breeze—press a button on each side of the flimsy, plastic case, and lift off the top. The case goes back on smoothly, too, though it doesn't fit snugly. Dell's 17-inch M770 monitor displays crisp text and bright colors at the standard 1024 by 768 resolution, but the integrated video requires you to choose between resolution and color depth—you can't have both.

BEST USE: With its compact size, integrated network interface, and management features, the speedy OptiPlex GX100 seems destined to fill a stall in a corporate cubicle farm.

3 MICRO EXPRESS MICROFLEX-40B

WHAT'S HOT: Powered by an AMD K6-III-400 processor, the MicroFlex-40B posted a PC WorldBench 98 score of 215, one of the fastest finishes we've seen from a system using that chip. The spacious, easy-to-navigate midsize tower chassis houses 128MB of RAM (most budget PCs have only 64MB). The Impression 5VX monitor displays sharp images at all resolutions.

WHAT'S NOT: You don't need a screwdriver to crack the case, but the box is still puzzling to open. And the included documentation offers users little help—it provides a setup poster, an adequate (though somewhat generic) system manual, and a CD-ROM version of the manual. The reset button looks confusingly like the wake-up button.

WHAT ELSE: Only Norton AntiVirus comes bundled with the system; all other applications are sold à la carte. For ▶

gaming, you'll get acceptable sound and video from the Altec Lansing ACS44 speakers and Diamond Monster Fusion video card, though the latter amounts to overkill for the 15-inch monitor.

BEST USE: This Micro Express system offers small offices lots of power. Consider it if you're looking to replace an older, slower machine and you already have all the software you need.

4 QUANTEX M466-2C

WHAT'S HOT: This Celeron-466–based Quantex earned a 209 on our PC WorldBench 98 tests, the fourth-highest performance score for a Windows 98 machine on our budget chart. Inside, you get a whopping six open slots and six open drive bays, and the cables are bundled together and pulled out of the way.

WHAT'S NOT: The 17-inch Quantex AT897C monitor that accompanied our test system suffered from badly blurred text at its 1600 by 1200 setting and looked somewhat fuzzy even at a less strenuous 1024 by 768 resolution.

WHAT ELSE: The 6X DVD-ROM drive that comes with the M466-2c provides smooth, uninterrupted video playback, even when other applications are open.

BEST USE: A small office with budget constraints could do much worse than this quick, multipurpose system.

LOCK AND LOAD:

Dell's OptiPlex GX100 packs small components into a short case, including a notebook-style CD-ROM drive that makes you press the CD firmly onto the spindle.

5 AXIS SYSTEMS ORION LX/CVE CELERON 400

WHAT'S HOT: For the terrific price of $878, you get a Celeron-400 system that outperformed most similarly configured PCs on our PC WorldBench 98 tests. This budget system also leaves you plenty of room to grow, with three open drive bays and four free slots. The Altec Lansing ACS43W speakers pump out respectable sound.

WHAT'S NOT: The 17-inch ADI VD-697 monitor displays adequate pictures at resolutions up to 800 by 600, but at 1024 by 768, text fuzziness causes discomfort. Our test unit didn't come with much in the way of hard-copy manuals. Documentation is available on the PC's hard drive, but you're out of luck if the drive fails (unless you've printed everything in advance).

WHAT ELSE: The Orion's interior is spacious, but you need a screwdriver to get there, and you have to manhandle the all-metal housing to remove and replace it. Stamped icons clearly identify rear ports. The Keytronic keyboard flexes more than we'd like, and the keys rattle a bit but allow smooth typing.

BEST USE: The Orion LX/CVE is a little rough around the edges, but it would make a competent small-office system.

6 XI COMPUTER 400A MTOWER

WHAT'S HOT: With a PC WorldBench 98 score of 199, this Celeron-400 machine ranks as the fastest computer we've tested with that processor. The MTower comes well configured, with high-end components like a 14GB hard disk, a 6X DVD-ROM drive, and a bright 17-inch monitor that displays crisp and vivid images. The Altec Lansing ACS45 speakers and subwoofer deliver full-bodied sound with real punch. The Keytronic keyboard feels comfortable to use and is quiet. Added into the mix is Microsoft Office 97 Small Business Edition—a boon at this great sticker price.

WHAT'S NOT: This tallish midsize tower looks like any other beige computer except for its sliding plastic cover. ▶

Integrated Graphics Versus Expansion Cards

TECH TREND INTEL'S 810 CHIP set has accelerated a trend toward component integration—the combination of separate motherboard components into one. While PC manufacturers have integrated graphics processors onto their motherboards for years to save space and minimize costs, Intel's integration of a graphics processor inside the 810 chip set gives computer makers another way to save money. But what does an integrated graphics processor mean for your system?

DIAMOND Viper V770

The use of integrated graphics essentially amounts to a lack of flexibility, insists Peter Wicher, product marketing director at 3dfx, a graphics card manufacturer that obviously has a big stake in the market. "With all things being equal in the CPU department, the graphics card is the component that can give [systems] the performance edge," Wicher says. He adds, "It is a lot easier to add a graphics card in a slot than to redesign a motherboard."

Daniel Francisco, a spokesperson for Intel, concedes the upgradability point, but says that Intel feels its customers don't need this flexibility. "Integrated graphics provide excellent 2D and 3D performance for value PCs," he says—referring to computer systems priced at less than $1200.

In the end, whether integrated graphics will adversely affect your productivity depends on the kind of work you'll be doing on your machine. For instance, if your daily computing tasks consist primarily of basic word processing, giving presentations, and browsing the Web, integrated graphics should work well enough. As Mike Feibus, a principal analyst at Mercury Research, explains, "Unless you've got a rabid interest in games or you have work interests that demand the highest level of performance, you're fine with integrated graphics."

PHOTOGRAPH: MARC SIMON

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which ostensibly protects the floppy, DVD-ROM, and expansion drives from dust. Unfortunately, this innovation proved to be more nuisance than nicety: Ours was difficult to open when we needed to access drives; and because the cover does not lock, leaving it ajar proved more convenient than closing it.

WHAT ELSE: We had to undo a couple of screws to loosen the case's side panels, but then the panels slid off easily to reveal a clean, tidy interior with readily accessible slots and bays.

BEST USE: Small-office denizens with a penchant for speed will like this system's power-to-price ratio.

7 NEC POWERMATE VT 300

WHAT'S HOT: The PowerMate VT 300's case opens easily—just loosen a few thumbscrews to get inside. Setup is painless, thanks to a well-designed chart, color-coded cables, and labeled connectors on the back. NEC's crystal-clear 17-inch monitor displays sharp text and graphics, even at 1280 by 1024 resolution.

WHAT'S NOT: Though its PC WorldBench score of 181 is average for a Celeron-366 PC running Windows 98, this system is the slowest member on our budget chart.

WHAT ELSE: In our anonymous calls to the company's tech support line, we found the reps knowledgeable on everything from FAT32 to screen savers.

BEST USE: With its sharp display, the PowerMate is good for offices where someone will stare at the screen all day long but not need much speed.

BOW TO THE TASKMASTER: The Sys Technology TaskMaster 500 costs just $999.

8 SYS TASKMASTER 500

NEW **WHAT'S HOT:** For $999, the TaskMaster 500 is a solid system. Its well laid out interior allows unobstructed access to components. The soft-touch keyboard (which allows crisp keystrokes) and the two-wheel Sys mouse make an excellent input device combination.

WHAT'S NOT: The TaskMaster 500's PC WorldBench 98 score of 209 lags slightly behind those of other Celeron-500 systems running Windows 98. At a time when many machines offer tool-less entry to their cases, the Sys makes you remove two tiny screws to get inside. The bundled Axion CL-1770 17-inch monitor blurs at its maximum 1024 by 768 resolution, and the integrated video's limited display cache supports only 16-bit color at that resolution.

WHAT ELSE: A case lock helps safeguard against system theft. The keyboard connects to the system via an old-fashioned PS/2 adapter.

BEST USE: A budget-conscious home office would do well to employ the TaskMaster 500.

9 PREMIO APOLLO II CS1

NEW **WHAT'S HOT:** Cabling in the Apollo's orderly interior is bundled out of the way to give you easy access to components. A case lock keeps intruders out of the midsize tower. The keyboard allows for smooth typing.

WHAT'S NOT: The 17-inch Premio TE770B monitor produces fuzzy images at all resolutions, but the blur is worse at higher settings. You must remove two screws before you can get inside the flimsy plastic case. One of the two serial ports inside is located awkwardly on a bracket near the expansion slots (it doesn't take up a slot).

WHAT ELSE: The Celeron-500 CPU boosts the Apollo's PC WorldBench score to 211—average for this processor class. The large Premio 636A speaker set is easy to set up but not very powerful. The motherboard offers only two open PCI slots and two open drive bays for future expansion. Premio bundles Microsoft Office 2000 Small Business Edition in this configuration.

JUST UNDER A GRAND: Premio's Apollo II CS1 offers a Celeron-500 processor for $999. Its built-in case lock helps secure interior components from prying hands.

BEST USE: With decent power and Office 2000, the Apollo could make a solid landing on a small-office desk.

10 POLYWELL POLY 810CW-433

WHAT'S HOT: This affordable $1025 system posted a score of 204 on our PC WorldBench 98 tests, becoming one of the fastest Celeron-433 machines we've evaluated. It ships with an excellent bound manual full of comprehensive computing data, and Polywell provides decent online help.

WHAT'S NOT: Accessing the interior of the tiny case can be a pain: You have to remove three screws and fiddle with the cover to get it off. The small keyboard seemed flimsy, and the keys felt cramped when we typed. Polywell uses integrated video and sound to achieve the compact size; if you want to upgrade the graphics, you'll have to buy a PCI board.

WHAT ELSE: The Poly leaves two slots open for future upgrades, but it has no free internal drive bays and only one available externally accessible bay.

BEST USE: If space and money are constraints, this system fits nicely into a budget office environment. ▶

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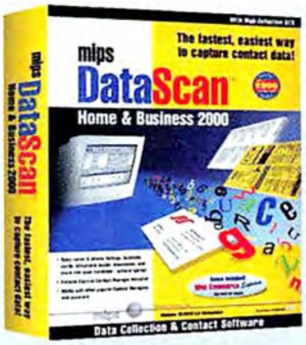

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1	**Gateway Solo 9300LS** 800/315-2536 www.gateway.com	NEW	88	**Average:** $3374	Good 193	**Very good:** Pentium II-400, 15-inch active screen, touchpad, 128MB of RAM, 12GB hard drive
2	**Dell Latitude CPi A366XT** 800/388-8542 www.dell.com	May 99	85	**Inexpensive:** $2799	Satisfactory 184	**Good:** Pentium II-366, 13.3-inch active screen, touchpad, 64MB of RAM, 6.4GB hard drive
3	**Dell Inspiron 7500 C466VT** 800/388-8542 www.dell.com	NEW	84	**Average:** $3501	Outstanding 202	**Good:** Celeron-466, 15-inch active screen, touchpad, 64MB of RAM, 25GB hard drive
4	**Micron TransPort NX PII-400** 800/642-7667 www.micronpc.com	Oct 99	83	**Average:** $3399	Outstanding 202	**Very good:** Pentium II-400, 15.1-inch active screen, touchpad and eraserhead, 128MB of RAM, 14GB hard drive
5	**Compaq Armada M700** 800/345-1518 www.compaq.com	NEW	80	**Very expensive:** $3799	Good 191	**Good:** Pentium II-400, 14.1-inch active screen, eraserhead, 64MB of RAM, 6.4GB hard drive
	MIDRANGE NOTEBOOK: $1700 TO $2699	Percent of overall rating ▶		Price: 14 percent	Performance: 20 percent	Base configuration: 5 percent
1	**Micron TransPort Trek2** 800/642-7667 www.micronpc.com	Sept 99	89	**Average:** $2299	Very good 184	**Good:** Celeron-400, 14.1-inch active screen, touchpad and eraserhead, 64MB of RAM, 4.3GB hard drive
2	**Quantex I-1410** 800/896-4898 www.quantex.com	May 99	87	**Average:** $2199	Very good 191	**Very good:** Pentium II-366, 14.1-inch active screen, touchpad, 128MB of RAM, 8GB hard drive
3	**Fujitsu LifeBook E Series PII-333** 888/466-8434 www.fujitsu-pc.com	Aug 99	86	**Inexpensive:** $1900	Good 176	**Good:** Pentium II-333, 13.3-inch active screen, ErgoTrac pointing device, 64MB of RAM, 6.4GB hard drive
4	**HP OmniBook XE2** 800/322-4772 www.hp.com	NEW	85	**Average:** $2399	Very good 184	**Good:** Pentium II-366, 13.3-inch active screen, touchpad, 64MB of RAM, 6.4GB hard drive
5	**Compaq Prosignia Notebook 165** 800/345-1518 www.compaq.com	Oct 99	84	**Average:** $2699	Very good 183	**Very good:** Pentium II-400, 14.1-inch active screen, touchpad, 64MB of RAM, 10GB hard drive
	BUDGET NOTEBOOK: UNDER $1700	Percent of overall rating ▶		Price: 17 percent	Performance: 17 percent	Base configuration: 5 percent
1	**Toshiba Satellite 2595CDS** 800/867-4422 www.toshiba.com	Nov 99	87	**Average:** $1499	Very good 170	**Good:** Celeron-400, 13.1-inch dual-scan screen, eraserhead, 64MB of RAM, 4.3GB hard drive
2	**IBM ThinkPad I Series 1480** 800/426-7255 ext. 4751 www.ibm.com/pc/us/thinkpad	Nov 99	84	**Expensive:** $1699	Very good 162	**Satisfactory:** Celeron-366, 12.1-inch active screen, eraserhead, 32MB of RAM, 4.8GB hard drive
3	**Chem USA ChemBook 7200** 800/866-2436 www.chemusa.com	Aug 99	82	**Average:** $1499	Very good 165	**Good:** Celeron-333, 12.1-inch active screen, touchpad, 64MB of RAM, 4.8GB hard drive
4	**Compaq Prosignia Notebook 150** 800/345-1518 www.compaq.com	Nov 99	82	**Average:** $1499	Good 153	**Good:** AMD K6-2-380, 12.1-inch active screen, touchpad, 64MB of RAM, 4GB hard drive
5	**Gateway Solo 2500SE** 800/315-2536 www.gateway.com	Nov 99	80	**Expensive:** $1699	Good 154	**Satisfactory:** Celeron-366, 12.1-inch active screen, touchpad, 32MB of RAM, 4.3GB hard drive
	Best Buy	Percent of overall rating ▶		Price: 20 percent	Performance: 14 percent	Base configuration: 5 percent

[1] Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.

[2] For more information about all the products listed in this table, select number 903 on the product information card or visit www.pcworld.com/productinfo.

[3] Five years on CPU and main memory, one year on other parts.

NOTEBOOK VENDORS often claim their portables are as powerful and versatile as desktop PCs, quipping, "Now you can take your PC with you," or calling their laptops "desktop replacements." Some of these vendors deliver: Note the massive 25GB hard drive in the Dell Inspiron 7500 C466VT on this month's power list, the 128MB of RAM in the Quantex I-1410 on our new midrange chart, and the Celeron-400 CPU in the budget Toshiba Satellite 2595CDS.

POWER NOTEBOOK

1 GATEWAY SOLO 9300LS

NEW **WHAT'S HOT:** Its thin, sleek design. Plus, the Solo 9300LS's 12-cell lithium ion battery outlasts other laptops' power packs. With a second battery in its multipurpose bay, the Gateway should be able to run as long as some Windows CE devices. It lasted 5

Extra features	Design and ease of use	Battery life (hours:min)	Travel weight (pounds)[1]	Vendor's system reliability	Tech support quality/ policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)	Product info number[2]
Very good: 4X DVD-ROM drive, V.90 modem, lithium ion battery, multipurpose bay takes second battery	**Excellent:** slick multimedia design	**Outstanding:** 5:06	**Average:** 8.6	**Good**	**Good/ Good**	**24/7, toll-free**	**3/3**	**633**
Good: 10X-20X CD-ROM drive, lithium ion battery, multipurpose bay takes second battery	**Very good:** easy to upgrade	**Satisfactory:** 2:15	**Average:** 7	**Outstanding**	**Good/ Good**	**24/7, toll-free**	**3/3**	-
Excellent: 4X DVD-ROM drive, V.90 modem, lithium ion battery, multipurpose bay takes second battery, Zip drive	**Excellent:** vast storage possibilities, screen overbite	**Good:** 2:34	**Very heavy:** 10.4	**Outstanding**	**Good/ Good**	**24/7, toll-free**	**3/3**	-
Very good: 4X DVD-ROM drive, V.90 PC Card modem, lithium ion battery, multipurpose bay takes second battery	**Average:** accepts many add-in devices	**Satisfactory:** 2:26	**Heavy:** 9.9	**Good**	**Good/ Fair**	**24/7, toll-free**	Varies [3]/1	**634**
Very good: 4X DVD-ROM drive, V.90 modem, lithium ion battery, multipurpose bay takes second battery	**Average:** accepts a wide range of add-ins	**Outstanding:** 4:35	**Light:** 6.6	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**3/3**	**635**
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**			
Good: 12X-24X CD-ROM drive, V.90 modem, lithium ion battery, multipurpose bay takes second hard drive	**Very good:** versatile desktop replacement	**Good:** 2:38	**Average:** 8.7	**Good**	**Good/ Fair**	**24/7, toll-free**	Varies [3]/1	**636**
Satisfactory: 4X DVD-ROM drive, V.90 modem, lithium ion battery, multipurpose bay takes second battery	**Average:** good audio	**Very good:** 3:15	**Heavy:** 9.7	[4]	**Good [5]/ Fair**	**24/7, toll-free**	Varies [6]/1	**637**
Excellent: 12X-24X CD-ROM drive, V.90 modem, lithium ion battery, two shared bays (one holds second battery)	**Very good:** two versatile bays	**Good:** 2:25	**Average:** 8.2	**Good**	**Poor/ Fair**	**24/7, toll-free**	**1/1**	**638**
Satisfactory: 10X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Average:** fairly thin all-in-one	**Good:** 2:45	**Average:** 7.6	**Good**	**Good [5]/ Poor**	**24/7, toll-free [7]**	**1/1**	**639**
Good: 12X-24X CD-ROM drive, V.90 modem, lithium ion battery, multipurpose bay takes second battery	**Excellent:** best built-in audio available	**Satisfactory:** 2:09	**Heavy:** 8.9	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**3/1**	**640**
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**			
Satisfactory: 12X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Average:** built-in speakers	**Very good:** 3:12	**Average:** 7.7	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**1/1**	**641**
Satisfactory: 10X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Average:** comfortable keyboard	**Very good:** 3:07	**Average:** 7.9	**Good**	**Good/ Fair**	**24/7, toll-free**	**1/1**	-
Satisfactory: 10X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Average:** best feature is great keyboard	**Very good:** 3:20	**Average:** 6.9	[4]	**Fair [5]/ Fair**	**24/7, toll-free**	**1/3**	**642**
Satisfactory: 12X-24X CD-ROM drive, V.90 modem, lithium ion battery	**Very good:** superb built-in sound	**Satisfactory:** 2:19	**Average:** 8.1	**Fair**	**Fair/ Fair**	**24/7, toll-free**	**3/1**	**643**
Poor: 10X-24X CD-ROM drive, V.90 modem, NiMH battery	**Average:** built-in mic, floppy drive removes easily	**Good:** 2:31	**Average:** 7.8	**Good**	**Good/ Good**	**24/7, toll-free**	**3/3**	**644**
Extra features: 5 percent	**Design and ease of use: 10 percent**	**Battery life: 8 percent**	**Weight: 8 percent**	**Reliability: 20 percent**	**Support and warranty: 10 percent**			

[4] Insufficient data to give a rating.

[5] Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

[6] Three years on CPU and main memory, one year on other parts.

[7] Toll-free for three years.

hours and 6 minutes in our tests, 31 minutes longer than the second longest lasting notebook, Compaq's Armada M700.

WHAT'S NOT: At $3374, the Solo 9300LS is on the expensive side. Its PC WorldBench 98 score of 193 is quick for a notebook, but below average for a PII-400.

WHAT ELSE: The 9300LS has many of the discontinued 9150LS's audiovisual extras yet weighs a pound less. Like the 9150LS, the 9300LS sports TV-in and TV-out ports and a Dolby jack for connecting a surround-sound stereo system. Other features include buttons to make playing audio CDs more convenient, an IEEE 1394 port for capturing digital video (you supply the editing software), and programmable shortcut buttons at the top of the keyboard for launching apps. Another nicety: A charge indicator on the ▶

LISTEN WHILE YOU WORK: Toshiba builds stereo speakers into its Satellite 2595CDS.

PHOTOGRAPHS: KEN SMITH

outside of the notebook lets you check on leftover juice without removing the battery.
BEST USE: Presenters and digital editors with relatively deep pockets will appreciate this beautifully designed notebook.

MIDRANGE NOTEBOOK

1 MICRON TRANSPORT TREK2

WHAT'S HOT: Removing devices for upgrading is a snap, because you can access memory slots, the CD-ROM drive, and the hard drive without tools. You can connect multiple multimedia devices for recording and playing sound. The multipurpose bay supports a second hard drive.
WHAT'S NOT: Thin-sounding speakers don't do justice to the TransPort's impressive audio and video components.
WHAT ELSE: Upgrading the CD-ROM drive to a DVD-ROM drive (for $199) lets you take advantage of the Trek2's S-Video port so you can watch movies on a television. The system runs a shade faster than other Celeron-400 portables we've tested, and it offers average battery life of about 2.5 hours. The Trek2 has both a touchpad and an eraserhead, but the latter's use as a primary input device is limited because you can't configure it (out of the box) for tapping. The eraserhead is also too far away from the two mouse buttons, which are located in front of the touchpad.
BEST USE: A desktop replacement with some top-notch audio and video features.

A STAND-UP LAPTOP: Compaq's streamlined Armada M700 is just a little over an inch thick with the screen closed. Despite its svelte form, it delivers the multimedia goods.

BUDGET NOTEBOOK

1 TOSHIBA SATELLITE 2595CDS

WHAT'S HOT: The Toshiba's 13.1-inch screen is big for a $1499 laptop. In our tests, its battery lasted a long 3 hours and 12 minutes. The system also sports programmable shortcut keys.
WHAT'S NOT: A cursor trail, the only giveaway that the screen is dual-scan, may annoy some users. The hard drive goes back to the manufacturer for upgrading.
WHAT ELSE: This all-in-one unit offers few upgrade possibilities. The keyboard and crescent-shaped mouse buttons (arranged vertically) are comfortable to use, and Toshiba bundles lots of software.
BEST USE: With its long battery life, the Satellite is a good choice for travelers on a Motel 6 budget.

PORTABLE BLUES: Hewlett-Packard's all-in-one OmniBook XE2 doesn't miss a beat. The laptop offers colorful external controls that permit users to play music CDs without having to power up the notebook first.

New This Month

IF YOU'VE BEEN waiting for a laptop with 75GB of storage, put Dell's new $3501 Inspiron 7500 C466VT on your holiday wish list. This 10.4-pound desktop replacement, ranked third on our power list, can hold three 25GB hard drives at once if you remove the battery and DVD-ROM/floppy drive combo.

Unlike the speakers in previous Inspirons, the C466VT's produce loud sound (although not as rich as that generated by Compaq Prosignia laptops). Like the Quantex I-1511 and new vendor Impression's 4315 (two also-rans nearly identical to the Inspiron), the C466VT suffers from a half-inch screen overbite. That could make the 15-inch screen take the brunt of the impact in case of a fall.

NEC VERSA SX KILLER?

FOR THE LAST two years, NEC's Versa SX has reigned as the only ultrathin, full-size laptop capable of accepting a wide range of add-in accessories. That sovereignty comes to an end with the introduction of Compaq's new Armada M700, a $3799 Pentium II-400 notebook that debuts in fifth place on the power chart this month. Like the SX, the M700 measures only a little over an inch thick with the screen closed and weighs less than 5 pounds with a spaceholder plugged into its modular bay. It can hold almost as many different types of removable drives as the SX (though Compaq doesn't sell an internal Zip drive), performed just as well as the SX in our benchmark tests, and outruns the SX in battery life: 4.6 hours compared to the NEC's 2 hours. On the other hand, the M700 costs more than the NEC (an SX with a 6GB hard drive goes for $3349), its all-gray case looks drab next to the two-tone SX, and it forfeits some of the SX's slicker touches, like an external battery charge indicator. —*Carla Thornton*

Contributing Editor Carla Thornton regularly covers notebooks for PC World. ▶

ALSO NEW THIS MONTH

WE EVALUATED THE following systems along with the others, but they didn't score high enough to reach the *Top 15 Notebook PCs* chart. For write-ups, visit PC World Online (www.pcworld.com/top400).

- **Impression 4315**
- **NEC Versa LX PII-400**

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- Compaq V.90 Data/Fax Modem[5]
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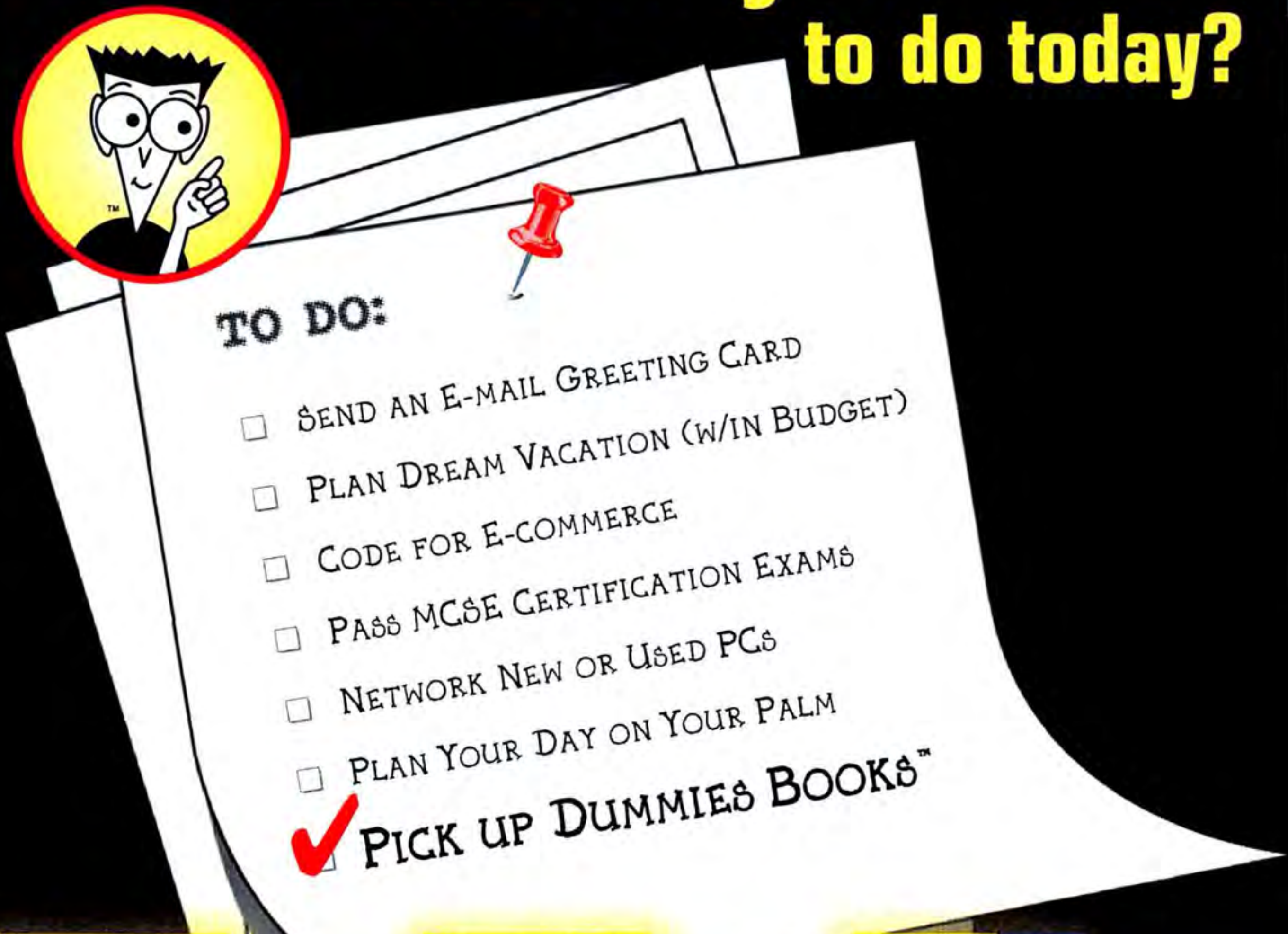
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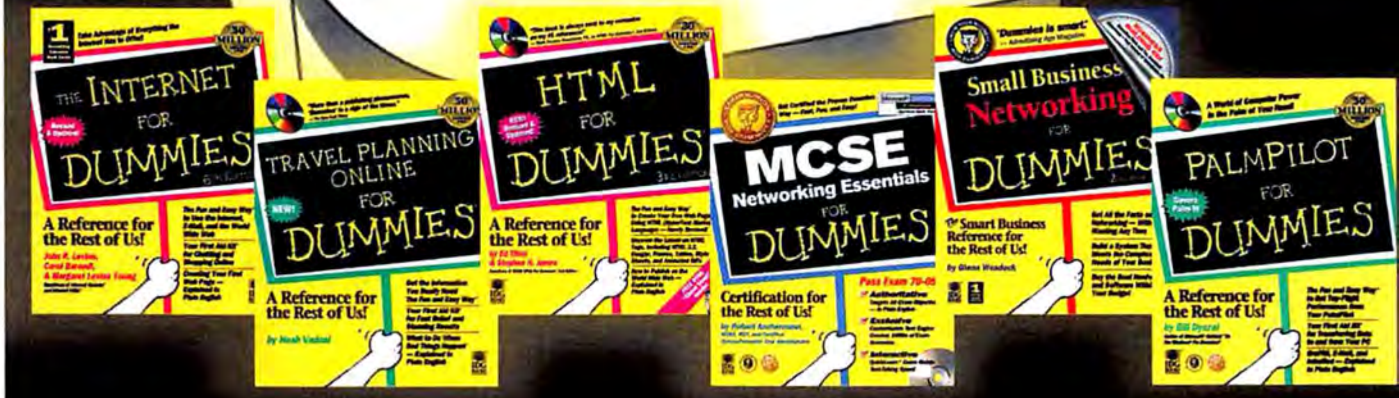
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TOP 10 SCANNERS

	SOHO SCANNER	Street price (9/29/99)	Overall rating	Scan quality	Scan speed—B&W at 300 dpi/color at 600 dpi (seconds per page)	Comments	Product info number
1	**Epson Perfection 636U** 800/463-7766 www.epson.com	$199	98	Very good	12/74	**FEATURES:** USB, 600 by 2400 dpi, 11.3-by-16.8-by-3.5-inch unit,[1] 9.9 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter. **SUMMARY:** This USB unit delivers the same great features as its SCSI twin, the Epson Perfection 636, for $100 less. Easy installation and lifetime support win it the SOHO Best Buy.	-
2	**Microtek SlimScan C6** 800/654-4160 www.microtekusa.com	$90	89	Very good	36/81	**FEATURES:** USB, 600 by 1200 dpi, 10.4-by-16.4-by-1.7-inch unit,[1] 7.7 pounds, 8.5-by-11.7-inch scanning area, no transparency adapter. **SUMMARY:** This low-cost, lightweight unit is the only CIS (non-CCD) scanner on the chart. Impressive scan quality, choice software, and good support keep it high on the list.	669
3	**Microtek ScanMaker X6** 800/654-4160 www.microtekusa.com	$100	88	Good	34/50	**FEATURES:** USB, 600 by 1200 dpi, 11.5-by-17.3-by-3.2-inch unit,[1] 11 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter. **SUMMARY:** Solid scan quality and overall performance make this model a contender. A $20 price cut, strong software, and well-rounded features sweeten the deal.	670
4	**HP ScanJet 5200Cse** 800/722-6538 www.scanjet.com	$299	87	Very good	24/80	**FEATURES:** Parallel and USB, 600 by 1200 dpi, 12-by-19.1-by-4.9-inch unit,[1] 12.5 pounds, 8.5-by-11.7-inch scanning area, optional 35mm slide adapter. **SUMMARY:** Versatile but pricey scanner delivers admirable scan quality, includes useful software, and has an easy-to-use design.	671
5	**Acer AcerScan Prisa 620UT** 800/377-2237 www.acerperipherals.com	$149	86	Good	27/112	**FEATURES:** USB, 600 by 1200 dpi, 12-by-18-by-4-inch unit,[1] 9.5 pounds, 8.5-by-11.7-inch scanning area, includes transparency adapter. **SUMMARY:** Beyond good scan quality, this all-purpose unit scans transparent and reflective materials. Without a transparency adapter, $99 AcerScan Prisa 620U is also a good value.	672
6	**Visioneer OneTouch 8600** (NEW) 888/229-4172 www.visioneer.com	$299	85	Good	18/96	**FEATURES:** Parallel and USB, 600 by 1200 dpi, 16.7-by-11.7-by-3.7-inch unit,[1] 6.4 pounds, 8.5-by-11.7-inch scanning area, no transparency adapter. **SUMMARY:** Relatively high-priced newcomer lands on the chart with zippy performance, handy seven-button front panel, and a sleek design.	673
7	**Agfa SnapScan Touch** (NEW) 888/281-2302 www.agfahome.com	$129	85	Very good	35/85	**FEATURES:** USB, 600 by 1200 dpi, 12-by-18-by-4.13-inch unit,[1] 14 pounds, 8.5-by-11.7-inch scanning area, no transparency adapter. **SUMMARY:** Impressive scan quality, easy-to-use push-buttons, and toll-free tech support make this newcomer a wise choice for entry-level scanning tasks.	674
	CORPORATE SCANNER						
1	**Umax Astra 2400S** 800/562-0311 www.umax.com	$299	95	Good	12/67	**FEATURES:** SCSI, 600 by 2400 dpi, 13.2-by-23.3-by-5.9-inch unit,[1] 14.6 pounds, 8.5-by-14-inch scanning area, optional transparency adapter. **SUMMARY:** Fast performance and outstanding support earn this legal document-capable unit a Best Buy. Scan quality, software, and price are other strong points.	675
2	**HP ScanJet 6350C** 800/722-6538 www.scanjet.com	$499	94	Very good	13/76	**FEATURES:** SCSI and USB, 1200 by 2400 dpi, 12.3-by-19.6-by-7.6-inch unit,[1] 15.8 pounds, 8.5-by-11.7-inch scanning area, includes transparency adapter and ADF. **SUMMARY:** A great choice for OCR, this speedy model includes an automatic document feeder, scans 35mm slides, and produces top-quality scans.	676
3	**Canon CanoScan FB 1200S** 800/652-2666 www.ccsi.canon.com	$499	93	Very good	20/74	**FEATURES:** SCSI, 1200 by 1200 dpi, 11.5-by-18.1-by-3-inch unit,[1] 8.8 pounds, 8.5-by-11.7-inch scanning area, optional transparency adapter and ADF. **SUMMARY:** High-resolution corporate model boasts great color and detail, plus lifetime support, but it's a tad slow, and comes priced at a premium.	677

Best Buy   For expanded reviews of this month's scanners, visit www.pcworld.com/dec99/scanners.   All products: 907

HOW WE TEST All scanners are tested with default settings under Windows 98 on a Dell Dimension V333 (Pentium II-333) PC with 64MB of RAM, using each scanner's bundled software. Overall score is based on scanned image quality (28 percent), scanning speed (25 percent), ease of use (17 percent), features (15 percent), support (10 percent), and price (5 percent). Speed tests are timed from the start of scanning until cursor control is regained. Data based on tests designed and conducted by the PC World Test Center.

[1] Dimensions are listed in the following order: width, depth, and height.

WELCOME TO THE WORLD of push-button scanning. Nearly every model on this month's SOHO chart has at least one quick-start button, but two new units pull out all the stops: The $129 Agfa SnapScan Touch features four and the $299 Visioneer OneTouch 8600, a whopping eight. If you're looking for quick-launch buttons on a beefier unit, check out HP's ScanJet 6350C and Canon's CanoScan FB 1200S on our corporate chart. ■

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TOP 10 MONITORS

	19-INCH MONITOR	Month tested	Street price (9/15/99)	Overall rating	Quality of text/graphics	Comments	Product info number
1	★ Samsung SyncMaster 950p 800/726-7864 www.samsungmonitor.com	NEW	$392	88	Very good/ Very good	**FEATURES:** 17.9-inch viewable area, .26mm dot pitch tube, up to 119-Hz refresh rate,[1] Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** A dirt-cheap price, razor-sharp text, fine colors, and generous support garner this handsome model top honors. BNC connectors[2] are a nice extra.	688
2	Dell UltraScan P991 800/289-3355 www.dell.com	NEW	$559	86	Excellent/ Very good	**FEATURES:** 17.8-inch viewable area, .25mm FD Trinitron stripe pitch tube,[3] up to 134-Hz refresh rate,[1] Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Bright colors and high refresh rates overshadow humdrum case design and somewhat high price.	-
3	Mitsubishi Diamond Pro 900u 800/843-2515 www.mitsubishi-display.com	retested this month	$659	85	Very good/ Excellent	**FEATURES:** 18-inch viewable area, .25/.27mm Diamondtron NF variable stripe pitch tube,[3] up to 117-Hz refresh rate,[1] Plug and Play ready, TCO'95 compliant, three-year warranty, 12-hour daily toll-free support. **SUMMARY:** Pricey, but offers lovely colors, sharp text, front USB port, and BNC connectors.[2] Shortish support hours.	689
4	Sampo AlphaScan 812SR 877/467-2676 www.sampotech.com	NEW	$429	84	Very good/ Very good	**FEATURES:** 17.5-inch viewable area, .25mm dot pitch tube, up to 130-Hz refresh rate,[1] Plug and Play ready, TCO'92 compliant, three-year warranty, 10-hour daily toll-free support. **SUMMARY:** Competitive price, space-saving design, and strong text and graphics overcome short support hours and relatively small viewable area.	690
5	MAG InnoVision XJ800V 800/827-3998 www.maginnovision.com	NEW	$399	82	Very good/ Excellent	**FEATURES:** 17.9-inch viewable area, .26mm dot pitch tube, up to 112-Hz refresh rate,[1] Plug and Play ready, three-year warranty, 11-hour daily toll-free support. **SUMMARY:** Low price and terrific graphics quality reap a spot on the chart, but tech support hours lag behind most, and on-screen controls are hard to navigate.	691
	21-INCH MONITOR						
1	★ Mitsubishi Diamond Pro 2020u 800/843-2515 www.mitsubishi-display.com	NEW	$1169	90	Very good/ Very good	**FEATURES:** 19.7-inch viewable area, .25/.27mm Diamondtron NF variable stripe pitch tube,[3] up to 112-Hz refresh rate,[4] Plug and Play ready, TCO'99 compliant, three-year warranty, 12-hour daily toll-free support. **SUMMARY:** Graceful design, large viewable area, nuanced colors, sharp detail; front USB port and BNC connectors.[2]	692
2	Panasonic PanaSync P110i 800/742-8086 www.panasonic.com/alive	NEW	$1049	89	Very good/ Very good	**FEATURES:** 19.6-inch viewable area, .25mm dot pitch tube, up to 115-Hz refresh rate,[4] Plug and Play ready, TCO'95 compliant, three-year warranty, 12-hour weekday toll-free support. **SUMMARY:** Crisp text, saturated colors, and a fine array of intuitive on-screen controls. Tech support hours aren't as generous as some.	693
3	Cornerstone Peripherals Technology c1001 800/562-2552 www.bigmonitors.com	NEW	$945	88	Very good/ Very good	**FEATURES:** 19.7-inch viewable area, .25mm dot pitch tube, up to 88-Hz refresh rate,[4] Plug and Play ready, TCO'99 compliant, five-year warranty, 24-hour weekday toll-free support. **SUMMARY:** Moderately priced, displays lively colors and solid text. Advanced controls and color-correction utilities add to overall value.	694
4	Sony CPD-G500 800/352-7669 www.sony.com/displays	NEW	$1199	84	Very good/ Good	**FEATURES:** 19.6-inch viewable area, .24mm FD Trinitron stripe pitch tube, up to 97-Hz refresh rate,[4] Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour toll-free support. **SUMMARY:** Crisp, dark text and logically organized on-screen controls compensate for high price and relatively weak graphics scores.	695
5	ViewSonic P815 800/888-8583 www.viewsonic.com	NEW	$899	84	Good/ Good	**FEATURES:** 19.8-inch viewable area, .25mm dot pitch tube, up to 108-Hz refresh rate,[4] Plug and Play ready, TCO'99 compliant, three-year warranty, 24-hour weekday toll-free support. **SUMMARY:** Comprehensive on-screen controls, BNC connectors,[2] and low price are pluses, though colors and text pale next to competing brands.	696

★ **Best Buy** **All products: 909**

TEST PC WORLD CENTER **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] Specialized connector used with some high-end graphics cards. [3] Uses an aperture grille tube with a variable stripe pitch of .25mm at the center and .27mm at the sides. [4] Highest refresh rate at 1280 by 1024 resolution.

NEWER MODELS with lower prices flood our chart this month. Samsung's SyncMaster 950p, our top 19-inch pick, offers the best all-around value—a fine low-cost choice for producing professional documents and graphics. Among 21-inchers, Mitsubishi's classy Diamond Pro 2020u combines great colors with advanced features like handy USB ports and BNC connectors to snag a Best Buy. Next month: the latest 17-inch models. ■

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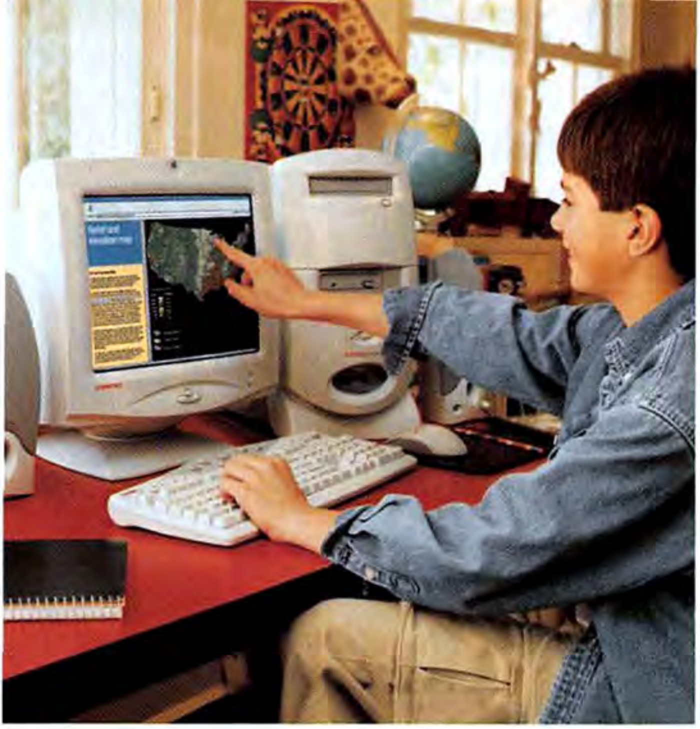
[†] All prices shown are Compaq Direct selling prices and do not include applicable sales tax and shipping, are valid in the U.S. only and are subject to change or cancellation without notice. Not all models available in retail stores. Illustrations may not accurately represent exact configurations priced. Compaq is not liable for editorial, pictorial, or typographical errors in this advertisement. [‡] Financing available on approved credit through MBNA America Bank, N.A., by arrangement with Compaq Capital. Payments based on a 48-month term at a fixed Annual Percentage Rate as low as 14.99%. Your APR may be higher. There is no fee for Compaq purchases billed directly to your account. However, there is an access check fee of 2% of the U.S. Dollar amount of each advance check ($2 min./$15 max.). [††] System tested using NSTL YMARK2000 hardware test. Non-compliant third-party software/hardware products may affect rollover results. For more details, see www.compaq.com/year2000. [*] Requires sharing subscriber profile information and viewing targeted ads. Other terms and conditions also apply. See NetZero User Agreement for details. [‡‡] For hard drives, GB=billion bytes. [||] 32X Max CD-ROM data transfer rates may vary from 1800 to 4800 Kbps. [¶] ITU V.90 modems are designed only to allow faster downloads from K56flex- or V.90-compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56 Kbps, and will vary with line conditions. [§] Works with most third-party devices. [#] CD-RW drive data transfer rates may vary as follows: for recording to CD-R media, the data transfer rate may vary from 150 to 600 Kbps; for writing to CD-RW media,



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32X Max CD-ROM Drive[2]	32X Max CD-ROM Drive[2]	10X DVD-ROM Drive[6]
2X AGP with 64-bit Hardware Accelerated 3D Graphics	Voodoo 3 1000 2X AGP Graphics Card with 16 MB	Voodoo 3 1000 2X AGP Graphics Card with 16 MB
ESS Solo PCI Audio	ESS Solo PCI Audio	Creative Labs 1373 Audio
56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]
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Creativity Action Center	Digital Creativity Imaging Center[4]	Digital Creativity Imaging Center[4]
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Microsoft® Word	Microsoft Featured Home Collection	Home Phoneline Networking[5]
Microsoft Windows®98	Microsoft Word	Microsoft Featured Home Collection + MS® Word
Compaq CV515 15" Monitor (13.8" VIA)	Microsoft Windows98	Microsoft Windows98
	Compaq CV715 17" Monitor (16.0" VIA)	Compaq CV715 17" Monitor (16.0" VIA)
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the data transfer rate may vary from 150 to 300 Kbps; for reading to CD media, the data transfer rate may vary from 1500 to 3600 Kbps. An appropriate license may be required. [6]10X DVD-ROM drives read a minimum of 5545 Kbps and a maximum of 13525 Kbps. [7]The 6.0Mb Max Digital Modem uses the ADSL/G.Lite protocol. ADSL/G.Lite updates may be downloaded from Compaq's website when available. The ADSL/G.Lite protocol is designed to allow faster downloads from ADSL/G.Lite-compliant digital sources. Availability of ADSL/G.Lite services will vary by region and Internet Service Provider (ISP), and may differ from V.90 ISP services. Maximum achievable download transmission rates with ADSL/G.Lite are currently unknown, may not reach 6.0Mbps, and will vary with line conditions and distance. [5]Home Phoneline Networking and Ethernet Port cannot be used simultaneously. Additional PC must have a network adapter, sold separately. AOL is a single user systerm and will not allow multiple users to access simultaneously under the same account. Other Internet Service Providers may have the same restrictions. One year parts and labor. Labor for desktops systems is pick-up service during the first 90 days of ownership. Compaq, the Compaq Logo, and Presario are registered in the U.S. Patent and Trademark Office. Microsoft® Windows®98 installed. Microsoft, MS, and Windows are registered trademarks of Microsoft Corporation. Intel, the Intel Inside Logo, and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. Iomega and Zip are registered trademarks and Zip Built-In is a trademark of Iomega Corporation. Product and company names mentioned herein may be trademarks and/or registered trademarks of other companies. Call Compaq Monday–Friday, 7:00am–11:00pm (CT). ©1999 Compaq Computer Corporation. All rights reserved.

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PC WORLD

TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (10/5/99)	Overall rating	Mixed-media business rating	3D rating	Features rating	Comments	Product info number
1	**Matrox Millennium G400 32MB** 800/361-1408 www.matrox.com/mga	Sept 99	$199	90	Excellent	Excellent	Excellent	**FEATURES:** 32MB of SGRAM, 300-MHz RAMDAC, Matrox G400 chip, bundled image editor, 3D modeling tool, and 3D game. **SUMMARY:** Speedy card lets you run apps simultaneously on two displays. A slightly slower 16MB version costs $50 less.	678
2	**ATI Xpert 2000** 905/882-2600 www.ati.com	NEW	$99	90	Excellent	Excellent	Excellent	**FEATURES:** 32MB of SDRAM, 250-MHz RAMDAC, ATI Rage 128 chip, bundled 3D game. **SUMMARY:** Affordable price and excellent all-around performance make it a terrific buy for basic graphics tasks and occasional 3D gaming.	679
3	3dfx Voodoo3 3500 TV 800/234-4334 www.3dfx.com	Nov 99	$249	89	Excellent	Excellent	Excellent	**FEATURES:** 16MB of SDRAM, 350-MHz RAMDAC, 3dfx Voodoo3 chip, bundled video editing tool and 3D games. **SUMMARY:** Extremely fast in 3D and produced good-looking graphics in our 3D-gaming tests. It also lets you view and capture video files.	680
4	ATI Xpert 128 905/882-2600 www.ati.com	Aug 99	$89	89	Good	Good	Excellent	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, ATI Rage 128GL chip, bundled graphics plug-in and 3D games. **SUMMARY:** Lowest-priced AGP board here. An affordable choice for those who use standard office apps and play games.	681
5	Matrox Millennium G400 Max 800/361-1408 www.matrox.com/mga	Sept 99	$249	88	Excellent	Excellent	Excellent	**FEATURES:** 32MB of SGRAM, 300-MHz RAMDAC, Matrox G400 Max chip, bundled image editor, 3D modeling tool, and 3D game. **SUMMARY:** Fastest at mixed-media business graphics, but ranks below G400 32MB sibling due to high price.	682
6	3dfx Voodoo3 3000 800/234-4334 www.3dfx.com	July 99	$150	88	Excellent	Excellent	Good	**FEATURES:** 16MB of SDRAM, 350-MHz RAMDAC, 3dfx Voodoo3 chip, bundled 3D games. **SUMMARY:** Speedy card costs $30 less and regains a seat on the chart. But unlike its peers, it doesn't support 32-bit color for displaying more realistic effects.	683
7	Creative Labs 3D Blaster RIVA TNT2 Ultra 800/998-1000 www.creative.com	Sept 99	$200	88	Good	Good	Good	**FEATURES:** 32MB of SDRAM, 300-MHz RAMDAC, NVidia RIVA TNT2 Ultra chip, no bundled applications. **SUMMARY:** Solid performance in office apps and very fast in games, although it's still a tad slower than some of its competitors.	684
	PCI BOARD								
1	**3dfx Voodoo3 2000** 800/234-4334 www.3dfx.com	Oct 99	$100	96	Good	Excellent	Good	**FEATURES:** 16MB of SDRAM, 300-MHz RAMDAC, 3dfx Voodoo3 chip, no bundled applications. **SUMMARY:** Top upgrade choice for avid gamers has the fastest 3D performance among tested PCI cards and now costs $30 less.	685
2	ELSA Erazor II 800/272-3572 www.elsa.com	June 99	$89	86	Good	Average	Excellent	**FEATURES:** 16MB of SDRAM, 250-MHz RAMDAC, NVidia RIVA TNT chip, no bundled applications. **SUMMARY:** Cheapest PCI card on the chart thanks to $20 price drop. Performs well in day-to-day graphics jobs, but it's a little slow in 3D games.	686
3	Matrox Millennium G200 SD PCI 800/361-1408 www.matrox.com/mga	Feb 99	$119	86	Good	Good	Good	**FEATURES:** 8MB of SGRAM, 250-MHz RAMDAC, MGA-G200 chip, bundled 3D modeling tool, image editing application, and 3D game. **SUMMARY:** Speedy in both business graphics and 3D games and offers useful software extras.	687

Best Buy — For reviews of other new graphics cards that we tested this month, visit www.pcworld.com/t10graphics. All products: 908

TEST PC WORLD CENTER **HOW WE TEST** We test boards under Windows 95. Business tests include PC WorldBench 98, a PowerPoint test, and a Macromedia Director script. Our 3D score is based on four games, each evaluated on frame rate and image quality. For AGP cards we add a texturing test using Caligari's TrueSpace3. We tested AGP boards in an NEC Direction 333 with a PII-333 and 64MB of RAM. We tested PCI boards in a Micron Millennia Mme PC with a Pentium MMX-233 and 32MB of RAM. Overall rating is based on performance (AGP 55 percent, PCI 50 percent), features (25 percent), price (AGP 10 percent, PCI 15 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.

GRAPHICS BOARD prices plunge. You can buy ELSA's Erazor II (PCI) for as little as $89 or 3dfx's Voodoo3 3000 (AGP) for $150. Both rejoin the chart after $20 and $30 price cuts, respectively. Matrox's Millennium G400 32MB and ATI's Xpert 2000 tie for AGP Best Buy, thanks to breakneck speed in business applications and 3D games. The 3dfx Voodoo3 2000 wins the PCI Best Buy—it's speediest in its class and very affordable at $100. ■

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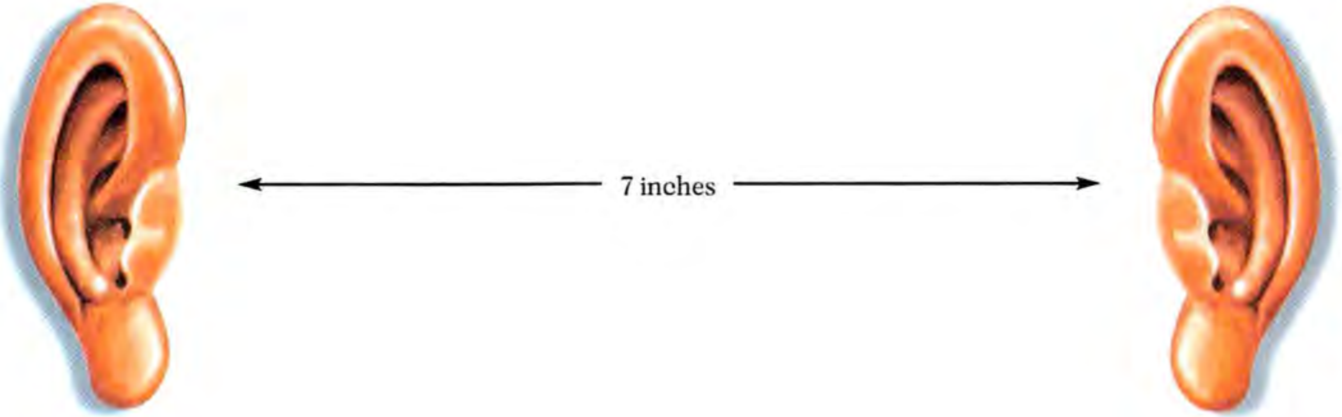

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INSIDE **308** Rule NT's Command Line | **310** Stop Password Prompts | **314** Thaw AOL Freeze-Ups

HERE'S HOW

WINDOWS TIPS

SCOTT DUNN

See Many Files at Once With Thumbnail View

BOTH WINDOWS 98 and Windows 95 with the Desktop Update portion of Internet Explorer 4.*x* installed provide a handy way to take a quick peek at the contents of files in common Web formats (HTML, GIF, JPEG, and so on): Just make sure *As Web Page* is checked on the View menu of any Explorer or folder window. Then select a file to see the preview in the column on the left.

Using this Web-view mode does require you to select one file at a time. Fortunately, you can make all the files in a folder appear as previews to help you quickly find what you need. This feature is especially useful if you work with multiple graphics files or want to visually identify the Web sites in your Favorites folder (see **FIGURE 1**). If only Microsoft hadn't made this feature so hard to find.

Navigate to one of the folders in your Favorites folder (it's located in the Windows folder by default). Right-click a vacant area of the folder window and choose *Properties*. Check the *Enable thumbnail view* box at the bottom, and click *OK*. Right-click an empty area again, and this time choose *Refresh*. If you don't see thumbnails at once, choose *View•Thumbnails*. (If you don't see a Thumbnails command on the menu, close and reopen the folder.) Unless you recently visited the sites, your thumbnails may appear as a series of nearly empty boxes. To fix that, connect to the Internet and press **<Ctrl>-A** to select all thumbnails within the folder. Right-click one of these thumbnails and choose *Refresh Thumbnail*. (If you use this technique on a folder of GIF or JPEG files, you don't need to connect to the Net.)

What's up with Thumbs.db. If a folder's options are set to let you view all files, you may see a new file called Thumbs.db in that folder. This is the folder's thumbnails database. If you don't see Thumbs.db, choose *View•Folder Options*, click the *View* tab, select *Show all files* in the Advanced settings list, and click *OK*. Each folder with a thumbnail view will have its own Thumbs.db file; and the more files a folder contains, the larger its Thumbs.db file will be. So if you're getting tight on disk space, it pays to keep track of how much space these files occupy. To see their cumulative size, choose *Start•Find•Files or Folders*, type **Thumbs.db** in the Name field, choose *Local hard drives* for 'Look in', and click *Find Now*. Press **<Ctrl>-A** to select all the found files, and press **<Alt>-<Enter>** to display a Properties dialog box that shows the total disk space consumed.

If thumbnails are crowding your hard drive, consider changing the View menu setting to something other than Thumbnails. Then display the Properties for the folder as explained above, and uncheck *Enable thumbnail view*. Doing this deletes the Thumbs.db file for that folder. Repeat for as many folders as desired.

Try to remember. Forget which folders you enabled for thumbnail viewing? Search for Thumbs.db as described earlier. The

ILLUSTRATION: PHIL ANDERSON

folders listed in the Find window provide a quick reminder. (The Find window won't, however, show folders that have the feature enabled but contain no thumbnails—such as an empty folder or one containing only unsupported file formats.)

Accidents will happen. If you accidentally delete a Thumbs.db file, don't worry. Windows will re-create the file and the thumbnails the next time you view the folder. If they don't appear then, use the *Refresh Thumbnail* command explained earlier.

Wrapping woes. Often, folders with thumbnails align improperly across the folder window when you resize the window. Align them properly by pressing **<F5>**.

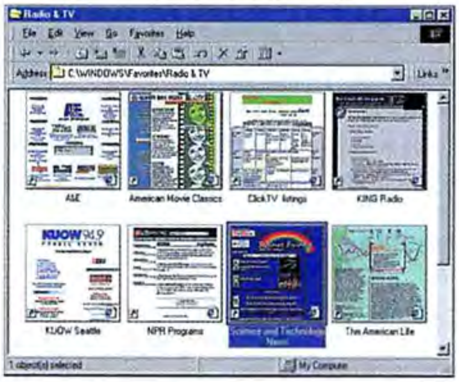


FIGURE 1: CHOOSE A WEB page by scanning the contents of your Favorites folder in thumbnail view.

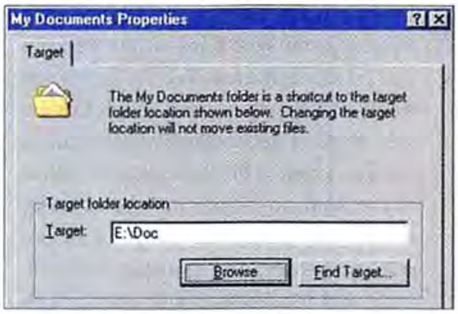
Deletion dilemma. In Win 98, if you delete a folder containing thumbnails and then empty the Recycle Bin, you may get an 'Access denied' error message saying that the disk may be full or write-protected, or that the file in question is in use. Microsoft confirms this bug in its KnowledgeBase (support.microsoft.com/search). To avoid this error, close Windows Explorer before emptying the Recycle Bin.

Go pro. Though the thumbnail view greatly simplifies the task of managing image files, anyone who handles lots of images should consider getting a dedicated utility for handling the job. PolyView, my favorite, maintains the familiar Explorer-like interface but lets you choose the size of the thumbnails, gives you more options for sorting and managing files, and includes many basic image-editing features. PolyView is available as $25 shareware. Download it from PC World Online's FileWorld site or from www.polybytes.com.

PUT 'MY DOCUMENTS' IN ITS PLACE

WHEN YOU INSTALL Windows 98, it creates a folder called My Documents and creates a desktop icon of the same name for quick access to that folder. (You may already have such a folder if you've installed certain other Microsoft products, such as Office 95.) By default, all Microsoft applications (including Paint and WordPad accessories as well as Microsoft Office apps) turn to that folder the first time you choose *File•Open* or *File•Save As.* In addition, choosing *Start•Documents•My Documents* opens a window for the My Documents folder. Keeping your work files separate from your application files is all well and good, but why should you keep them where Microsoft dictates?

Fortunately, there's a quick and easy way to tell Windows where you want to store your work files. Right-click the *My Documents* icon on the desktop, and choose *Properties.* In the 'Target folder location' box, type the path to the drive and folder of your choice (see **FIGURE 2**). Or simply click *Browse,* select the folder of your choice from the drive-and-folder tree diagram, and click *OK.* Next, click *OK* to close the My Documents Properties dialog box. From now on, your Microsoft applications will default to the location you specified, and you'll see that folder when you choose *Start•Documents•My Documents.* If you previously stored some files in the My Documents folder, you can move them and delete the original My Documents folder. As a final touch, you can right-click the *My Documents* icon on the desktop, choose *Rename,* type the new name of your choice, and press **<Enter>**.



The My Documents folder is a shortcut to the target folder location shown below. Changing the target location will not move existing files.

Target: E:\Doc

FIGURE 2: USE THE MY Documents Properties box to make any folder your default documents folder.

WINDOWS TIPS
304 See many files simultaneously with a thumbnail view; refind your lost Active Desktop.

WINDOWS NT
308 Get the hang of NT's fast, powerful command line; power off automatically at shutdown.

ANSWER LINE
310 Tell Windows you don't need no stinking passwords; close multiple programs at once.

INTERNET TIPS
314 Overcome AOL 4.0 freeze-ups and crashes; print Web pages; zap banner ads.

WORD PROCESSING
318 Automate frequent Word tasks with easy supermacros; fix custom-dictionary errors.

SPREADSHEETS
327 Protect your numbers four ways in Excel; activate cells used in a formula.

HARDWARE TIPS
328 Transfer big files with little hassle; fix Windows crashes coming out of Standby mode.

UPGRADE GUIDE
334 Install a new motherboard.

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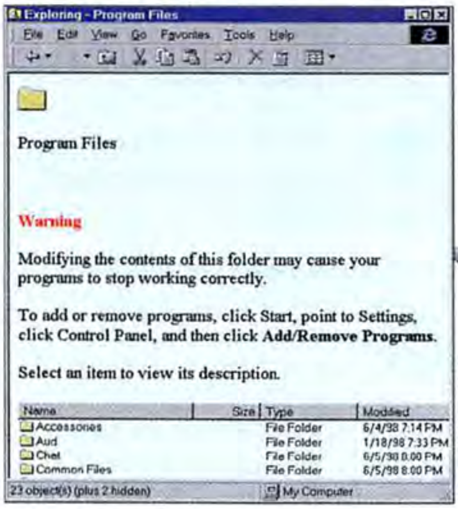
PEEKING THROUGH WINDOWS

THERE YOU ARE, minding your own business, trying to use your networked Windows 95 or NT 4 machine (with Internet Explorer 4's Desktop Update installed) to look at the Program Files folder on a Windows 98 machine elsewhere on the network. If you have *View•as Web page* checked, you may be treated to a scary warning screen like the one in **FIGURE 3**. If you enlarge the window, you may be able to see some of the folder's contents, but since the window lacks scroll bars, you won't get very far. What to do?

You get stuck with this undesirable view because the Windows you're using to look at Win 98 doesn't know ▶

where to find a certain file (Webview.css). Fortunately, the fix is pretty easy. Just select *View•as Web Page,* and uncheck that option. For a more permanent fix, replace Folder.htt—the Web view settings file in the Windows 98 PC's Program Files folder—with another settings file that doesn't care about Webview.css; or copy Webview.css to Program Files, and edit Program File's Folder.htt file to tell it Webview.css's new location.

First, the simple method, which disables the warning. Start by choosing *View•Folder Options* in Windows Explorer or in any folder window. Click the *View* tab. Under 'Hidden files', make sure *Show all files* is selected, and then click *OK.* Next, locate Folder.htt in Program Files on the Windows 98 system. Rename it something like **Folder.old.htt** (you may not see the .htt if extensions are hidden). Now find Folder.htt in the Windows\Web folder of the Windows 98 machine. Copy it to that system's Program Files folder. The next time you access that folder from a networked PC running Windows 95 or NT using IE 4, you'll get a plain-Jane Web view–with scroll bars and no warning. On the other hand, if you'd rather strengthen the warning—and hide all files until you click *Show files* (as normally happens when you view the Windows and System folders in Windows 98)—copy Folder.htt from the Windows 98 PC's Windows folder (or its System folder) to its Program Files folder.


Exploring - Program Files
File Edit View Go Favorites Tools Help

Program Files

Warning

Modifying the contents of this folder may cause your programs to stop working correctly.

To add or remove programs, click Start, point to Settings, click Control Panel, and then click **Add/Remove Programs.**

Select an item to view its description.

Name	Size	Type	Modified
Accessories		File Folder	6/4/98 7:14 PM
Aud		File Folder	1/18/98 7:33 PM
Chat		File Folder	6/5/98 8:00 PM
Common Files		File Folder	6/5/98 8:00 PM

23 object(s) (plus 2 hidden) My Computer

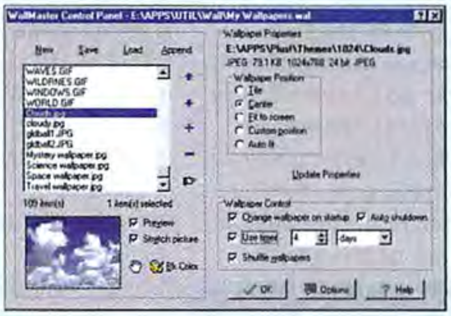
FIGURE 3: A WARNING appears when you access a Win 98 Program Files folder from Win 95 or NT 4.

Of course, replacing the default Folder.htt in Program Files will affect everyone's view of that folder. If that's a problem, follow these steps: First, make sure all files show as before. Then copy the Win 98 system's Windows\Web\Webview.css file to the Program Files folder of the same system. Next, with the Windows 98 PC's Program Files folder showing on your PC, choose *View•Customize this Folder.* Click *Next* twice to open the folder's Folder.htt in Notepad. Find the line beginning with '<link rel=' (it's near the top of the file). In that line, delete '%TEMPLATEDIR%\'; when you're finished, the line will read '<link rel=stylesheet href="webview.css" title="Windows">'. Choose *File•Save* and then *File•Exit.* In the 'Customize this Folder' wizard, click *Finish.* You'll still see a warning in Web view, but you'll have scroll bars for working with the files or folders in the Win 98 PC's Program Files folder.

WINDOWS TOOLBOX

WallMaster Pro: All Pictures Great and Small

I'VE TRIED A LOT of wallpaper managers, but WallMaster Pro is a cut above the competition. Like most utilities in this category, WallMaster (the free version) can change the background on your desktop at preset intervals and save custom collections. But WallMaster also resizes images to fit your screen, without your having to use Microsoft Plus and without distorting image proportions. The $25 commercial version, WallMaster Pro, adds file management functions, better image resizing, the ability to make icon labels transparent (so your wallpaper shows through), and more. Download WallMaster or a trial version of WallMaster Pro from FileWorld or from www.tropicalwares.com.



WHERE'S MY ACTIVE DESKTOP?

I RECENTLY INSTALLED Internet Explorer 5, but Active Desktop either hasn't been installed or isn't working properly. Can you give me any advice on how to make it appear?

Clifford Collings, via the Internet

AS YOU KNOW, Active Desktop is the part of Windows 98's or Internet Explorer's Desktop Update feature that lets you view content from Web sites on the desktop and employ common Web file formats as wallpaper. However, users didn't like the idea of "push" technology, whereby information is sent to the desktop at the whim of the Web site owner instead of being specifically "pulled" in (sought and chosen) by the user. And as a Microsoft publicist told me, users didn't want a Web browser that overhauled their Windows interface. Consequently, Internet Explorer 5 (and presumably its successors) will focus more on Web browsing and less on modifying Windows.

But don't despair. If you want a few enhancements to IE, check out "A Better Way to Explore Your Hard Drives" (www.pcworld.com/jun99/wintips_explore). But if you want to put Web data on your desktop (or just use animated GIFs as wallpaper), you can either upgrade to Windows 98 or find a copy of Internet Explorer 4.01 (for free). To be on the safe side, uninstall Internet Explorer 5 before you install IE 4.01. When setting up 4.01, be sure to install the Windows Desktop Update option if you want the Active Desktop and other interface enhancements. Then install IE 5 over IE 4.01. You can find both browsers at FileWorld.

online *Find files from this article at www.fileworld.com/magazine, and find additional tips at www.pcworld.com/heres_how.* Windows Tips *pays $50 for published tips and questions. Scott Dunn (scott_dunn@pcworld.com) is a contributing editor for* PC World *and a principal author of* The PC Bible, 2nd Edition *(Peachpit Press, 1995).* ■

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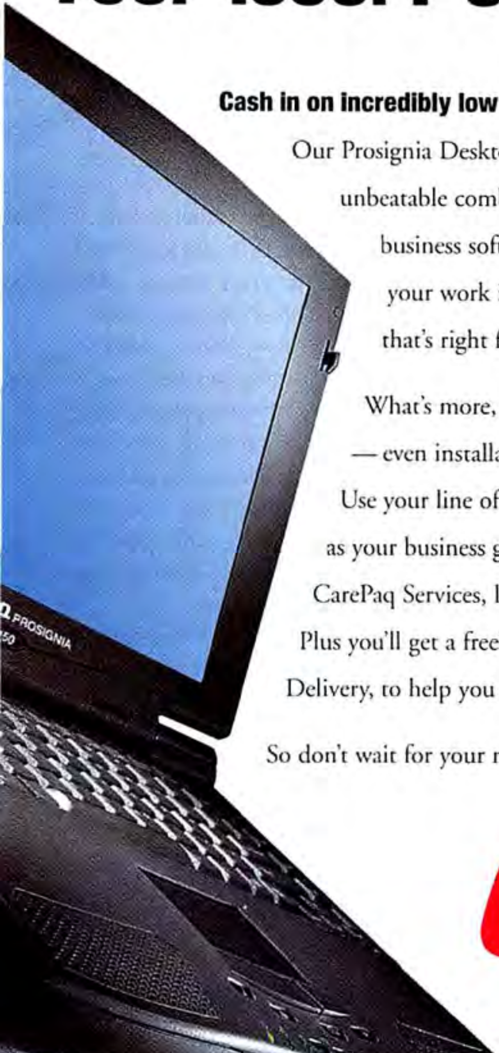

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Command Line Is Alive and Well and Living in NT

Power Down When You Shut Down

WINDOWS 9x can power off your PC automatically at shutdown. NT can't. But from Service Pack 4 on, NT includes a file that lets users get power-off at shutdown on many systems. To try it on your PC, rename the file hal.dll in your WINNT\System32 folder as hal.dll.old. Copy hal.dll.softex from the Service Pack CD to that folder, rename it hal.dll, and reboot. Now select *Start•Run*, type **regedit**, press **<F3>**, and search for *PowerdownAfterShutdown*. Change its value to 1, exit the Registry editor, and reboot.

WHEN YOU BECOME familiar with a complex tool's advanced features, it's easy to forget about the basic ones. Windows NT is no exception. Though you can use and configure almost all of the OS by using menus, dialog boxes, and graphical applications, NT's command line often provides a faster, more powerful interface.

To open a Command Prompt (or Console) window, choose *Start•Programs•Command Prompt*. By default, the Console window is 80 characters wide by 25 lines long and displays white text on a black background. You can modify these and other default settings, however, by using the Console applet in the Control Panel or by opening a command prompt window, pressing **<Alt>-<Space>** to open the system menu, and choosing *Properties*. To enlarge the default console window, select the *Layout* tab in the Properties dialog box, and increase the Height setting under Window Size—I find a setting of 50 roomy enough. If you'd like to be able to scroll back through your command line session, boost the Height setting in the Screen Buffer Size area, as well.

The Options tab is another story. To make NT remember more than the default 50 commands, boost the Buffer Size setting under Command History, and check the *Discard Old Duplicates* option to eliminate extra copies of remembered commands (see **FIGURE 1**). To scroll though your command history in a console window, press **<Up Arrow>** or **<Down Arrow>**; pressing **<F7>** displays a pop-up window containing a numbered list of all commands in the history, and hitting **<F9>** lets you choose a command by number.

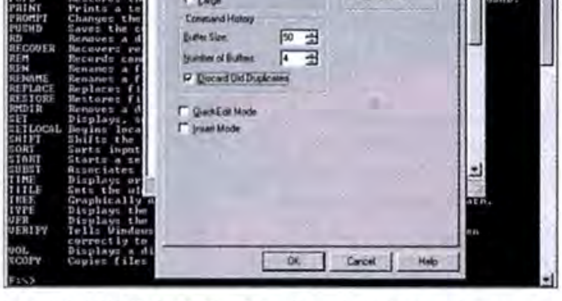
The keyboard isn't the only way to communicate with NT's Console. To copy and paste text into a command prompt window (to avoid typing a long file name and path, for example), open the system menu, choose *Edit•Mark*, and highlight the text you want to copy; then reopen the system menu and choose *Edit•Paste* to paste the text onto the command line. If you want to save yourself the step of selecting *Edit•Mark* before selecting text for copying, simply check the *Quick-Edit Mode* on the Properties dialog box's Options tab.

Once you master the command line interface itself, you'll need some commands. Most (though not all) of the commands familiar to MS-DOS and Windows 9x users are available in Windows NT 4.0. For a list of available commands, type the command **help** and press **<Enter>** at the prompt, or enter **help | more** to see the list a page at a time. NT offers several unique commands, including the string-searching tool findstr, the file and folder access/control utility cacls, and the file-association editor ftype. For instructions on using a particular command, enter the command name followed by **/?**.

These aren't the only commands available in Console mode. You can launch just about any Windows app by entering its file name at the prompt. For example, to open the Control Panel, type **control**; to launch Solitaire, enter **sol**. This approach won't work unless the program appears somewhere in NT's Path setting (enter **path** to see the current setting). You can add specific folders to NT's Path variable by opening Control Panel's *System* applet, clicking the *Environment* tab, selecting *Path* in the System Variables scroll list, and adding a semicolon and the folder's path to the end of the Value string at the bottom of the page. Or at the command prompt, type the full path to the program.

Done with the Console? Type **exit** to close the Command Prompt window.

Scott Spanbauer is a contributing editor for PC World. *Send your questions and tips to nttips@spanbauer.com. We pay $50 for published items.* ■


Command Prompt
Control Panel
File Edit View Go Favorites Help
Console Windows Properties
Options | Font | Layout | Colors
Cursor Size
Display Options
Window
Full Screen
OK Cancel Help

Cursor Size: ● Small ○ Medium ○ Large

Command History

Buffer Size: 50

Number of Buffers: 4

☑ Discard Old Duplicates

☐ QuickEdit Mode

☐ Insert Mode

FIGURE 1: INCREASE THE default number of remembered commands for NT's Console (background), and omit duplicates.

ILLUSTRATIONS: PHIL ANDERSON (LEFT); JEFFREY PELO (RIGHT)

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YOUR QUESTIONS ON: Closing multiple programs at once ◆ **Defective CD-ROMs**

You Don't Need No Stinking Passwords

Stop Office Slowdowns

IF YOU HAVE Outlook 97 or 98, it's probably slowing down your other Office apps by keeping a log of what you do in them. Thomas Plante of Seattle explains how to stop the logging. In Outlook, select *Tools•Options*. Click the *Journal* tab (if you're using Outlook 97) or click the *Preferences* tab and then the *Journal Options* button (Outlook 98). Uncheck all the items in the 'Also record files from' box, and click *OK* until you're back in Outlook. (In Office 2000, such record keeping is turned off by default.)

EVERY TIME I LOAD Windows 98, it asks me for my password. I'm the only person who uses my computer, and I'm not paranoid. Is there any way I can load Windows without this annoyance?

Bob Ruggles, Dayton, Ohio

SEVERAL SETTINGS will cause Windows to ask for a password, for logging on to a network or to Windows itself. If you are on a network, your administrator probably wants you to enter a password. But if you're not, this step is just a nuisance. To bypass the password request, try the following tricks.

2
1
4
6
05
573
409
628

Just say no. When Windows asks for your password, do you hit <Esc>? If you do, you may not have informed Windows that there is no password. Next time, type in a user name (if one isn't there already), leave the Password field blank, and hit **<Enter>**.

Tweak your user profile setting. If Windows detects more than one user name for your computer, it asks for a password by default even if you don't have one. To change this setting, select *Start•Settings•Control Panel*. Double-click the *Passwords* icon, then click the *User Profiles* tab. Select *All users of this PC use the same preferences and desktop settings*, and then click *OK*.

Change your Windows log-on. Windows may think you're on a network even though you're not. To see if this is the cause of your problem, select *Start•Settings•Control Panel*. Double-click Control Panel's *Network* icon and then click the *Configuration* tab. If *Windows Logon* is not selected as the Primary Network Logon, choose it now and click *OK*.

010101
What
Why
When
How

Don't bother to knock. As long as you have a password, Windows will keep asking for it. To get rid of your "open sesame," select *Start•Settings•Control Panel*. Double-click the *Passwords* icon, and click first the *Change Passwords* tab and then the *Change Windows Password* button. (If there is no Change Passwords tab, you don't have a password to delete.) In the 'Old password' field, enter your password, but leave the other two fields blank. Click *OK*.

Hide the password file. If the previous tip does not work for you, it may be because your password log file is corrupted, making it impossible to get rid of the old password. The solution? Find the file in your C:\Windows folder—it'll have a .pwl and the file name will probably be your name—and rename it, changing its extension. To be on the safe side, don't delete it. The next time Windows asks for a password, leave the field blank and press **<Enter>**.

CLOSE MULTIPLE PROGRAMS SIMULTANEOUSLY

IS THERE ANY easy way to close all of my programs at once instead of one at a time?

Kenan Casey, Jeffersonville, Indiana

IT'S A GOOD IDEA to close all of your applications before defragging, scanning your drive, backing up important files, installing a new application, or even playing a demanding game. Unfortunately, Windows offers no easy way to close all running apps simultaneously but I've found a program that does. It's called Kill Win, and it's free. You can download it from www.borgking.de/bk-soft or from FileWorld. It requires the Visual Basic 4.0 runtime, another freebie that you can download from either site.

Like many other programs, Kill Win puts an icon in your system tray for shutting down Windows—not a job worth doing, in my opinion. But it also allows you to create a shortcut that will close all of your running applications. My advice: Download and install the program, and create this shortcut, but don't set the program to run automatically.

To create the shortcut, open the folder where you've installed Kill Win and drag the file Exits95.exe to your desktop. Right-click the shortcut, select *Properties*, and add a space and **/w** to the end of what's already in the Target field, turning the command into something like 'C:\killwin\killwin.exe /w'. Click *OK*, rename the shortcut **Close Apps**, and move it to a location on the desktop, the QuickLaunch bar, or the Start menu.

SHARE A PRINTER

I HAVE TWO PCs, but only one printer. If I network them via Windows' Direct Cable Connections or another means, how do I share that printer?

James Skinner, Woodland, California ▶

ILLUSTRATIONS: PHIL ANDERSON (LEFT); JEFFREY PELO (RIGHT)

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ONCE THE DIRECT Cable Connections are installed (see *Hardware Tips*, page 328), go to the host computer and select *Start•Settings•Control Panel*. Double-click the *Network* icon. On the *Configuration* tab, look for 'File and printer sharing for Microsoft Networks' on the list of components. If it's not there, click *Add*, double-click *Service*, and double-click *File and printer sharing for Microsoft Networks*.

Next, click the Configuration tab again, then File and Print Sharing. Check *I want to be able to allow others to print to my printer(s)*, and click *OK* twice. You may have to reboot.

Once you're back at your desktop, select *Start•Settings•Printers*. Right-click the printer you want to share and select *Sharing*. Check the *Shared As* option, and then fill in the additional fields as appropriate. Click *OK*, and then close the printer window.

Now move over to the guest computer and check to make sure *File and printer sharing for Microsoft Networks* is enabled on that PC as described above. Then reboot and log on to the network.

When you log on, a My Computer–like window will display all of the host's shared resources. If it doesn't, go to the Direct Cable Connections dialog box and click *View Host*. In the resulting window, you should see icons for all of the host's shared drives and for the printer. Right-click the printer icon and select *Install*. This will launch a wizard for installing the printer. Once you've stepped through the wizard, the printer will be available on both computers.

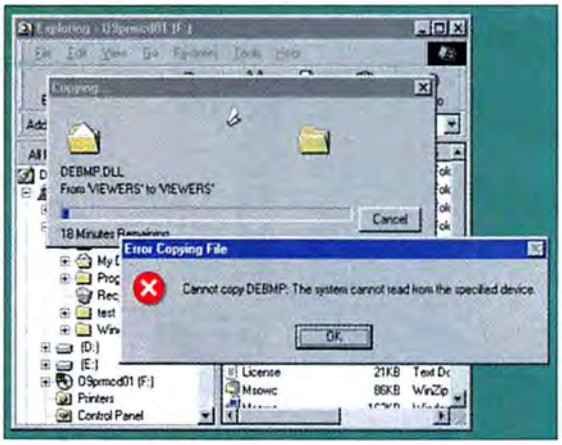
IDENTIFY A DEFECTIVE CD-ROM

IF A CD-ROM has bad sectors, how can I tell? I'm worried about those inevitable emergencies that force you to reinstall Windows and all of your applications. I don't want to discover then that that the CD-ROM for a major application has a scratch and its files can't be read.

Art Myatt, Pleasant Ridge, Michigan

YOU CAN CHECK the viability of a CD-ROM with or without special software. Either way, clean it first—dust on a good CD-ROM may fool you into thinking it's a bad one. You can buy CD-cleaning kits at any music store. If you clean a disc manually, use a soft, lint-free cloth (available at computer and audio stores) and wipe from center to outer rim in straight, never circular strokes.

A quick way to test a CD-ROM is by copying its files onto your hard drive—that is, if you've got enough of free hard drive space. Create a new folder on your hard drive. Then go to the CD-ROM's root directory and press **<Ctrl>-A** to select all of the files and folders there. Drag the selected files and folders to the new folder on your hard drive. If all the files copy over fine, the CD-ROM is okay. If you get an error message (see **FIGURE 1**), it isn't.



Copying...

DEBMP.DLL
From 'VIEWERS' to 'VIEWERS'

18 Minutes Remaining

Error Copying File

Cannot copy DEBMP: The system cannot read from the specified device.

FIGURE 1: YOU CAN TEST A CD-ROM by simply copying its files to another location. If the copying fails, the disc is bad.

If you don't have enough hard drive space, or you want a full report on what files are damaged, download CDCheck, a free CD-ROM diagnostic utility available from www.bigfoot.com/~Mitja.Perko/apps_eng or from FileWorld. But be prepared for a long wait—if a CD-ROM is seriously damaged, the complete test can take 2 hours (you'll know something is wrong much sooner than that).

Find files from this article at www.fileworld.com/magazine. Send your questions and tips to answer@pcworld.com. We pay $50 for published items. PC World *Contributing Editor Lincoln Spector's column* Gigglebytes *appears in 13 publications.* ■

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Combat AOL 4.0 Crashes and Freeze-Ups

AMERICA ONLINE users are no strangers to crashes. Freeze-ups and lockups on the service have numerous causes, but here are a few things you can do either to prevent them or to recover gracefully:

Resume operations. If an hourglass freezes on your screen, too many people may be logged on to AOL—or perhaps the system's server has crashed. Wait a minute or two. If the hourglass doesn't go away (and doesn't respond to your mouse movements), press **<Ctrl>-<Alt>-<Delete>**, click the line that reads *America Online [not responding]*, and then click the *End Task* button (see **FIGURE 1**).

If you don't see an hourglass, but AOL remains unresponsive, you may be experiencing problems with other areas of your PC (hardware or software). Besides being a resource hog, the AOL 4.0 software does not get along with Internet Explorer 5, it loathes IntelliMouse, and it may tangle with any number of utilities you may be running. If AOL 4.0 keeps crashing, try some of the following strategies.

Upgrade your AOL software. Some versions are flakier than others. To find out which species of AOL you're running, select *Help•About America Online*. When the America Online window pops up, hit **<Ctrl>-R**. If you're running a version of AOL 3.0 earlier than 131.75, you need to upgrade. If you have AOL 4.0, upgrade if your version is older than 134.224. If you're running Windows 95 and experiencing frequent freeze-ups when using AOL 4.0, consider returning to AOL 3.0. Use the keyword **upgrade**.

STOP
W
ww.com
Back
Forward
Load

Empty your cache. Clean out AOL's cache weekly by clicking the *My AOL* button and then selecting *Preferences•WWW*. Open the *General* tab, and click the *Delete Files* and *Clear History* buttons.

Turn down your video. AOL's software might be pushing your video card to its performance limits. Right-click an empty spot on the desktop and then click *Properties*. Under the *Settings* tab, change the Colors entry to 256 and click *Apply*. Under the *Performance* tab (you may need to click the *Advanced* button to find this), move the 'Hardware acceleration' slider down a notch. Click *OK*.

Disable your antivirus software. Some virus monitors conflict with America Online. To see if such a conflict is responsible for your troubles, try temporarily disabling your system's antivirus software. If that solves the problem, you'll probably need to switch your antivirus software.

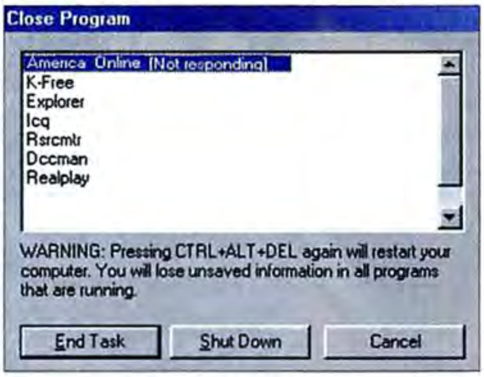
Turn off compression. AOL's graphics compression—which speeds up image rendering on your screen—tends to cause trouble for some Internet Explorer 5 users. To turn it off, first click the *My AOL* button and then select *Preferences•WWW*. Next, under the *Web Graphics* tab, remove the check in the box beside *Use compressed graphics*. Then click *OK*.

Remove the AOL adapter. Select *Start•Settings•Control Panel*, and double-click the *Network* icon. Under the *Configuration* tab, highlight *AOL Adapter* and click *Remove*. Click *OK*. Restart Windows, sign on to AOL, and the software will reinstall an updated version of the adapter.

Disable IntelliMouse. If you're running Microsoft's IntelliMouse, try disabling its software. It may conflict with AOL 4.0.

Try calling a different number. The server you're calling may be busy or even down. To test this possibility, try calling a different access number (they're listed under *My AOL•Access Numbers*).

Get your system in order. Run ScanDisk and Disk Defragmenter to clean up your hard disk: Select *Start•Programs•Accessories•System Tools*. To make sure you're running the latest version of whatever browser you use with AOL, check the appropriate Web site for Microsoft ▶



WARNING: Pressing CTRL+ALT+DEL again will restart your computer. You will lose unsaved information in all programs that are running.

FIGURE 1: WHEN AOL CRASHES beyond repair, press <Ctrl>-<Alt>-<Delete> and close the ailing program.

Thwart Netscape's Drop-Down Trail

MATT REYNOLDS of Spartanburg, South Carolina, writes that opening a new browser window can help you prevent URLs you've typed into Navigator's Netsite bar (or Location bar, in earlier versions) from appearing in the drop-down URL history box. Select *File•New•Navigator Window* or press <Ctrl>-N. Type your URLs in the Netsite bar in the second window. When you're done surfing, close the second browser and then the first. You'll retain URLs in the history file, but these won't appear in the drop-down box.

ILLUSTRATIONS: PHIL ANDERSON (LEFT); JEFFREY PELO (RIGHT)

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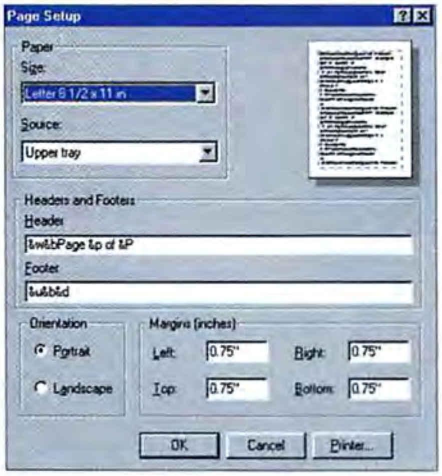


Size: Letter 8 1/2 x 11 in
Source: Upper tray
Header: &w&bPage &p of &P
Footer: &u&b&d
Orientation: ● Portrait ○ Landscape
Left: 0.75" Right: 0.75"
Top: 0.75" Bottom: 0.75"

FIGURE 2: CUSTOMIZE THE HARD COPY of your Web page by specifying headers and footers.

(www.microsoft.com) or Netscape (www.netscape.com). It's also a good idea to visit the Web sites of the companies that made your PC and your video card, and download any updated drivers.

PRINT WEB PAGES

FRUSTRATED BY your browser's inability to print URLs? Wish your browser would refrain from printing a Web site's background images? Here's how to customize what—and how—your Web browser prints.

Navigator 4.5: From the *File* menu, select *Page Setup* and specify in the dialog box whether you want your browser to print backgrounds, Web page titles, URLs, page numbers, and other elements.

Internet Explorer 5: To get rid of background colors and images, select *Tools•Internet Options.* Click the *Advanced* tab, and scroll down to the Printing section. Remove the check beside *Print background colors and images.* Click *OK.* To set other options, select *File•Page Setup* (see **FIGURE 2**). Under the Header and Footer lines, you can add any of the variables shown in **FIGURE 3** to get IE to print URLs, Web page titles, the date, the time, and the number of pages.

TO PRINT	Type in...
Web page title	&w
URL	&u
Number of pages	&P
Current page number	&p
Date	&d for short format, &D for long format
Time	&t for a.m./p.m. format, &T for 24-hour (military) format

FIGURE 3: SURE, THEY'RE CRYPTIC, but these headers and footers add value to your Web printout.

ZAP BANNER ADS

IF YOU'RE FED UP with banner ads and windows popping out of your browser, use InterCan Tech's $16 AdsOff to filter ads, pop-ups, and even animated GIFs as you surf. Configure it to remove only certain types of commercial pitches, like banner ads, or set it to eliminate ads completely or to display them as empty frames or links. The tool works with both IE and Navigator. Download a trial version from PC World Online's FileWorld or from www.intercantech.com.

SET IE TO FIRE UP HOTMAIL

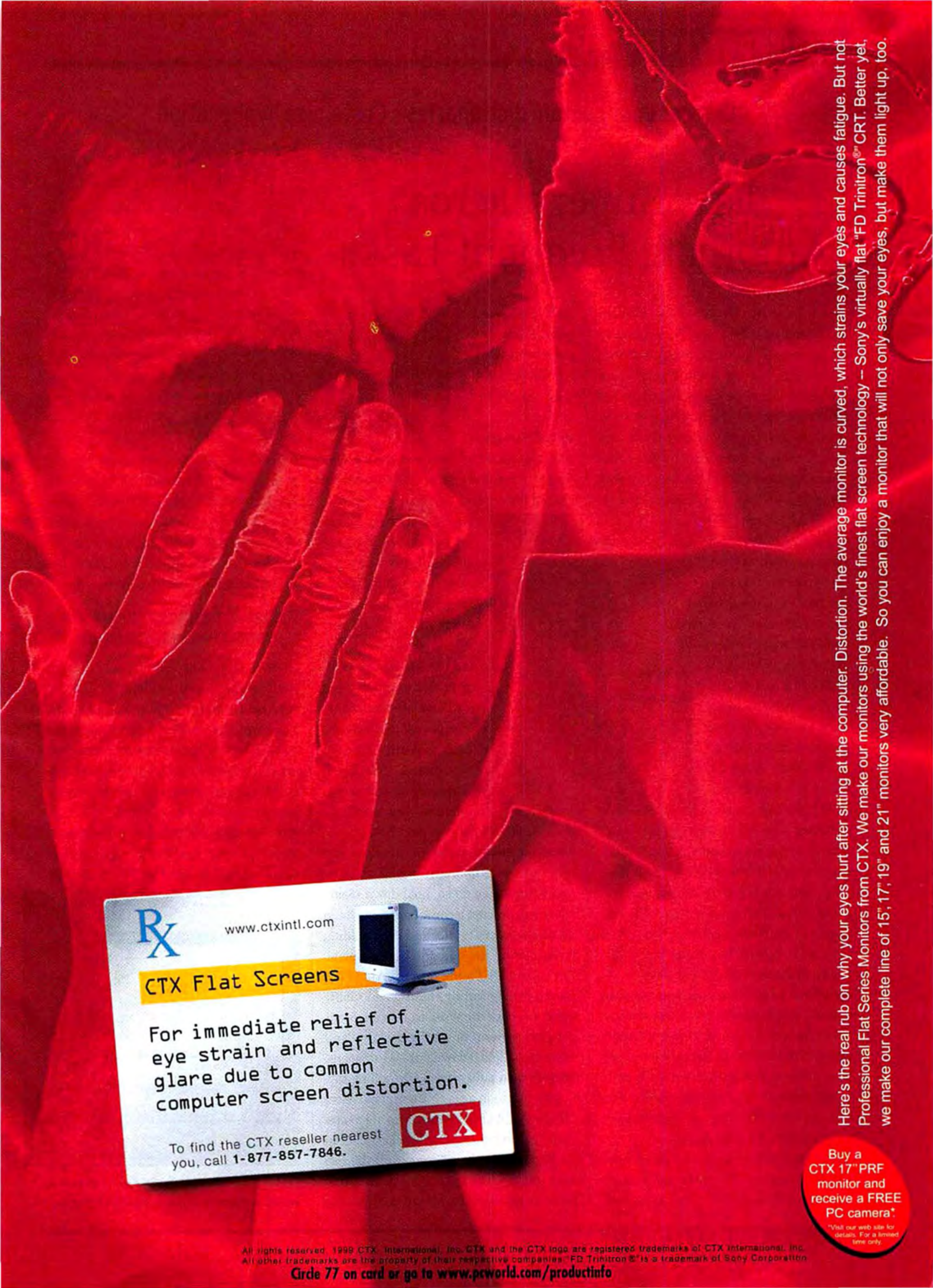
WANT TO USE your Hotmail account as your preferred e-mail program (and address) when you're using IE? In the browser, select *Tools•Internet Options.* Head to the *Programs* tab and select *Hotmail* in the E-mail box. Click *OK.*

Check your free Web mail accounts with Mail Monitor. Free Web mail sites like Hotmail are useful, but running your browser just to check for mail can be a grind. Ristra's $20 Mail Monitor will check all your free e-mail accounts for new mail and sound a chime and flash a letter icon in your Windows tray when it finds some. You can set it to log into multiple accounts at scheduled times. It works with Hotmail, Yahoo, Excite, RocketMail, and Net@ddress. You'll still need to use your browser to retrieve mail, however. Download a trial version of Mail Monitor from FileWorld or from welcome.to/ristra.

Guarantee that important mail arrives in your in-box. Your professionalism may be called into question when a client sends you an e-mail message and it gets returned as undeliverable. Though the cause is quite often out of your control (your mail server may be down), you can take steps to ensure that important mail does arrive in your in-box consistently:

- Don't rely on free e-mail services like Hotmail or Juno for business purposes. They don't store many messages and lack many of the features that "real" (POP3) accounts offer.
- Find out how much space your ISP gives you on its mail server for mail (this number is not to be confused with the space it gives you for your Web page). The most common size is 10MB, but some ISPs allocate less. When you expect a large file attachment to arrive by e-mail, make sure it doesn't exceed your allotted space. If it's too large for your in-box, advise the sender to FTP the file to your site so you can download it to your hard disk. (Note: If you take this approach, you'll have to divulge your user name and password to the sender, so be sure to change your password immediately after that transaction is completed.)
- Some ISPs store only a certain number of e-mail messages—100, say—before they start bouncing your mail. Find out whether your ISP imposes such a limit; if the limit is a problem, switch ISPs.
- For security reasons, some ISPs—like many corporate mail servers—forbid users to receive file attachments larger than 1MB or 2MB. If your ISP has a size limit, you may be able to get an extension simply by asking for one. Note that some providers may charge you for providing that additional service.
- If a daily deluge of e-mail comes your way, download your mail at least once a day so it doesn't overrun your mailbox. Unsubscribe from mailing lists before you go out of town.
- Make sure your e-mail software is set to "delete mail from server" once it downloads the messages. Otherwise, old mail will stack up on your ISP's server until the ISP starts bouncing incoming mail.
- Finally, if your ISP repeatedly bounces your mail, by all means sign up with a new provider.

Find files from this article at www.fileworld.com/magazine. Contributing Editor Judy Heim is coauthor of The Quilter's Computer Companion *(No Starch Press, 1997).* ■



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Remove Line Numbers From Blank Lines

WHEN LINES are numbered in Word, even blank lines are numbered. There's no way to force Word not to number blank lines, so you must remove the numbers manually. To do this, switch to *Page/Print Layout* view, click just left of the blank line to select it, and then select *Format•Paragraph*. Click the *Line and Page Breaks* tab (*Text Flow* in Word 7) in the Paragraph dialog box, select *Suppress Line Numbers*, and click *OK*.

SURE, AUTOMATING some Word functions has always been possible. It's easy to set up macros that automate a series of commands or even type a block of text. But beyond these prosaic instructions lies an order of special Word macros that run automatically, requiring no action on your part. You create the macros yourself, but you must name them in accordance with the list below. They have the power to control Word in a number of particular circumstances. And if you know how to program in the macro language that your version of Word uses, you can hone them to do even more. Here's a list of Word's automatic macros, with descriptions and a step-by-step guide to customizing them. They work in any version of Word, from 7 through 2000.

AutoExec runs whenever you start Word. It can automatically load a template other than the default normal.dot, set page margins, load a specific document you edit every day, or carry out any set of operations you normally perform when you first start Word. You must store this macro in the normal.dot template.

AutoOpen runs whenever you open an existing document. You can use the macro to do several things: to save a temporary backup copy of the file before you edit it, to jump to a bookmark within it, or to select a particular document view. You can store this macro in any template or even in a specific document.

AutoNew starts whenever you use the File•New command to create a new document. Use it to automate functions such as Word's View mode—Word otherwise cannot be preset to start in a particular mode.

AutoClose goes into operation each time you use the File•Close command or the Close button to close a document. This macro, stored in any template, is handy for saving a document automatically when you close it, avoiding Word's save-prompt dialog box.

AutoExit functions only when you exit Word. You can use it to save the current document or even to save all documents before exiting. **Note**: To access Word's Save All command—which will save all your open documents—you must hold down **<Shift>** while you select *File*.

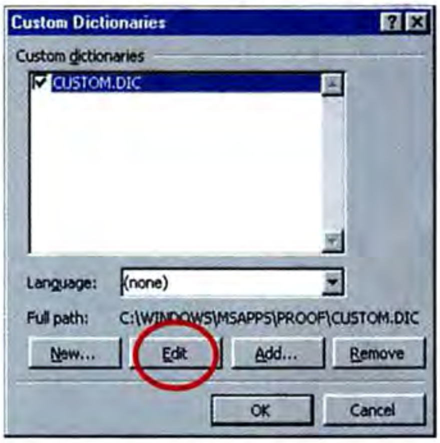
Disabling auto macros. Sometimes you may want to temporarily disable an automatic macro. To do so, hold down **<Shift>** while you execute a command that would cause the macro to run, and keep holding it down until the operation is complete. For example: To prevent an AutoExec macro from running, hold down **<Shift>** while you click the Word icon in the Start•Programs menu or on the desktop, and continue to hold it down until Word opens.

Recording an auto macro. If you'll be saving the macro in a specific template, select *File•New*, and choose that template to create a new document. Double-click *REC* on the Word status bar. Type one of the five Auto macro names in the Macro name field of the Record Macro dialog box. Select a template or document for the macro in the 'Store macro in' drop-down list. If you wish, type a brief description of the macro in the Description field. Click *OK*. Perform the tasks you want to record. Double-click *REC* on the Word status bar to stop recording and save the macro.

CORRECT ERRORS IN CUSTOM SPELLING DICTIONARIES

IT HAPPENS ALL too often: During a spelling check, you accidentally click the Add command on a misspelled word. Your word processor dutifully adds the error to its custom dictionary. From then on, the spelling checker ignores that misspelling. Here's how to correct such errors in your program's dictionary:

Word 7 through 2000: Select *Tools•Options*, then click the *Spelling* or *Spelling and Grammar* tab in the Options dialog ▶



☑ CUSTOM.DIC

Language: (none)

Full path: C:\WINDOWS\MSAPPS\PROOF\CUSTOM.DIC

FIGURE 1: ONCE YOU CLICK EDIT, correcting errors in Word's custom dictionaries is easy.

ILLUSTRATIONS: PHIL ANDERSON (LEFT), JEFFREY PELO (RIGHT)

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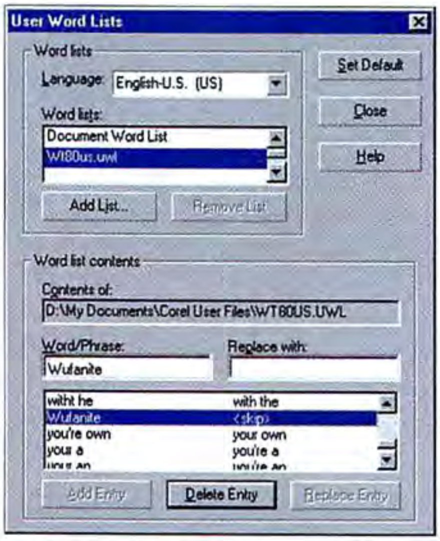
box. Click the *Dictionaries* or *Custom Dictionaries* button. Choose *CUSTOM.DIC* from the Custom Dictionaries list, then click *Edit* (see **FIGURE 1**). Once Word opens the dictionary, locate and delete the entire line containing the misspelled word or words, then select *File•Close* and click *Yes* when prompted to save the file.

WordPerfect 8: Select *Tools•Spell Check*, and click *No* if asked to close the Spell Checker. Click *Options* in the spell check dialog box and select *User Word Lists* from the pop-up menu. In the resulting dialog box, choose *Wt80us.uwl* from the Word Lists list. Locate the misspelled word in the 'Word list contents' list, then select it and click *Delete Entry* (see **FIGURE 2**). **Hint:** You can jump to a word by clicking any entry in the list and then beginning to type the word you want. After deleting all erroneous entries, click *Close* in both dialog boxes to return to the document.

CONTROL HYPHENATION

PROPER HYPHENATION can improve the look of many documents, particularly those where text is justified, or flush on both the left and right sides—it helps prevent unsightly gaps in word spacing. Today's word processors come with built-in hyphenation dictionaries and do a decent job of hyphenating, but sometimes you need more precise control. Here are some tricks to help you get a handle on hyphenation.



Language: English-U.S. (US)

Word lists: Document Word List, WT80us.uwl

Contents of: D:\My Documents\Corel User Files\WT80US.UWL

Word/Phrase: Wufanite

Replace with:

witht he	with the
Wufanite	<skip>
you're own	your own
your a	you're a
your an	you're an

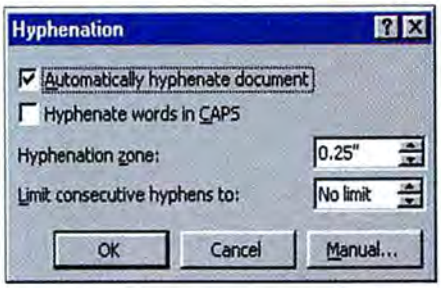
FIGURE 2: WORDPERFECT 8 lets you delete erroneous entries from its user dictionary.

Word 7 through 2000: To hyphenate an existing document or to hyphenate automatically as you type, first make sure no text is selected, and then choose *Tools•Language•Hyphenation* (*Tools•Hyphenation* in Word 7). Select *Automatically hyphenate document*, then click *OK* (see **FIGURE 3**). To hyphenate a particular block of text, select the text that you want hyphenation to apply to, and then follow the same steps.

- Word hyphenates words within a specific distance from the right margin. To adjust this zone, change the setting in the Hyphenation dialog box (see Figure 3). Larger measurements allow hyphenation farther from the margin, which creates extra space at the ends of lines. Word's defaults are usually just right, except in circumstances such as narrow columns. The same dialog box lets you control the number of consecutive hyphenated lines.
- To exclude particular paragraphs from hyphenation, or to remove hyphenation, select the text, then select *Format•Paragraph*. Click the *Line and Page Breaks* tab (*Text Flow* in Word 7), select *Don't Hyphenate*, then click *OK*.
- To hyphenate a document manually, select *Tools•Language•Hyphenation* (*Tools•Hyphenation* in Word 7). Click *Manual*. When the program proposes a hyphenation point, click *Yes* to accept the hyphenation, click *No* to skip that word, or use the cursor keys to shift the hyphenation point; then click *Yes*.
- To indicate, while typing, where you want a word to break, press **<Ctrl>-<Hyphen>** at the desired hyphenation point.
- While typing in a document, you can prevent a hyphenated word such as *self-reliant* from splitting at the end of a line by putting the cursor after the hyphen and pressing **<Ctrl>-<Shift>-<Hyphen>**.

WordPerfect 8: To turn WordPerfect's hyphenation on, position the cursor at the point where you want hyphenation to begin, then select *Tools•Language•Hyphenation*. Select *Turn hyphenation on* to mark the check box, then click *OK*.

- To adjust the size of the area in which WordPerfect hyphenates, change the percentages to the left and right of the margin in the Hyphenate Line dialog box.
- To turn off hyphenation for a particular block of text, position the cursor at the beginning of the block, then select *Tools•Language•Hyphenation*, clear the *Turn Hyphenation on* check box and click *OK*. Turn it back on again where you want hyphenation to continue.



☑ Automatically hyphenate document

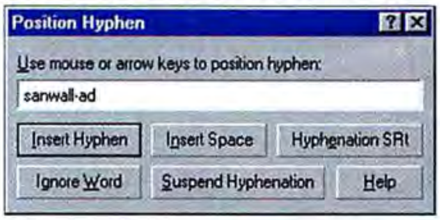
☐ Hyphenate words in CAPS

Hyphenation zone: 0.25"

Limit consecutive hyphens to: No limit

FIGURE 3: USE THIS WORD dialog box to control the hyphenation zone and lines hyphenated.

- WordPerfect will automatically prompt you when it isn't sure where to hyphenate. When the Position Hyphen dialog box appears, use the cursor keys to select a location for the hyphen, then click *Insert Hyphen* or another option (see **FIGURE 4**).
- You can control WordPerfect's hyphenation prompts. Select *Tools•Settings*, then double-click the *Environment* icon. Click the *Prompts* tab in the Environment Settings dialog box. Select one of the 'On hyphenation' choices from the list, then click *OK* and *Close*.



Use mouse or arrow keys to position hyphen: sanwall-ad

FIGURE 4: IN WORDPERFECT, move the hyphen point with the arrow keys or by clicking.

- To remove hyphenation, select *View•Reveal Codes* or press **<Alt>-<F3>**. Place the cursor just to the right of the *Hyph:On* button at the beginning of the hyphenated text, then press **<Backspace>**.

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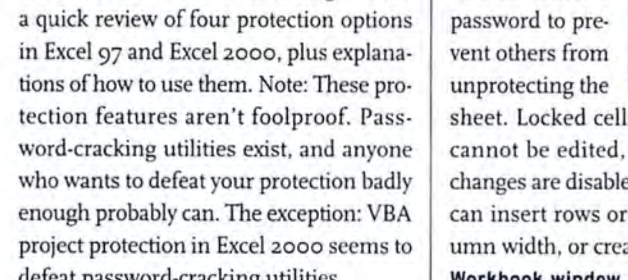
Count Them: Four Ways to Protect Your Numbers

EXCEL OFFERS many ways to protect your data. But understanding the differences between the methods and the limitations of each of them can be daunting. Here's a quick review of four protection options in Excel 97 and Excel 2000, plus explanations of how to use them. Note: These protection features aren't foolproof. Password-cracking utilities exist, and anyone who wants to defeat your protection badly enough probably can. The exception: VBA project protection in Excel 2000 seems to defeat password-cracking utilities.

Cell protection. Every cell has two key properties: locked and hidden. A locked cell can't be changed, and the contents of a hidden cell don't appear in the formula bar when the cell is selected. By default, every cell is locked and not hidden. Locked and hidden attributes have no effect unless the worksheet is protected. To change these attributes, select the appropriate cell or a range and then choose *Format•Cells.*



	A	B	C	D	E	F	G	H	I	J
1	Tony Gwynn's First 3,000 Hits									
2										
3	Qualifying Records:			73						
4										
5										
6	Hit	Date	Type	OnBase	RBI	Out	Inning	Field Pos	Bat Pos	Oppone
44	38	08/22/82	HR	0	1	1	6	lf	2	CHI
186	180	04/25/84	HR	0	1	2	3	rf	2	SF
232	226	06/10/84	HR	0	1	0	5	rf	2	CIN
311	305	08/04/84	HR	0	1	0	8	rf	2	HOU
390	384	04/28/85	HR	0	1	1	9	rf	2	LA
433	427	06/07/85	HR	0	1	1	11	rf	2	CIN

FIGURE 1: THE FORMULA IN CELL D3 uses the SUBTOTAL function to count the number of displayed rows in the AutoFiltered list.

In the Format Cells dialog box, click the *Protection* tab and select *Locked* or *Hidden*. Unlock cells that accept user input, and lock formula cells and other cells that should stay unchanged (such as titles). To prevent others from seeing your formulas, lock and hide the formula cells—the results of the formulas will be visible, but the formulas will not.

To protect a sheet, choose *Tools•Protection•Protect Sheet* to bring up the Protect Sheet dialog, and make sure *Contents* is checked. You can enter a password to prevent others from unprotecting the sheet. Locked cells in a protected sheet cannot be edited, and other worksheet changes are disabled. For example, no one can insert rows or columns, change column width, or create embedded charts.

Workbook window protection. The *Tools•Protection•Protect Workbook* command enables you to protect a workbook so no one can add or delete sheets or resize or move the workbook window.

Workbook file protection. Here's how to save a workbook in such a way that you must supply a password to open or modify it: In Excel 97, select *File•Save As* to display the Save As dialog box; then click *Options* in that box to call up the Save Options dialog. In Excel 2000, select *Tools•General Options* when the Save As dialog box appears. If you enter a password in the 'Password to open' field, the user must provide the correct password to open the file. If you enter a password in the 'Password to modify' field, the user must give the right password to make changes to the file. Without the correct password, the file opens in read-only mode.

VBA project protection. If your workbook contains VBA macros, you can use these to prohibit others from viewing or modifying them. Press **<Alt>-<F11>** to activate the VB Editor window, and select your project from the Project window. Choose *Tools•VBA Project Properties.* Click the *Protection* tab, place a check mark next to *Lock project for viewing*, and enter the password twice. Click *OK* and save your workbook.

Activate Cells Used in Formulas

IN EXCEL, double-clicking a cell puts the cell into edit mode. If you disable in-cell editing, double-clicking a formula cell selects the cells used by the formula, even if they're on a different sheet. To disable in-cell editing, choose *Tools•Options.* In the Edit tab of the Options dialog box, uncheck *Edit directly in cell.* When this option is disabled, you must do your cell editing in the formula bar. To do this, select the appropriate cell, and click in the formula bar or press **<F2>**. Double-clicking a nonformula cell has no effect.

COUNT AUTOFILTERED ROWS

WHEN I USE Excel's AutoFiltering, the status bar displays the number of qualifying rows. But for no apparent reason, that number often vanishes. How do I keep this number visible while I work?

Luis M. Meade, Centerville, Virginia

AUTOFILTERING A LIST hides rows that don't meet your filter criteria. After applying filtering criteria, Excel shows the record count on the status bar—but this value disappears when the sheet is calculated. To display a permanent count of the visible rows in an AutoFiltered list, create a formula using Excel's SUBTOTAL function. The first argument for SUBTOTAL specifies the type of operation (an argument of 2 displays a count of the visible cells in a range). **FIGURE 1** shows a list in rows 6 through 3006. The formula in cell D3 is: =SUBTOTAL(2,A6:A3006). It counts the number of visible cells in the range (minus the header row). Apply different filtering criteria, and the formula updates to show the new count. The SUBTOTAL function only works for AutoFiltering and outlining. If you hide rows manually, it won't return the correct result.

Send your questions and tips to john@j-walk.com. We pay $50 for published items. Contributing Editor John Walkenbach is the author of Excel 2000 Bible *(IDG Books, 1999) and maintains The Spreadsheet Page (www.j-walk.com).* ■

ILLUSTRATION: JEFFREY PELO

Use Direct Cable Connection ◆ Fix standby-mode hassles ◆ **Redial automatically**

Transfer Big Files With Little Hassle

MOVING A DOCUMENT or spreadsheet between your PC and your laptop has always been easy—just pop in a floppy disk and copy the file, right? But in these days of gargantuan hard disks and elephantine amounts of RAM, file sizes have swelled. And if you need to move large files—or a large number of files—between two PCs, the old standby 1.44MB floppy just isn't convenient.

Attaching both PCs to a network would, of course, solve the file transfer problem, as would buying bigger-capacity storage devices like an external Zip drive or a CD-RW drive. But those are expensive solutions. Here are some cheaper alternatives.

Compress it. For moving files that are only marginally bigger than 1.44MB, the 3.5-inch floppy is still your most effective solution. Try squeezing the file onto a single floppy by using a file compression utility like WinZip 7, a $29 shareware program available from www.winzip.com or from FileWorld. Some files will compress better than others: those with lots of text and numbers often can be reduced by 50 percent or more. A JPEG image file, on the other hand, is already compressed and won't shrink appreciably.

And even if you can't shrink a file or files to fit on a single floppy, WinZip and similar utilities can store their compressed content on a series of floppy disks. That makes cheap floppies a convenient solution for transfers up to several megabytes.

Buy your own cable network. If you move big files often, you'll want something faster and easier than a floppy. Your best bet: Connect your PCs with cables.

Setting up a traditional ethernet network just to transfer files is obviously too costly and takes too much work. But if both your computers have USB ports and use Windows 98, you can set up a simple network between them that's extremely fast and quite easy to use.

Both the $80 USB Direct Connect from Belkin and the $90 EZ-Link from Anchor Chips let you set up a Windows network connection between two PCs. Each comes with a cable that links two systems via their USB ports—no network cards required. But you will have to perform a few Windows Network configuration tasks, such as installing protocols and enabling sharing, directions for which come with the product.

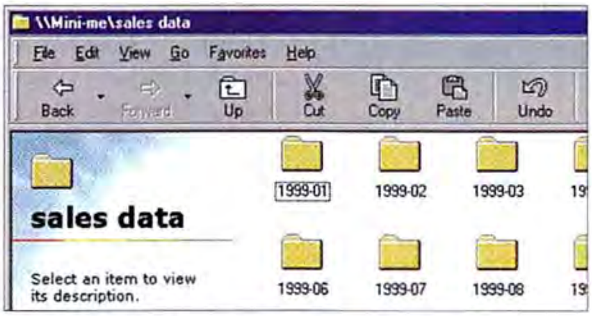


FIGURE 1: A VIRTUAL FOLDER appears on the guest system with the host's name ("Mini-me") displayed first in the title bar.

If the thought of mucking around with *any* Windows' network settings appeals to you as much as swallowing chalk dust, try LapLink from LapLink.com. LapLink lets you transfer files via a USB cable without any network setup. It also has a simple interface that's loaded with handy one-click features for moving data and allows remote control of your computer over the Internet. Unfortunately, it costs a steep $149, not including the $40 you'll have to spend for the USB cable. LapLink also works with slower parallel-port connections (the cable used in such a setup costs around $15) and with much slower serial-port connections (a serial cable is included free with the software).

Go direct. The above solutions are fine if you move lots of data on a regular basis and you don't have a network. But $149—or even $80—is a lot to spend if you transfer data only occasionally. Windows 9*x* offers a functional, if clumsier, free alternative: Direct Cable Connection.

The Direct Cable Connection utility included in Windows 95 and 98 establishes a network connection between two computers using Windows' Dial-Up Networking software. Once a link is established, a shared drive or folder on the host computer appears on the guest system as a network folder with the name of the host and the name the host gave to the shared drive or folder (see **FIGURE 1**). Via this network folder, the guest can move, copy, create, delete, and even open and save files in the host PC's shared drive or folder. You can also use the DCC utility to install software on a guest PC, using a CD-ROM drive located on (and shared by) a host PC—which can come in very handy if your notebook lacks a CD-ROM drive.

Before you can launch DCC, however, you'll need to connect your PCs with a cable. DCC doesn't support USB, so ▶

Dial E for Enough Already

DO YOU HAVE trouble connecting to your ISP via Dial-Up Networking? Because phone lines were designed for voice communications, line quality inadequate for data may be causing busy signals or otherwise preventing you from connecting. Instead of constantly clicking the Connect button, let your computer do the redialing. Open *My Computer*, then *Dial Up Networking*. Select *Connections•Settings*. Check the *Redial* box, and your PC will automatically redial if it encounters a busy signal or fails to connect.

ILLUSTRATION: JEFFREY PELO

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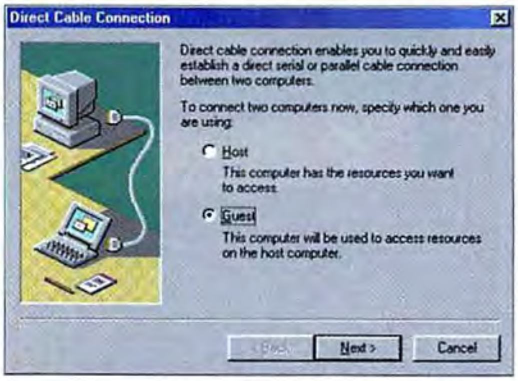
you'll need either a special serial cable—called a null modem cable—or a faster parallel cable, also known as an interlink or LapLink cable. Both are available for less than $20 at your local computer shop.

Also, before you can start DCC on either PC, you must outfit both machines with Dial-Up Networking, Client for Microsoft Networks, and the IPX/SPX network protocol. DUN can be installed in exactly the same manner as you install DCC. To install Client for Microsoft Networks, right-click *Network Neighborhood* (on the desktop or in Windows Explorer), select *Properties*, and then click the *Add* button. Now select, in sequence, *Client*, *Add*, and *Microsoft*, and follow the prompts. Repeat these steps to install IPX/SPX in Windows, choosing *Protocol* instead of *Client*. When prompted, make sure that you assign each system a unique name, or else DCC won't work.



Direct cable connection enables you to quickly and easily establish a direct serial or parallel cable connection between two computers.

To connect two computers now, specify which one you are using:

○ Host
This computer has the resources you want to access.

● Guest
This computer will be used to access resources on the host computer.

FIGURE 2: DIRECT CABLE CONNECTION designates one computer as the host and another as the guest.

To launch DCC, select *Start•Programs•Accessories•Communications.* If you don't see a listing for Direct Cable Connection in the menu, double-click the *Add/Remove Programs* icon in Control Panel. Then click the *Windows Setup* tab, select *Communications* in the Components list, click the *Details* button, and check the box next to *Direct Cable Connection*. Click *OK* twice and follow any further prompts. You may have to insert your Windows 98 CD-ROM to load the program files.

DCC starts with a wizard program that must run on both machines. It asks you to designate one computer as the host and the other as the guest (see **FIGURE 2**). In this setup, the guest PC has access to the host PC, but not vice versa.

See eye to eye. You can avoid the hassle of plugging and unplugging cables if you install an infrared connection between your PCs. Windows 95 and 98 support transfers between IR ports, and most laptops come with an IR port installed. But you'll probably need to buy an IR port that attaches to your desktop PC.

One such option is the $99 JetEye PC, an IR port from Extended Systems that attaches to a desktop PC's serial port. It limits your transfer speeds to the serial port maximum of 115 kbps, but that's also the maximum rate supported by many laptop IR ports.

To create an infrared connection,

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launch Windows' Infrared Monitor on each machine: Click the *Infrared* icon in Control Panel, and follow the on-screen prompts. Next, place the two computers so that their IR ports are within 3 to 6 feet of each other with a clear line of sight. The red indicator light in Infrared Monitor will turn green when you have established an IR link. Windows 98 comes with its own IR file transfer program, Infrared Transfer. Window 95 users will need a separate file transfer package that supports IR communications (a program of this type comes with JetEye PC).

HEAVY SLEEPER

WHEN I WAKE my year-old desktop PC (which runs the Windows 98 operating system) from standby mode, I am greeted with a dialog box telling me that my system has stopped responding and asking me whether I want to disable the standby feature in the future. Often, I can't even respond to the question because my system completely freezes. Any ideas on what's lurking behind this problem?

Lee Rahn, Dallas

THIS COMMON problem has several possible causes, but basically one or more components of your PC—some software, a hardware driver, or even the BIOS—isn't functioning in perfect harmony with your PC's power management scheme. Hard to believe, eh? When it comes time for your PC to wake, one of these components is down for the count.

Your system uses one of two possible power management standards, the older Advanced Power Management or the more recent Advanced Configuration and Power Interface. Most newer systems like yours use the latter. (Ignore the Advanced Power Management title in the warning dialog; it's not an accurate reflection of which standard a system uses.) As in the early days of Plug and Play, lots of systems have slightly imperfect implementations of ACPI, resulting in conflicts.

To resolve these conflicts, your best first step is to upgrade your system's BIOS to its latest version. Check with your PC's vendor for instructions on how to do this. And the same goes for most of the device drivers used by Windows—make sure you have the latest versions. Of course, locating all these could take days, depending on how many devices you have. For help figuring out which component may be causing the conflict, run the Windows 98 Power Management Troubleshooter utility, pmtshoot.exe. You'll find it on the Windows 98 CD-ROM in the tools/mtsutil/pmtshoot folder.

You'll find details about products discussed in this article at www.pcworld.com/dec99/hw_tips and files mentioned at www.fileworld.com/magazine. Send your questions and tips to kirk_steers@pcworld.com. We pay $50 for published items. Kirk Steers is a PC World *contributing editor.* ■

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018 Appliances

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Install a New Motherboard

SURE, YOU CAN UPGRADE various parts of your computer, but for the ultimate performance boost, a new motherboard—which, in turn, usually requires a new processor and new memory modules—is the answer.

The 100- and 133-MHz system buses on today's motherboards ease the bottleneck between the CPU and other internal components, such as system memory. Built-in extras, like high-speed parallel and USB ports, unclog the arteries leading to external peripherals.

If you want to keep your total cost down to about $350, look for a motherboard outfitted with an AMD K6-III-400 processor and 64MB of SDRAM. If you're willing to spend as much as $500, look for a motherboard with an Intel Pentium III-450 or -500 CPU and 128MB of SDRAM.

THE TOP DOWN

Benefits: Dramatically improved performance

Cost: $350 to $500

Time required: 4 to 6 hours

Equipment required: Phillips screwdriver, needle-nose pliers, masking tape, antistatic wrist strap

Expertise level: Advanced

Motherboard reviews: PC Guide (www.pcguide.com), Tom's Hardware Guide (www.tomshardware.com)

Vendors: Motherboards Super Store (www.motherboards.com), Motherboards Direct (www.motherboardsdirect.com), Asus (www.asus.com), SuperMicro (www.supermicro.com), Tyan (www.tyan.com)

Before you buy, find out whether your PC case requires an AT or an ATX motherboard (see diagrams on facing page). If your system is more than two years old, it probably has an AT motherboard. In that case, you'll find a much greater selection of AT motherboards that support Socket 7 processors (like the K6-III and Cyrix's MII) than you will AT motherboards that support Slot 1 processors (such as Intel's Pentium II and III). If your PC is newer, it probably requires an ATX motherboard, and you can use one of the latest Slot 1 or Socket 370 processors. In the unlikely event that your PC case takes neither an AT nor an ATX motherboard, you'll probably have to replace your system's power supply and case.

Upgrading your motherboard is an advanced-level project. Figure on devoting half a day and plenty of patience to the project. If you're reasonably comfortable with multiple intricate steps and working with basic tools, you can probably pull it off, though having a hardware-savvy friend on hand (or at least available by phone) is good insurance.

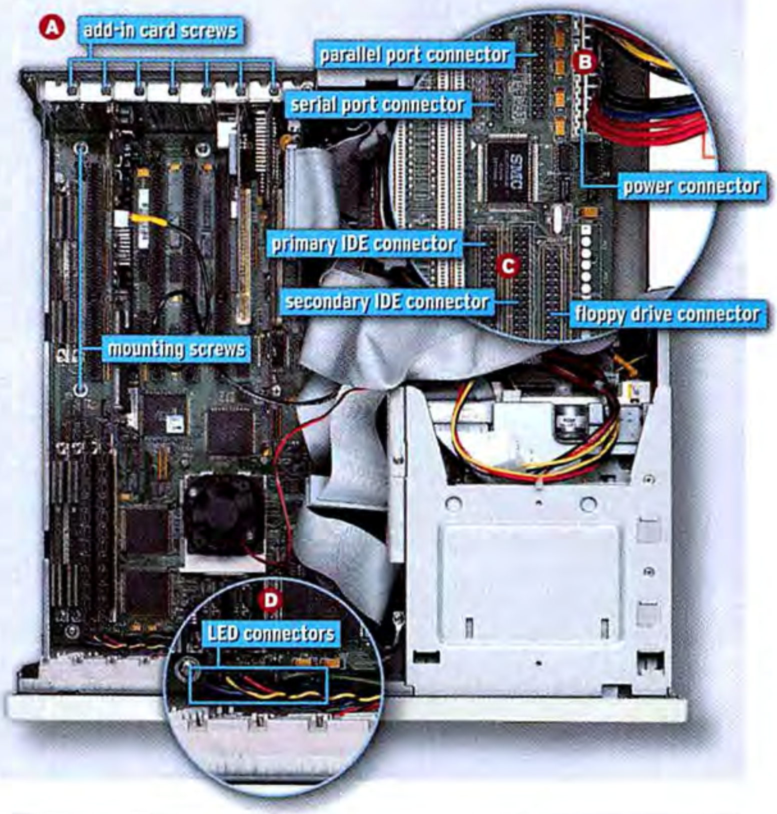
Of course, before you install your new motherboard, back up your hard disk.

Stan Miastkowski is a contributing editor for PC World.

① Remove cards and cables. Prepare a large and uncluttered space on which to work. Turn off your PC; unplug it from the electric outlet; and disconnect the mouse, keyboard, monitor, and all external cables. Take off the PC's cover, look the interior over carefully, and figure out exactly what you must remove to reach the motherboard. Sometimes you have to remove a hard drive or other hardware.

Before you begin work inside your PC, put on an antistatic wrist strap and clip it to a grounded metal object (such as a screw—slightly loosened and preferably unpainted—that holds the faceplate on an AC outlet). Remove the screws holding each add-in card (A), and carefully remove each card.

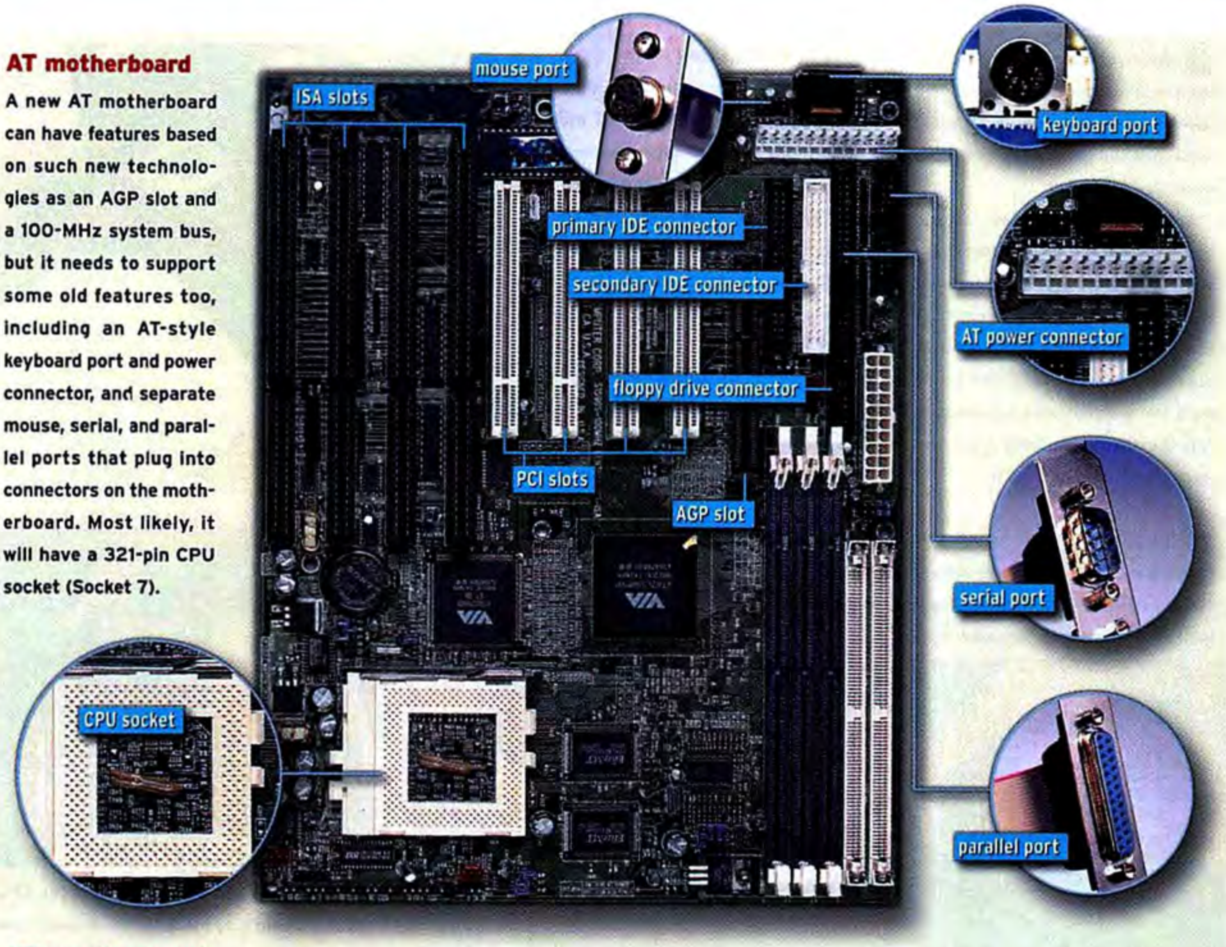
Use masking tape to mark cables as you remove them. Unplug the motherboard power connectors (B), floppy disk cable, and IDE connectors (C), noting which cable is attached to the primary channel and which to the secondary channel. Unplug the small connectors attached to the front-panel switches and LED indicators (D). If you're working with an AT motherboard, as shown here, you must also remove cables for the serial and parallel ports, and (sometimes) cables for the mouse connector or USB ports.



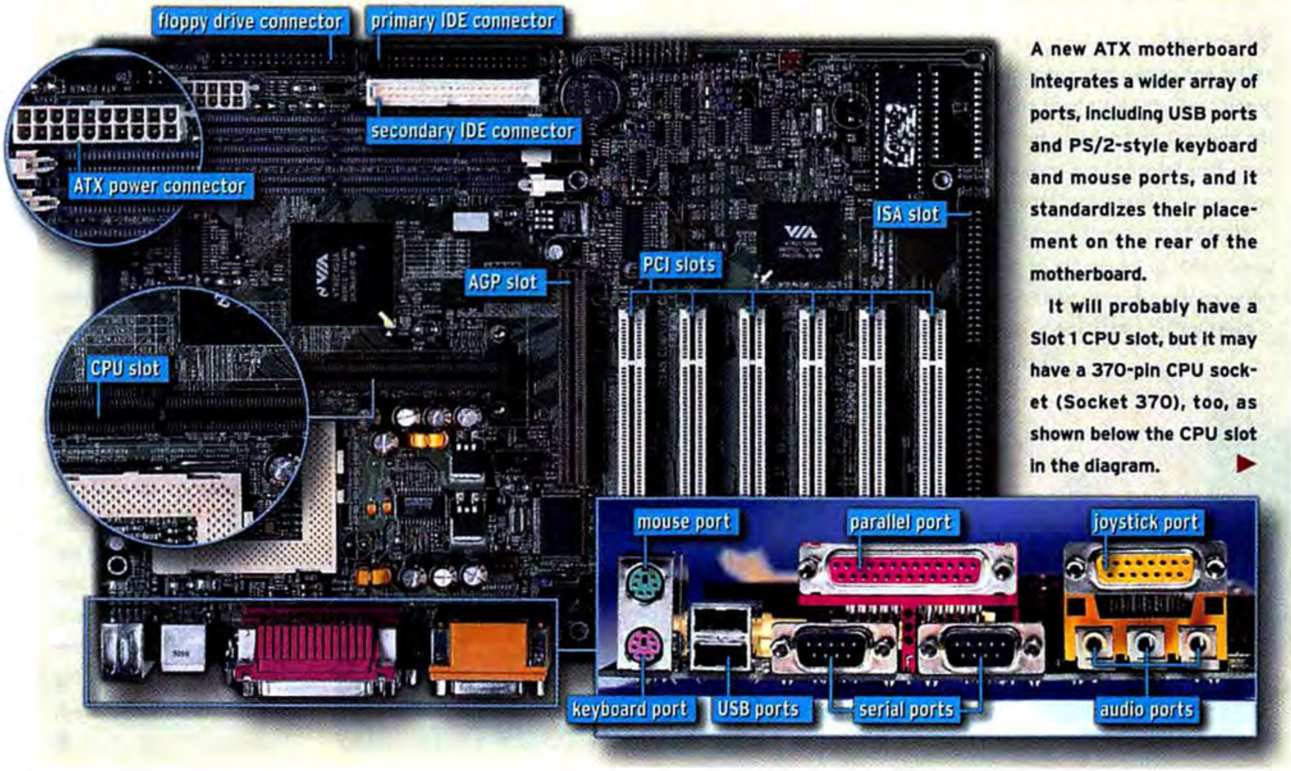
PHOTOGRAPHS: KEVIN CANDLAND

AT motherboard

A new AT motherboard can have features based on such new technologies as an AGP slot and a 100-MHz system bus, but it needs to support some old features too, including an AT-style keyboard port and power connector, and separate mouse, serial, and parallel ports that plug into connectors on the motherboard. Most likely, it will have a 321-pin CPU socket (Socket 7).


mouse port
ISA slots
keyboard port
primary IDE connector
secondary IDE connector
AT power connector
floppy drive connector
PCI slots
AGP slot
serial port
CPU socket
parallel port

ATX motherboard


floppy drive connector
primary IDE connector
secondary IDE connector
ATX power connector
ISA slot
PCI slots
AGP slot
CPU slot
mouse port
parallel port
joystick port
keyboard port
USB ports
serial ports
audio ports

A new ATX motherboard integrates a wider array of ports, including USB ports and PS/2-style keyboard and mouse ports, and it standardizes their placement on the rear of the motherboard.

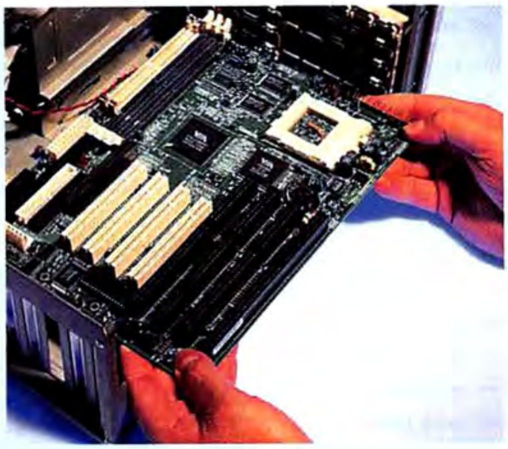
It will probably have a Slot 1 CPU slot, but it may have a 370-pin CPU socket (Socket 370), too, as shown below the CPU slot in the diagram. ▶

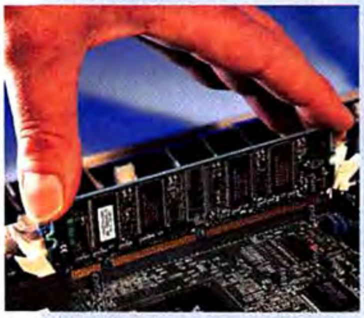
② Remove the old motherboard. Most motherboards are held to the case by six to nine screws. Carefully remove the screws and set them aside in a container.

After you take out the screws, you can remove an ATX motherboard by sliding it slightly forward and pulling it upward. AT motherboards are sometimes secured with plastic brackets, and you must slide the motherboard sideways to release these brackets from the (hidden) slots underneath.

③ Install the new motherboard. An ATX motherboard should slide easily into the case. Installing an AT motherboard may involve moving some of the mounting posts that hold it to the case so that the mounting holes on the motherboard align with the posts. You normally don't need to reuse the plastic brackets (if any) from your original AT motherboard.

After you line up the mounting holes, mount the motherboard with the screws you removed in step 2. Don't screw them in too tightly—just snug them up.





pentium II
intel

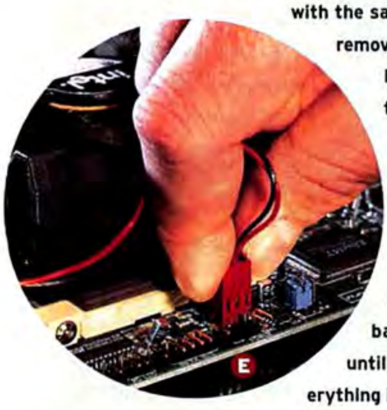
④ Install the RAM and CPU in the new motherboard. Insert the DIMM memory module (or modules) into the slots, beginning with the slot representing Bank 0, as indicated in the motherboard manual or on the board itself. The modules fit only one way. Slide them in firmly until the tabs on each side of the socket snap in place. If you're installing a CPU that fits into a flat socket, lift the lever on the socket, carefully insert the CPU (making sure that Pin 1 on the CPU lines up with Pin 1 on the socket), hold it in place firmly, and lock the lever down. If you're installing a CPU that fits into a slot, carefully insert it until it's firmly seated.

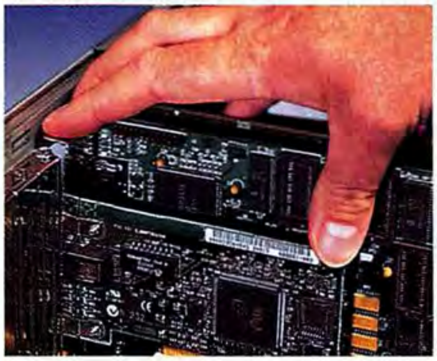
⑤ Reinstall the cards and cables. Reattach all the cables and connectors you removed in step 1. Work slowly and carefully (don't bend any pins), and remember that the connectors probably won't be in exactly the same place they were on your original motherboard. Check and double-check that everything is connected correctly.

IMPORTANT: Don't forget to connect the CPU fan's power cable to its jumper on the motherboard (E). If you fail to connect it, your new CPU may overheat.

Reinsert your PC's add-in cards, and screw them down with the same screws that you removed earlier.

Reconnect the monitor, mouse, keyboard, and any other external peripherals. Plug in the power cable to your PC and AC socket, but don't put the cover back on the system until you're sure that everything is working properly.





⑥ Start up your new system. Turn your computer on. If normal startup messages appear on the screen, you're halfway home. Be prepared for a number of restarts in Windows 9*x*, though. The operating system will initially be confused by the new hardware it finds and will need to reconfigure itself (it should take care of this automatically).

If nothing happens, or if your PC starts but locks up in Windows, turn off the power, unplug the PC, and recheck all connections. If that doesn't help, swallow your pride and contact the motherboard maker's tech support. ■

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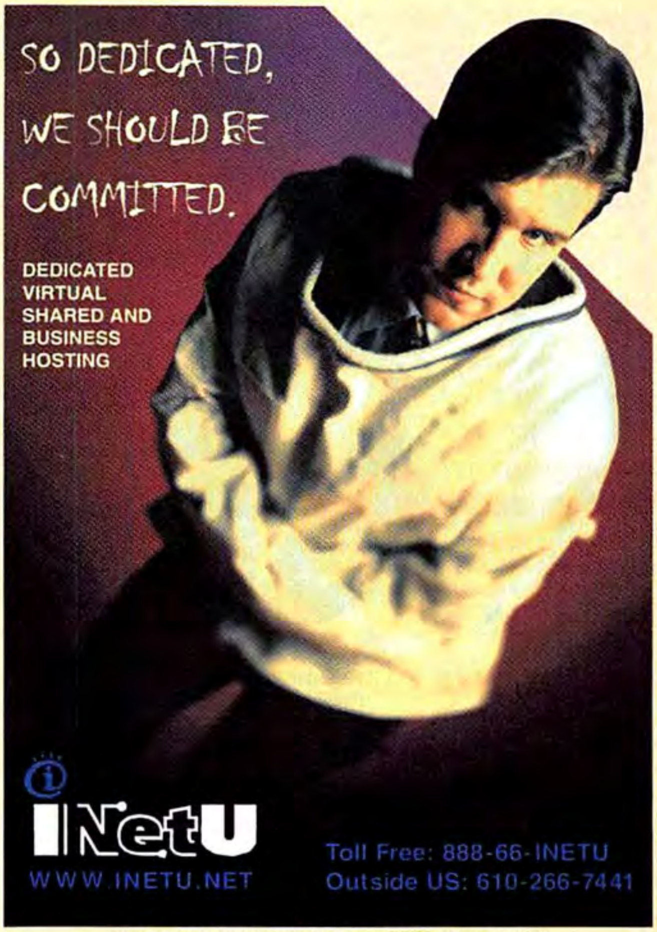

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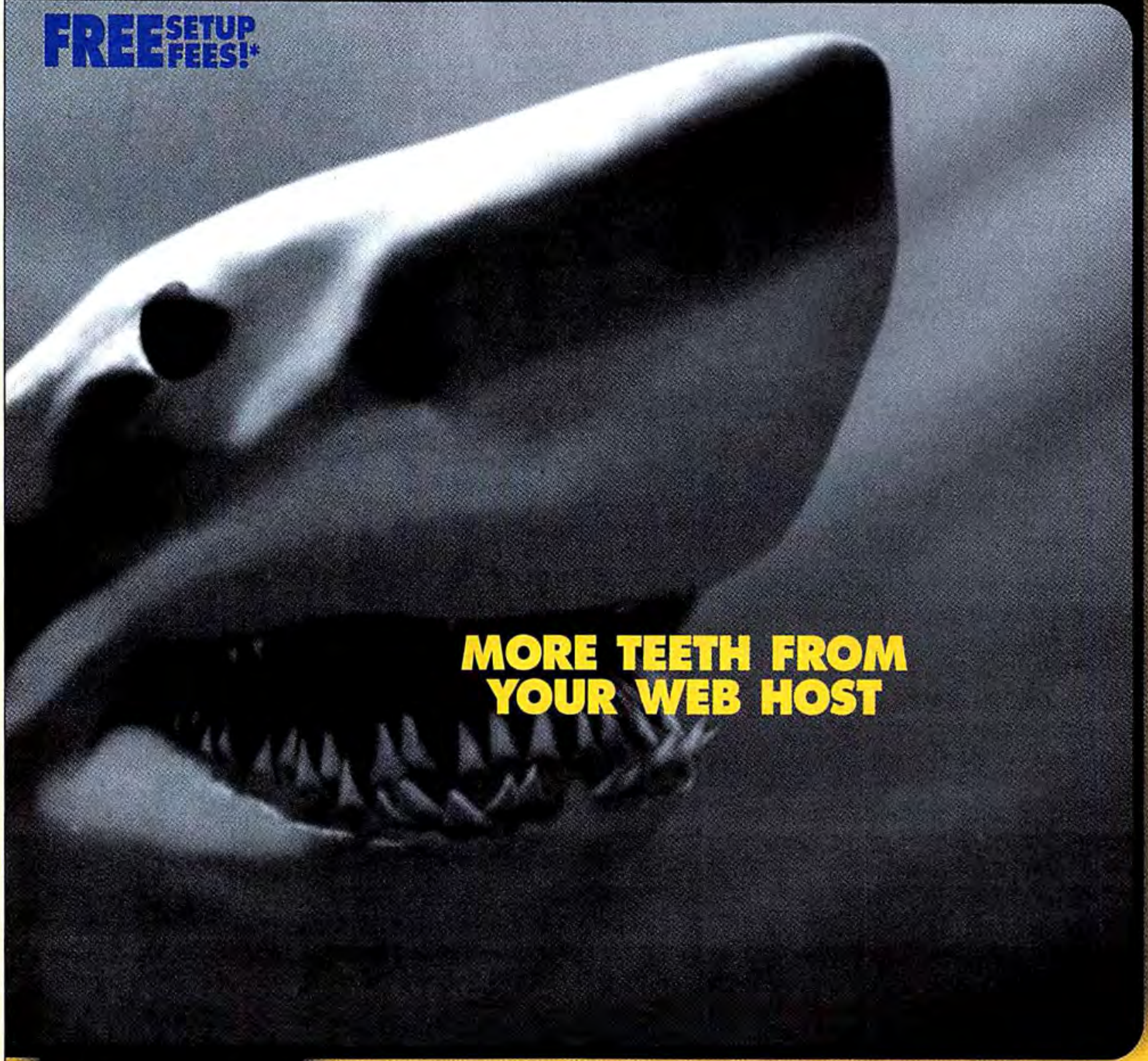

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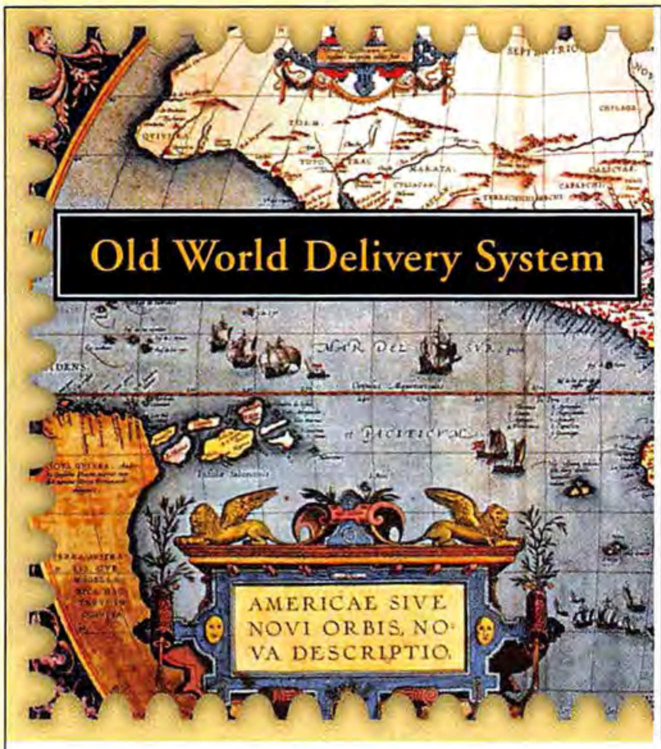
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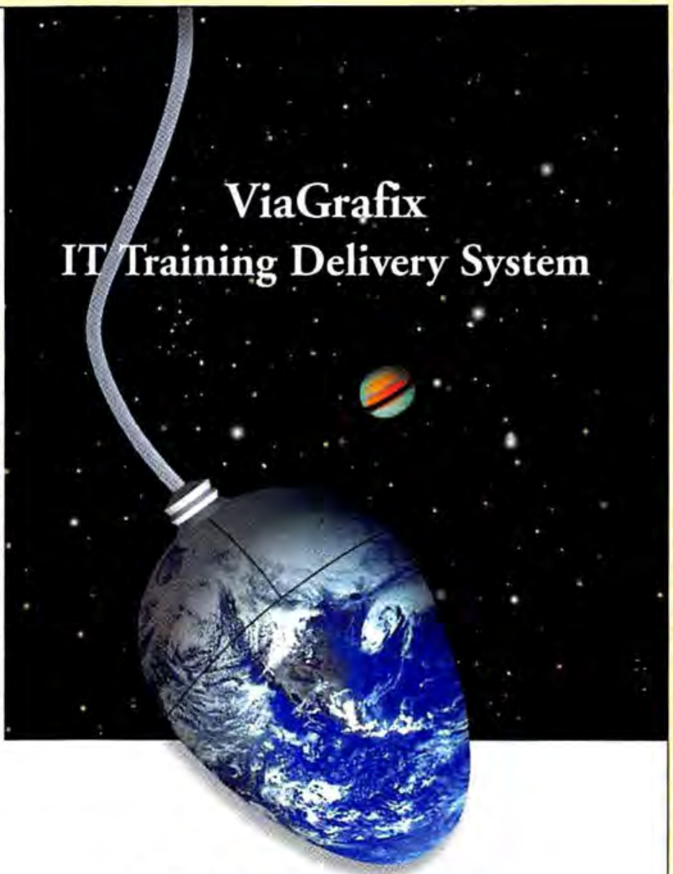

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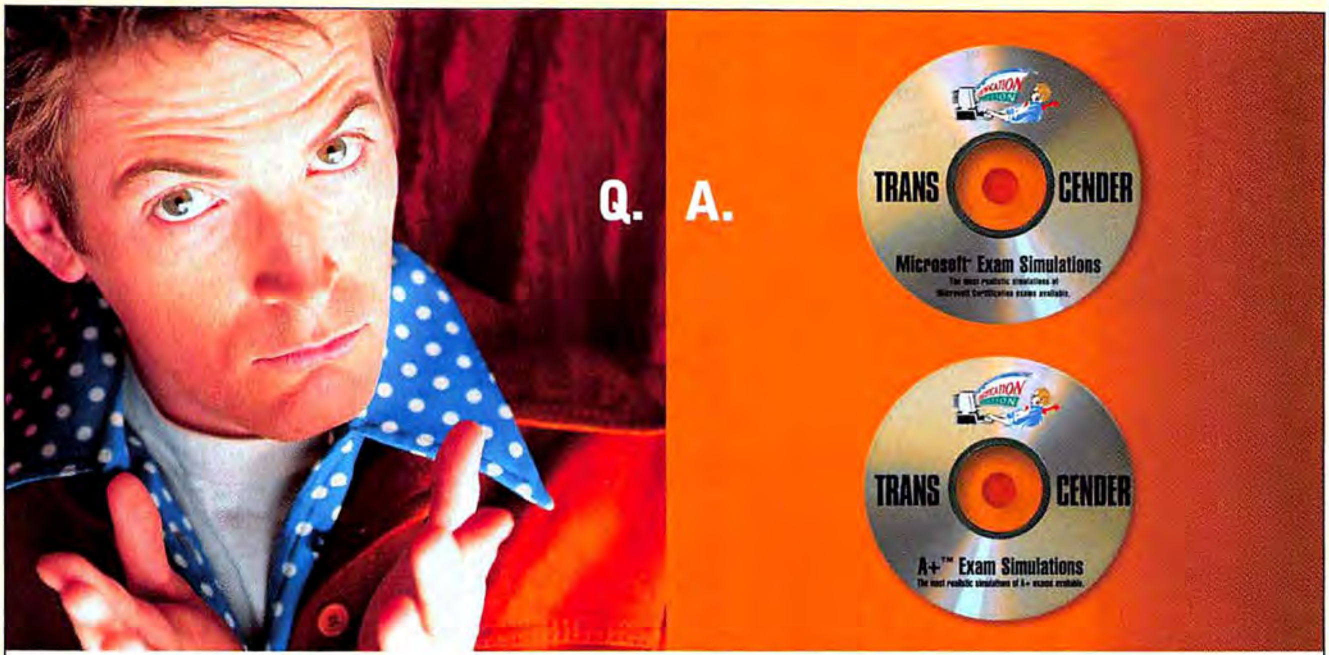

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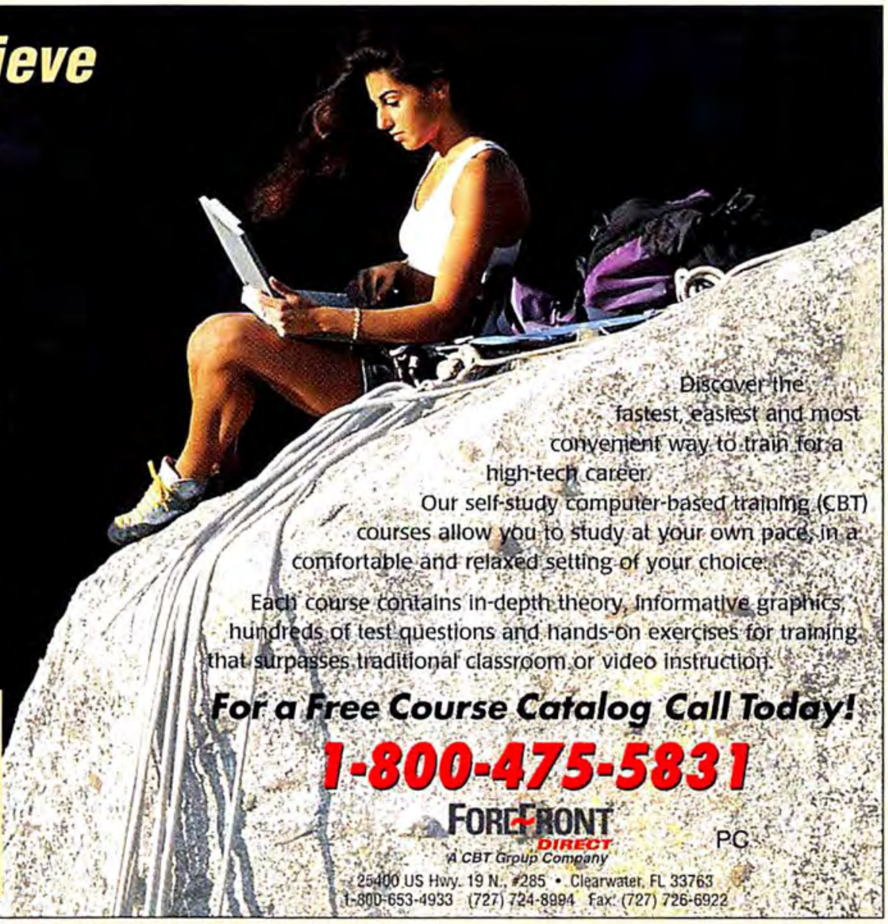

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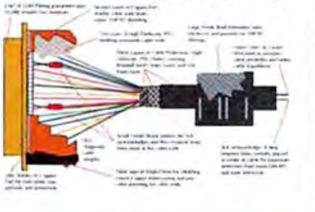

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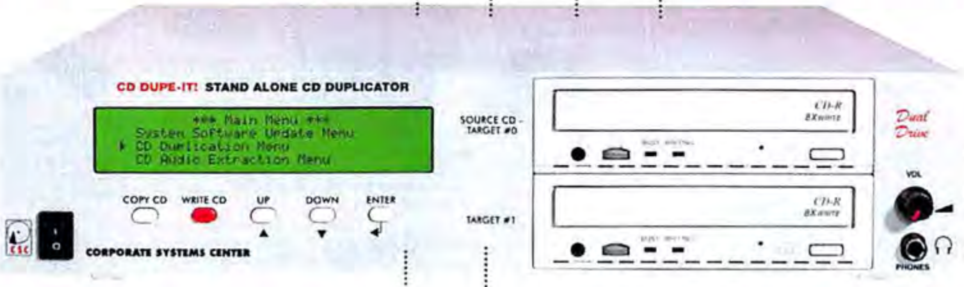
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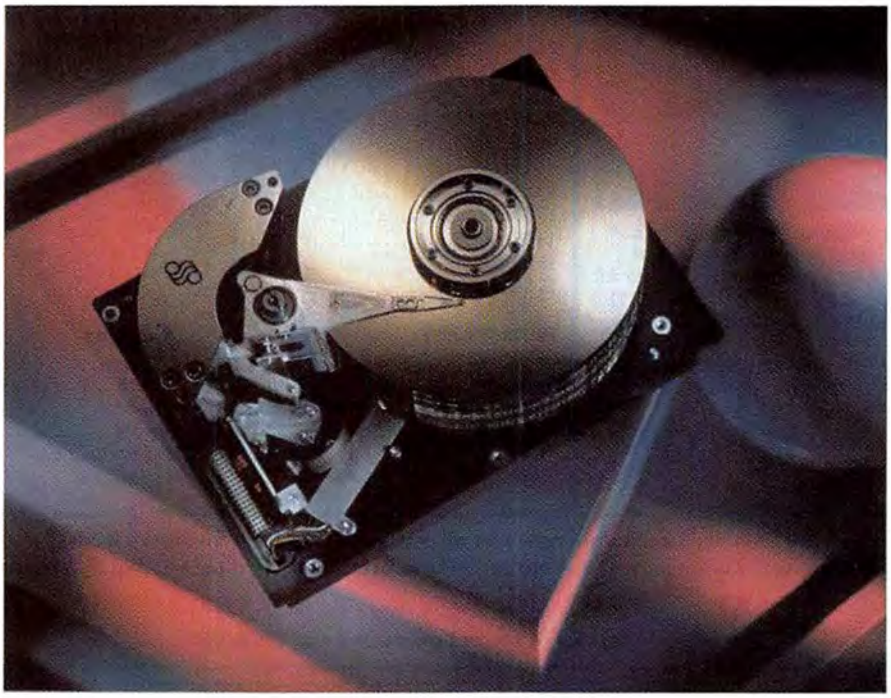

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System Price **$219.00**

INTEL CELERON SYSTEM

Includes same as System #1

CPU	
Celeron 433 Mhz (128K), add	99
Celeron 400 Mhz (128K), add	79
Celeron 366 Mhz (128K), add	69
Fans, add	10.95
HARD DRIVES	
4.0 GB, add	109
6.4 GB, add	119
8.4 GB, add	129
10 GB, add	159
13 GB, add	179
18 GB, add	239
25 GB, add	299
PC-100 MEMORY	
32 Meg, add	Market Price
64 Meg, add	Market Price
128 Meg, add	Market Price
256 Meg, add	Market Price
512 Meg, add	Market Price
768 Meg, add	Market Price

INTEL PENTIUM II or III COMPUTER SYSTEM

System includes EVERYTHING in System #1

CPU	
Pentium III 550 Mhz, add	679
Pentium III 500 Mhz, add	369
Pentium II 450 Mhz, add	229
Pentium II 400 Mhz, add	199
Fans, add	11.95
HARD DRIVES	
4.0 GB, add	109
6.4 GB, add	119
8.4 GB, add	129
10 GB, add	159
13 GB, add	179
18 GB, add	239
25 GB, add	299
PC-100 MEMORY	
32 Meg, add	Market Price
64 Meg, add	Market Price
128 Meg, add	Market Price
256 Meg, add	Market Price
512 Meg, add	Market Price
768 Meg, add	Market Price

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SIZE	SDRAM PC-66	PC-66 ECC	PC-100	PC-100 ECC	PC-133	PC-133 ECC
32Meg	69	79	74	79	79	89
64Meg	129	139	139	149	149	159
128Meg	279	289	289	299	299	319
256Meg	499	519	519	529	529	549

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HARD DRIVES (UDMA IDE)

3.2GB	.98
4.0GB	.109
6.4GB	.119
8.4GB	.129
10GB	.159
13GB	.179
17GB	.199
18GB	.239
25GB	.299

HARD DRIVES (UWSCSI)

4.5GB IBM 7200 rpm	.199
9.1GB IBM 7200 rpm	.289
9.1GB IBM 10K rpm	.509
18GB IBM 7200 rpm	.559
18GB IBM 10K rpm	.789
18GB Seagate 7200 rpm	.589
18GB Seagate 10K rpm	.799

IBM NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NimH/Li-on
Thinkpad i Series	32/64/128Meg	69/89/249	99/—
Thinkpad 310E, ED, 315	16/32Meg	49/89	129/—
Thinkpad 340, 345, 355, C, CS	4/8/16Meg	49/59/89	109/—
Thinkpad 360C, CE, CSE, P, PE	4/8/16Meg	49/59/89	109/—
Thinkpad 365X, 365XD	8/16/32Meg	39/54/89	109/—
Thinkpad 380, 380D, 380E, 385ED, 385XD	16/32/64Meg	54/89/149	119/209
Thinkpad 560, 560E, 560X	8/16/32/64Meg	29/49/79/139	209/—
Thinkpad 600, 770, ED (SDRAM)	16/32/64/128Meg	39/69/89/249	—/219
Thinkpad 700, 720, 750, CL57SX	4/8/16/32Meg	59/89/129/219	134/—
Thinkpad 701, 701C, 701CS	4/8/16/32Meg	19/34/59/99	119/—
Thinkpad 755C,CE,CD,CS,CDV,CSE,CV	4/8/16/32Meg	59/79/129/219	134/249
Thinkpad 760C, CD, L, LD	8/16/32Meg	29/59/99	134/249
Thinkpad 760E, ED, EL, ELD	8/16/32Meg	29/59/99	134/249
Thinkpad 760XD, 760XL	8/16/32/64Meg	29/49/79/139	134/249
Thinkpad 765D, 765L	8/16/32/64Meg	29/49/79/139	134/249

GATEWAY MEMORY

Dest. Big Screen D5 – SDRAM	16/32/64Meg	29/59/79
Dest. Big Screen D6 – EDO (pairs)	4/8/16/32Meg	6/22/34/59
Family PC w/MMX – SDRAM	16/32/64Meg	29/59/79
G5-166, 200 Prof. System – SDRAM	16/32/64Meg	29/59/79
G5-166M, 200M MMedia System – SDRAM	16/32/64Meg	29/59/79
G6-200 Prof. System – SDRAM	16/32Meg	29/59
G6-Prof. M MMedia System – EDO	4/8/16/32Meg	6/22/34/59
Multimedia G-5 Systems – SDRAM	16/32/64Meg	29/59/79
Prof. P-5 Series – SDRAM	16/32/64Meg	29/59/79

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LASER PRINTER MEMORY UPGRADES

AMOUNT UPGRADED	1	2	3	4	5	8	16	32	64	128
Canon LBP 4X	2	–	–	9	–	–	–	–	–	–
Canon LBP 860, 1260	–	5	–	9	–	29	49	79	–	–
Epson Action Laser 1100, 1600	2	5	–	9	–	29	49	–	–	–
Epson Action Laser II	59	–	89	–	119	–	–	–	–	–
Epson 8000, 1800, 4000, 4100, 4300	59	–	89	–	119	–	–	–	–	–
Epson 1000, 1500, 5000, 5200	–	30	–	60	–	–	–	–	–	–
HP 2, 2D-	–	59	–	89	–	–	–	–	–	–
HP 3, 3D, 3P, 2P+	–	59	–	89	–	–	–	–	–	–
HP 4, 4M, 4SI, 4SIMX	–	9	–	19	–	39	–	–	–	–
HP 4MP, 4P	5	14	–	19	–	39	–	–	–	–
HP 4+, 4M+, 4V, 4MV	5	14	–	19	–	39	59	99	–	–
HP 5, 5M, 5MP, 5N, 5P, 5SI, 5MX	5	14	–	19	–	39	49	99	–	–
HP 5L, 6L	–	–	–	49	–	69	–	–	–	–
HP 6MP, 6P	9	19	–	19	–	29	49	79	–	–
HP 1100, 2100	–	–	–	29	–	49	79	–	–	–
HP Laser Jet 4000, 5000 (SDRam)	–	–	–	29	–	59	89	129	199	–
HP Laser Jet 4500, 8000, 8100, 8500	–	–	–	29	–	49	79	89	–	–
HP Design Jet 200, 220	–	–	–	19	–	39	–	–	–	–
HP Design Jet 230, 250C	–	–	–	19	–	39	59	99	–	–
HP Design Jet 330, 350C	–	–	–	19	–	39	59	99	–	–
HP Design Jet 600, 650C	–	–	–	19	–	39	–	–	–	–
HP Design Jet 650C PS	–	–	–	19	–	39	59	99	–	–
HP Design Jet 700, 750C Plus, 755	–	–	–	19	–	39	59	99	–	–
HP Desigjet 1200C, 1200C/PS 1600C, 1600CM	–	–	–	19	–	39	59	99	–	–
IBM Laser 4029, 4037	–	–	–	34	–	–	–	–	–	–
IBM Laser 4039, 4079	–	–	–	29	–	39	–	–	–	–
Lexmark, Optra L, LX, R, RX	–	–	–	19	–	39	59	99	–	–
Lexmark, Optra 4059, 5043, K-Series	–	–	–	24	39	69	129	199	–	–
Lexmark Valuwriter 300, 600	29	39	–	49	–	–	–	–	–	–
Lexmark Wiswriter 200, 400, 600	29	39	–	49	–	–	–	–	–	–
Lexmark S Series (Edo)	–	–	–	–	–	24	49	79	–	–
Panasonic 4420/4450I	–	84	–	109	–	–	–	–	–	–
Panasonic 4410/4430	–	64	–	89	–	–	–	–	–	–
Panasonic 4450	49	–	–	–	–	–	–	–	–	–
Panasonic 4400/5400	49	69	–	99	–	–	–	–	–	–
Panasonic 4440, 5410	69	–	–	99	–	–	–	–	–	–
Panasonic 6500	2	5	–	29	–	–	–	–	–	–
Sharp 9400, 9460, 9600, 9700E	49	59	–	99	–	–	–	–	–	–
Sharp 9500, E, H, 9700, H	49	–	–	169	–	–	–	–	–	–
Tektronics Phaser 140, 240, 380	–	–	–	19	34	74	–	–	–	–
Tektronics Phaser 740, 780, 840	–	–	–	–	–	–	59	99	169	319

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2 x 32 8 mg	22	–	–	512 x 36	–	2	2
4 x 32 16 mg	44	–	–	256 x 32	–	2	2
8 x 32 32 mg	74	–	–	512 x 32	–	4	3
16 x 32 64 mg	139	–	–	1 x 36 4 mg	14	5	–
1 x 32 4 mg EDO	10	4	–	2 x 36 8 mg	34	–	–
2 x 32 8 mg EDO	22	–	–	4 x 36 16 mg	59	–	–
4 x 32 16 mg EDO	44	–	–	8 x 36 32 mg	88	–	–
8 x 32 32 mg EDO	64	–	–	16 x 36 64 mg	145	–	–
16x32 64 mg EDO	119	–	–	32 x 36	269	–	–

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1Meg x 3 (3 chip)	1.50	1.50	1.50
1Meg x 9 (9 chip)	1.50	1.50	1.50
4Meg x 3 (3 chip)	16	16	-
4Meg x 9 (9 chip)	19	19	15
16Meg x 9 (9 chip)	49	49	-

COMPAQ MEMORY MODULES

Deskpro 2000mmx, 4000mmx SDRam	32/64/128	39/74/149
Deskpro En, Ep Series non-Ecc SDRam	32/64/128	39/74/149
Deskpro En Ep Series PC-100 ECC	32/64/128	49/89/179
Presario 510, 520, 524, 660, 720, 724, 860, 866	8/16/32	34/49/89
Presario 920, 924, 954, 974, 978, 992	8/16/32	22/39/69
Presario 2100, 2200, 2120, 4112, 4122, 4150, 4170, 4402 (EDO)	8/16/32	22/34/59
Presario 4704, 4706, 4710, 4712, 4714, 4716, 6704, 6708 (EDO)	8/16/32	22/34/59
Presario 7212, 7222, 7232, 7234, 7240 (EDO)	8/16/32	22/34/59
Presario 2266, 4880, 5060, 5140, 5150, 5155, 5170 (PC-100)	32/64/128	39/79/149
Presario 5190, 5610, 5612, 5630, 5635, 5660, 5665 (PC-100)	32/64/128	39/79/149
Presario 2240, 2254, 2255, 2256, 2510, 3020, 3060	16/32	29/39
Presario 4504, 4505, 4506, 4508, 4526, 4528, 4532, 4540	16/32	29/39
Presario 4764, 4770, 4784, 4786, 4910, 8772	16/32	29/39
Presario 4620, 4640, 4660, 4808, 4810, 4814, 4816	32/64/128	39/79/149
Presario 4840, 4850, 4860, 5015, 5020, 5030, 5032, 5035, 5050	32/64/128	39/79/149
Presario 5151, 5190, 5670, 5202, 5204, 5220	32/64/128	39/79/149
Presario 5222, 5225, 5240, 5242, 5245, 5600i, 2275	32/64/128	39/79/149
Pro. Workstation 5000, 6000, 8000	32/64/128/256	89/129/239/519
Pro. Workstation AP400, AP500, SP700	64/128/256/512	119/229/599/call
Prolant 800, 850R, 1500, 2500, 2500R, 5500R	32/64/128/256	89/129/229/519
Prolant 6000, 6500, 7000 (Quads)	32/64/128/256	89/129/229/519
Prolant 1000, 1500, 2000R, 4000R, 4500R (Quads)	8/16/32/64	29/49/89/149
Prolinea Series	4/8/16/32	5/22/39/69
Prosignia Desktop	64/128	79/149
Prosignia 300, 500 (pairs)	4/8/16/32	5/34/49/89

COMPAQ NOTEBOOK/LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NimH/Li-on
Armada 1100, 1110, 1120T, 1120, 1125	8/16Meg	29/44/	104/—
Armada 1130, 1130T	8/16/32/64Meg	29/44/79/139	104/—
Armada All 1500 Series	8/16/32/64Meg	29/44/79/139	139/229
Armada1700, 3500, 7400 (SD Ram)	16/32/64/128Meg	39/69/89/249	—/219
Armada 4100, 4110D, 4120T, 4125D (Kit)	8/16/32/64/128Meg Kit	34/48/94/149/299	—/219
Armada 4130T, 4131T, 4150, 4160T (Kit)	8/16/32/64/128Meg Kit	34/48/94/149/299	—/209
Armada 4210T, 4220T	16/32/64/128Meg	36/59/139/329	—/209
Armada 6500	32/64/128Meg	69/89/249	—/219
Armada 7300, 7330, 7350, 7360, 7362, 7370, 7380, 7800	16/32/64Meg	39/69/139	—/231
Armada All 7700 Series	16/32/64Meg	39/69/139	—/229
Armada 5B Series 5200, 5231, 5233, 5266	16/32/64Meg	39/69/139	129/219
Armada 38 Series 6233/12T	16/32/64/128Meg	39/69/89/249	
Contura 4/25, 4/25C, 4/25CX	4/8/16Meg	39/49/89	119/—
Contura 400C, 400CX, 410C, 410CX	4/8/16Meg	5/49/89	104/—
Contura 420C, 420CX, 430C, 430CX	4/8/16/24Meg	5/39/49/89/99	104/—
LTE 5000, 5100, 5200, 5300, 5400 (Kit)	8/16/32/64Meg Kit	3/69/139/299	138/259
Presario 1000, 1010, 1020, 1030, 1070, 1080	8/16/32Meg	29/49/119	110/217
Presario All 1200, 1600, 1800 Series	16/32/64/128Meg	39/69/89/249	112/219

TOSHIBA LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NimH/Li-on
Libretto 50CT, 70CT, **100CT**	8/16/**32**Meg	39/69/**99**	—/151
Tecra 500CDT, CS, 510CDS, CDT, 520CDT, 530CDT	8/16/32/48/64/128Meg	22/44/79/119/149/289	231/239
Tecra 540, 550, 550CDT	8/16/32/64/128Meg	22/44/79/149/289	259/—
Tecra 700CS, 700CT (SDRAM)	8/16/32Meg	59/89/149	279/259
Tecra 710CDT, 720CDT, 730CDT, 750CDT, 740CDT	8/16/32/64/128Meg	39/49/89/149/289	279/259
Tecra 750CDT, CDM,DVD, 780 Series	8/16/32/64Meg	22/44/79/139	—/219
Tecra 8000 Series	32/64/128Meg	69/89/249	—/—
T2100 Series	4/8/16/24Meg	4/39/59/79	104/—
T1900, T4500, T4600, T4700, T4900 All Models	4/8/16/32Meg	33/49/79/129	104/—
T4400, T6400, T6600	16Meg	129	279/—
Satellite T100CS, 105CS, 110CS, 110CT, 115CS	8/16/32Meg	10/69/99	99/—
Satellite 200CDS, 205CDS, 210CS, CT Series	8/16/32Meg	10/69/99	99/—
Satellite 220CDS, 225CDS, 230CX	8/16/32/48/64/128Meg	24/44/79/119/135/289	196/208
Satellite 300, 305, 310, 315, 320, 325, 330, 335 Series	8/16/32/64/128Meg	22/44/79/139/289	196/208
Satellite 2505CDS, 2515, 2535	16/32/64/128Meg	44/84/149/289	196/208
Satellite 4000 Series	32/64/128Meg	69/89/249	196/208
Satellite Pro T400, 405, 410, 415, 420, 425, 430, 435 Series	8/16/32Meg	10/69/99	169/199
Satellite Pro 440CDT, 440CDX, 445, 460CDT	8/16/32/48/64/128Meg	24/44/79/115/149/289	196/208
Satellite Pro 465, 470, 480	8/16/32/48/64/128Meg	24/44/79/115/149/289	196/208
Satellite Pro 490	16/32/64/128Meg	44/79/149/289	169/199
Portege 610CT, 620CT	8/16/32Meg	35/59/89	—/229
Portege 650CT, 660CT	16/32/64/128Meg	59/69/139/289	—/229
Portege 7000, 7010	64/128Meg	96/249	—/—

PC CARDS (PCMCIA) Version 2.0

DIGITAL CAMERA & STORAGE CARDS

ATA FLASH	8/16/32/48/64/96/128/160/224Meg	43/79/89/139/199/289/379/469/599
ATA Compact Flash	8/16/24/32/48/64/96/128Meg	42/69/79/99/159/219/299/419
S-Ram Cards	1/2/4/6Meg	79/119/189/229
Smart Media	2/4/8/16/32Meg	17/19/29/59/109
Compact Flash Adapter	15	
Smart Media Adapter	65	

DATA/FAX MODEMS

56 6/14/4	79.00
56 6/14.4 & Ethernet	169.00

PC CARDS

Ethernet Combo (10 BT & 10 B2)	54.00
Kingmax 100 Base-TX	109.00
Calluna Tech Type III Hard Drive, 520 Meg	495.00
Calluna Tech Type III Hard Drive, 1GIG	599.00
PCMCIA Card Reader (Internal)	109.00
PCMCIA Card Reader (External)	109.00
CD Rom Kit (Card, Drive, Cables) 24X	229.00
DVD Rom Drive Kit (External)	799.00

CPU CHIPS

INTEL		Pro 200 512K/256K	299/89	Celeron 500/466/433	179/129/99
Pentium III Xeon 500	512/1mg/2mg/call	Pentium 233MMX	49	Celeron 400/366/333	79/59/69
Pentium II Xeon 500	512/1mg/2mg/call	Pentium 200/233 MMX	149/49	**AMD**	
Pentium II Xeon 450	512/1mg/2mg/call	Pentium 166/166MMX	49/55	K7-500/550/600	285/449/589
Pentium III 600/550/500/450	659/479/289/229	Pentium 150/133/120	49/49/39	K6-3-400, K6-3-450	129/179
Pentium II 450/400 MHZ	229/179	Pentium 100/90/75	39/29/25	K6-2-450/400/350	79/69/49
Pentium II 350/333 MHZ	179/155	486 DX2-66/DX4-100	19/39	K6-2-333 (95MHZ)	49
Pentium II 300/266 MHZ	159/139				

DELL MEMORY

Dimension XPS D233, D266, D300, D333 (SDRAM)	32/64/128Meg	59/79/149
Dimension XPS D233, D266, D300, D333 (ECC)	32/64/128Meg	59/84/179
Dimension XPS 133S, 166S, 200S, P133V, P200V (SDRAM)	16/32Meg	29/59
Dimension XPS R350, R400, R450 (PC-100)	64/128Meg	79/149
Dimension XPS V333, V333C, V350 (PC-100)	32/64/128Meg	49/79/149
Dimension XPS M166A, M200A, M200S (SDRAM)	16/32Meg	29/59
Dimension XPS Pent II H233, H266 (EDO pairs)	8/16/32Meg	19/39/59
Dimension XPS P100C, 120C, 133C, 166C (EDO pairs)	4/8/16/32Meg	11/15/39/69
Dimension XPS P60, P75, P90, P100 (FPM pairs)	4/8/16/32Meg	10/16/39/69
Optiplex GM, GMT P75, P90, P100, P120, P133, P166 (EDO pairs)	4/8/16/32Meg	11/19/39/69
Optiplex GNT, N Series (EDO Dimm)	32/64/128Meg	79/139/279
Optiplex GX Pro 180, 200 (SDRAM)	32/64/128Meg	59/79/149
Optiplex GXI (EDO ECC)	32/64/128Meg	89/139/279
Optiplex GX1 (ECC PC100)	32/64/128Meg	49/89/179
Optiplex GN/GNT 166, 200, 233 (EDO Dimm)	32/64/128Meg	79/139/229
Optiplex XL, XM, XMT (FPM pairs)	8/16/32Meg	19/39/69
PowerEdge 2100, 2200, 4100, 4200 (EDO, ECC)	32/64/128/256Meg	89/139/279/569
PowerEdge EL, SP, SP2 (FPM pairs)	8/16/32Meg	26/39/69

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADED	MEMORY PRICE	BATTERY NimH/Li-on
ACER Extensa 336/367/366/368 edo	16/32/64Meg	49/79/139	119/199
ACER Extensa 390, 391, 392, 393, 394, 395 edo	16/32/64Meg	49/79/139	129/—
ACERNote 763, 765, 782, 784, 786	4/8/16Meg	19/29/69	—/—
ACERNote Light 356, 358, 359, 361 (pairs) edo	4/8/16Meg	19/29/69 ea	135/—
ACERNote Nuevo 971, 972, 372, 373, 374	8/16/32Meg	29/49/79	239/—
ACERNote Pro 950, 954, 955, 957, 959 (pairs)	4/8/16Meg	19/29/69 ea	119/—
ACER Travelmate 310, 312, 7000 Series (SDram)	16/32/64	49/59/99	
AST Ascentia A Series and M Series	16/32/64Meg	49/79/149	139/219
AST Ascentia P30, P50	16/32Meg	69/144	—/299
AST Ascentia J10, J30,J50 (pairs)	4/8/16	19/29/69	—/189
AST Ascentia 800N, 810N, 900N, 910N	4/8/16Meg	46/58/89	105, 147/187
AST Ascentia 950N	8/16Meg	59/89	—/187
AT&T Globalyst 130	4/8/16Meg	4/29/69	102/—
Canon Innova Book 350CD, 360, 475 (pairs)	8/16Meg	29/59 ea	119/—
Canon Innova Book 480, 490 EDO (pairs)	8/16Meg	29/69 ea	119/—
CTX EZ Book 300 EDO (pairs)	8/16/32Meg	39/69/109 ea	138/—
CTX EZ Book 500, 600 Series	4/8/16Meg	4/39/69	138/—
CTX EZ Book 700, 760, 770 (EDO) (pairs)	4/8/16/32Meg	19/29/69/109 ea	138/—
CTX EZ Book 760MT, 765MT (EDO)	16/32/64Meg	49/79/139	138/—
DEC HiNote Ultra 2000	16/32/64Meg	49/79/139	
DEC HiNote VP 5100, 5120	8/16/32/64Meg	29/49/79/139	119/—
DEC HiNote VP, CSS, LSS, CTS, LTS	8/16/32/64Meg	29/45/79/139	119/199
DEC HiNote VP700, 703	16/32/64Meg	45/59/109	
Dell Inspiron 3000, 3200, 7000	16/32/64/128Meg	49/69/89/249	—/229
Dell Latitude CP & CPI Series	16/32/64Meg	49/79/139	—/219
Dell Latitude 433, C, CX	4/16Meg	49/89	119/—
Dell Latitude LX, M	4/8/16Meg	49/59/89	105/—
Dell Latitude XP, XP1, XPI CD M166ST (pairs)	4/8/16/32Meg	19/29/69/109 ea	—/209
Epson ActionNote 650, 650c, 660c, 660cx	4/8/16Meg	9/59/99	119/—
Epson ActionNote 880, 886c, 890, 910	4/8/16/20Meg	19/39/79/109	119/—
Fujitsu Lifebook 200, 500, 600, 700, 900 (SDRAM)	32/64Meg	69/99	
Fujitsu Lifebook 400, 500, 600 Series edo	8/16/32/64Meg	29/59/79/139	108/203
Fujitsu Monte Carlo, Montego, Milan	8/16/32/64Meg	29/49/79/139	—/203
Gateway 2000 Colorbook 4/33	4/16Meg	69/119	112/—
Gateway Solo Series 2100, edo	8/16/32Meg	54/79/139	119/199
Gateway Solo 2300, 2500, 3100, 5100, 910C	16/32/64Meg	49/69/89	—/299
Hitachi C-Series	8/16/32Meg	29/58/109	
Hitachi E-Series, MMX Series	8/16/32Meg	49/79/149	119/219
Hitachi M-Series	8/16/32Meg	49/79/149	104/—
Hitachi Visionbook Pro (SDram)	16/32/64	49/89/259	
HP Omnibook 800	8/16/32/64Meg	49/79/99/169	—/145
HP Omnibook 2100 PII 4100 (SDram)	32/64/128Meg	69/89/259	—/203
HP Omnibook 4000C, CT, C	4/8/16Meg	49/54/99	126/—
HP Omnibook 5000CT, CTS, C, 5500CS, 5700	8/16/32/64Meg	54/79/139/189	126/—
Micron Go Book 233 Lite, 233, 266	16/32/64Meg	49/79/139	
Micron MilleniaTransport Pentium (pairs), MRX	8/16Meg	39/59 ea	
Micron MilleniaTransport VLX P133 (pairs)	4/8/16Meg	19/29/59 ea	129/203
Micron MilleniaTransport XKE P166MMX	16/32/64Meg	49/79/149	—/203
Midwest Micro Elite or Soundbook Plus or Sndbk II, IP	4/8/16Meg	56/69/99	119/—
Midwest Micro Elite or Soundbook CD	4/8/16Meg	19/29/69	99/—
NEC Ready Notebook 220T, 330T, 430T, 440T	16/32/64/128Meg	49/69/89/259	133/—
NEC Ultralite Versa, E, V, MP	4/8/16/32Meg	2/8/99/139	133/—
NEC Versa 2600 Series (pairs)	4/8/16Meg	19/29/59 ea	
NEC Versa 4000, 4050/4080, 4200, 4230	4/8/16/20/32Meg	2/8/99/139	—/219
NEC Versa 6000, 6050, 6030	8/16/32/64Meg	44/79/139/179	—/219
NEC Versa 6200MX edo	8/16/32/64Meg	49/79/149	—/219
Packard Bell Statesman	8Meg	69	104/—
Panasonic CF-V41P Series	8/16/32Meg	59/59/149	126/—
Panasonic CF-62 P100, P133	16/32/64Meg	59/79/139	—/—
Panasonic Toughbook 25, 35, 45	16/32/64Meg	49/69/139	—/—
Samsung Sens 530, 520	16/32/64	49/79/149	
Sharp 3030, 3040, 3070	8/16/32Meg	49/79/159	—/209
Sharp 3010, 3020, 3050, 3060	4/8/16/32Meg	19/29/69/119	133/—
Sharp 8700, 8800, 8900	4/8/16Meg	49/59/99	124/—
Sharp 9000, 9030, 9020, 9050, 9300CD, T edo	8/16/32Meg	46/79/139	—/219
Sharp 9040, 9070 (pairs)	4/8/16Meg	19/29/69 ea	—/259
Sharp 9080 (pairs) edo	4/8/16Meg	19/29/69 ea	—/259
Sharp Widenote 100T	8/16/32Meg	29/69/139	—/—
Sony 505G, 505GX, 505FX	32/64Meg	89/219	—/—
Sony VAIO PCG-750C, 707C, 719	16/32/64Meg	49/69/99	—/—
TI 4000, TI 4000E, TI 4000M	4/16Meg	59/299	68, 110/—
TI 5000, 5100, 5200, 5300	8/16Meg	59/89	—/189
TI 6020, 6030, 6050, 6100	8/16/32Meg	29/49/79	—/215
TI Extensa 450, 450T, 455, 455T	4/8/16Meg	19/29/69	147/—
TI Extensa 510, 515 (pairs) edo	4/8/16Meg	19/29/69 ea	147/—
TI Extensa 550, 555, 560, 565, 570 (pairs)	4/8/16Meg	19/29/59 ea	161/—
TI Extensa 600, 605, 650, 900, T, CDT edo	8/16/32Meg	29/69/99	147/—
TI Extensa 700 Series	16/32/64/128Meg	49/69/99/259	147/—
Winbook FX P100, P133, P150	8/16/32Meg	49/99/149	—/279
Winbook XL, XL1, XL2 (SDram)	16/32/64/128Meg	49/69/99/259	139/219
Winbook XPS	32Meg	139	112/217
Winbook LM (pairs)	8/16Meg	29/69 ea	—/209

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Lite 352-374Series	149	179	229	349	449	659
730-789	149	179	229	349	449	659
Pro 950-959	149	179	229	349	449	659
Nuvo 971, 972	149	179	229	349	449	659
AST Ascentia	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
800s & 900s	149	179	229	349	449	659
COMPAQ	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
Contura 486	149	179	229	349	449	659
Contura 400–430	149	179	229	349	449	659
LTE 5000–5400	149	179	229	349	449	659
FUJITSU	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
Milan, Montego	149	179	229	349	449	659
Monte Carlo	149	179	229	349	449	659
Lifebk 500 Series	149	179	229	349	449	659
IBM THINKPAD	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
355, 360, C, CS, P	149	179	229	349	449	659
750, C, CE, CS, P	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
NEC VERSA	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
E, M, P, V	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
4000, 4050, 4200	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
[illegible]	149	179	229	349	449	659
PANASONIC	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
CF-V21P, CF-V41	149	179	229	349	449	659
AST PENTIUM	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
BASED NOTEBOOKS	149	179	229	349	449	659
SHARP	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
7700, 7750, 8150	149	179	229	349	449	659
8650, 8660, 8700	149	179	229	349	449	659
TOSHIBA	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
100 Series	149	179	229	349	449	659
1900 Series	149	179	229	349	449	659
2100 Series	149	179	229	349	449	659
2400 Series	149	179	229	349	449	659
Tecra 700 Series	149	179	229	349	449	659
Tecra 500 Series	149	179	229	349	449	659
T2115CS	149	179	229	349	449	659
T2150CS, CT	149	179	229	349	449	659
UNIVERSAL	**2.1G**	**3.2G**	**6.4G**	**8.0G**	**10.0G**	**14.0G**
2.5 IDE 12mm	149	179	229	349	449	659
2.5 IDE 19mm	149	—				
2.5 IDE 17mm	—	—	229	349		
MISCELLANEOUS SERIES						
AST J-Series	149	179	229	349	449	659
AT&T Globalyst 130	149	179	229	349	449	659
Canon Innova Books	149	179	229	349	449	659
CTX EZ Books	149	179	229	349	449	659
DEC Hi Notes	149	179	229	349	449	659
Dell Latitudes	149	179	229	349	449	659
Epson Action Notes	149	179	229	349	449	659
Gateway Solo	149	179	229	349	449	659
Hitachi	149	179	229	349	449	659
HP Omnibooks	149	179	229	349	449	659
Micron Millenia	149	179	229	349	449	659
Samsung Sens	149	179	229	349	449	659
Sharp Series	149	179	229	349	449	659
Sony Vaio	149	179	229	349	449	659
TI Extensa	149	179	229	349	449	659
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For a list of winners (available by 4/18/00) send a self-addressed, stamped envelope by 1/31/00 to: Hewlett-Packard CD-Writer Sweepstakes Winners, P.O. Box 9204, Medford, NY 11763-9204.

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Armada 7710MT Laptop	-	116.99	58.49
Armada 1130T Series Laptop	-	116.99	58.49
Presario 1610 Laptop	-	158.39	96.29
Presario 1620 Laptop	-	158.39	96.29
Presario 1622 Laptop	-	158.39	96.29

Micron Electronics	128MB	64MB	32MB
ClientPro 766XI	$300.59	150.29	88.19
ClientPro CP 450	$305.99	152.99	89.99
ClientPro MRE P200	$227.69	152.99	68.39
ClientPro P200	-	136.78	71.98
ClientPro VXE	$300.59	150.29	88.19
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Millennia MAX 450	$305.99	152.99	89.99
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Millennia Transport P133	-	-	80.98
Millennia Transport XKE P233(A)	-	116.99	58.49
TransPort Trek Series Notebooks	-	116.99	58.49
Transport Trek2 Series	$315.89	158.39	96.29

Gateway	128MB	64MB	32MB
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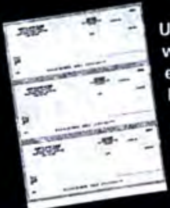

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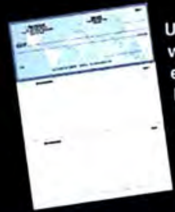

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953 Windows software
954 Monitors and video boards
955 Accounting software
956 Graphics software
957 Network/sharing products
958 Printers
959 Multimedia products
960 Utilities
961 Mail order companies
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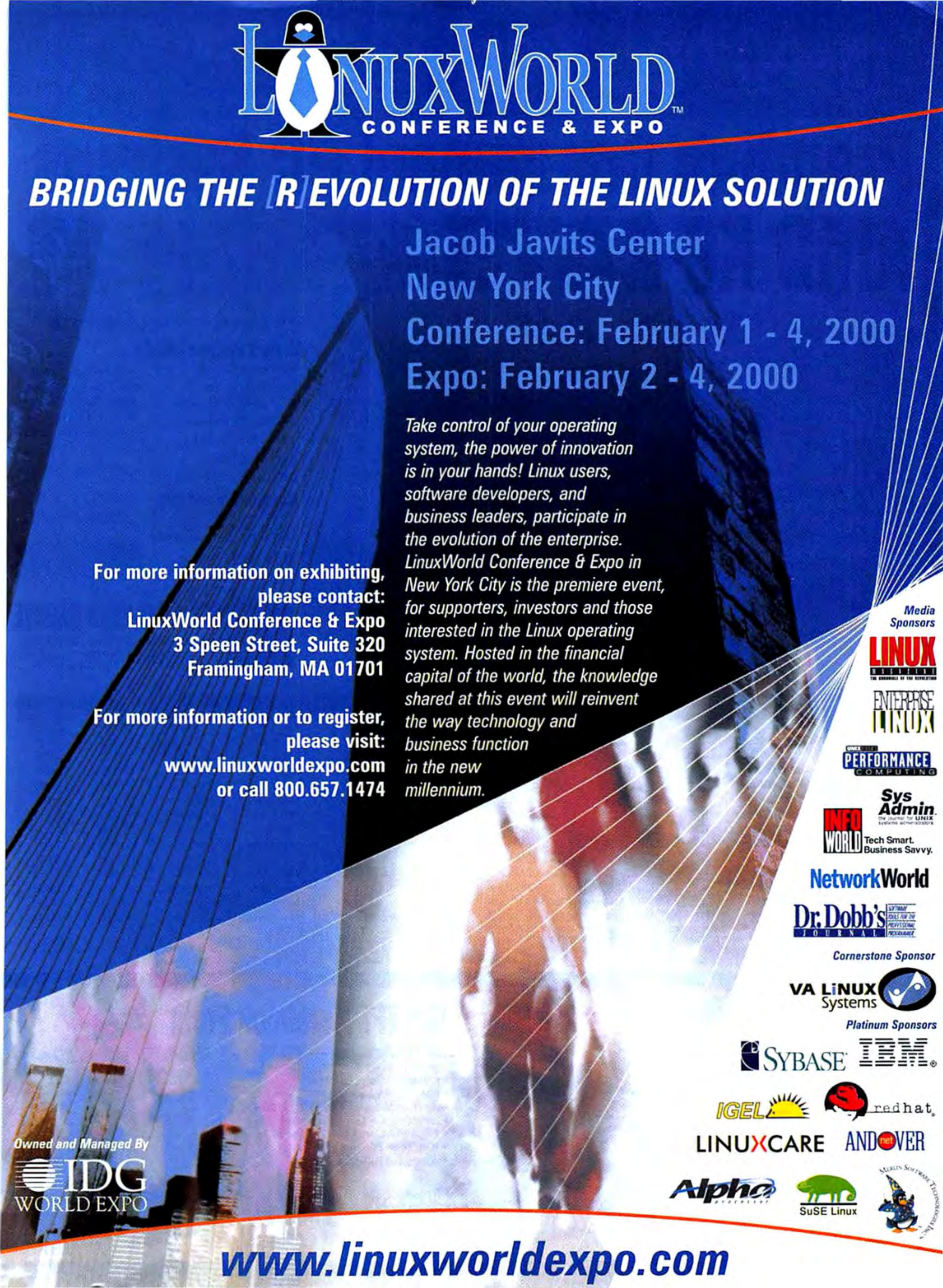

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AT-A-GLANCE

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CTXTM39A	**AMD K6-III/400 3DNow!**	17"	128MB PC 100	12GB UDMA	40X	AGP/8MB	Mid-Tower	$30/Month	**$999.99**	**$599.99**
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CTXTM47A	**AMD K6-III/450 3DNow!**	17"	128MB PC 100	19GB UDMA	40X	AGP/8MB	Mid-Tower	$35/Month	**$1139.99**	**$739.99**
CTXTM43C	**Pentium III 500MHz**	17"	128MB PC 100	12GB UDMA	40X	AGP/8MB	Mid-Tower	$36/Month	**$1179.99**	**$779.99**
CTXTM45C	**Pentium III 550MHz**	17"	96MB PC 100	20GB UDMA	40X	AGP/8MB	Mid-Tower	$42/Month	**$1399.99**	**$1399.99**
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Form Factor: **M-ATX** • CPU: **Socket 370/Slot 1** • Bus Speed: **Up to 100MHz** • On-board Video: **AGP 8MB** • On-board Audio: **Yes** • PCI Slots: **1** • ISA Slots: **1 (Shared)** • Memory: **3 SIMM** • Max Memory: **768 MB**

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Tiger 5EMA+ Motherboard Features At-A-Glance
Form Factor: **ATX** • CPU: **Socket 7** • Bus Speed: **Up to 100 MHz** • AGP Slots: **1** • PCI Slots: **5** • ISA Slots: **2** • Memory: **3DIMM Sockets** • Max Memory: **768MB**

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Tiger 598 Motherboard At-A-Glance
Form Factor: **AT** • CPU: **Super Socket 7** • Bus Speed: **Up to 100 MHz** • On-board Video: **8MB AGP** • On-board Audio: **YES** • PCI Slots: **3** • ISA Slots: **2** • Memory: **3 DIMM** • Max Memory: **768 MB**

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Matsonic6380SG M-ATX 1MB Cache, Wave Table sound and AGP On-board	**AMD** Up to K6-2/450; K6-III/450 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR366	MB2-599	$82.99	$79.99	$75.99
Tiger 5EMA+ *Super Socket 7* 1MB Cache and AGP Port	**AMD** Up to K6-2/500; K6-III-450 **Intel** Pentium up to 233 MMX **IBM/Cyrix** up to MII 366	MB1-T-7B	$83.99	$78.99	$74.99
Matsonic 7112 ATX *Slot 1* w/AGP Port	**Celeron** up to 500MHz **Intel** Pentium III up to 733MHz	MB2-7112C	$89.99	$84.99	$79.99
Tiger 741LMRT ATX *Slot 1* w/AGP On-board	**Celeron** up to 500MHz **Intel** Pentium III up to 600MHz	MB2-741L	$103.99	$98.99	$93.99

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#CP2-K62-500	500	3DNow!	$127.99	$122.99	$117.99*
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*** *Celeron CPUs are socket 370 format and require a fan and adapter (see far right) to be used in any slot 1 motherboard.*

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#CP2-CI500	Intel Celeron **500** processor (370)	$169.99	$159.99	$152.99
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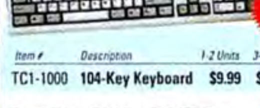

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The Machine That Changed My World

THIS IS MY LAST chance to pontificate on the computer business before the year 2000 arrives, so a look backward is in order. Where we end up in the coming decades may well be wonderful, but the distance we've come in my lifetime is dazzling enough.

The first time I ever interacted with a computer was 35 years ago in high school; the machine was a Control Data model at Carnegie Tech that took up a huge room but possessed less processing power than what's inside the 3-pound subnotebook I'm using to write this.

User interface? Type ALGOL code on an infernal keypunch machine to program a deck of 80-character punch cards. (There was even a name for the confetti punched out of the cards: *chad.*) Input? Shove the cards containing your pathetic little program through an opening to a guy behind a window. Output? Check back days later to collect a couple of wide, folded sheets of paper revealing that your program couldn't run because you'd left out a semicolon somewhere.

Memory and storage were so precious that programmers did everything they could to pare down their code. Who would have guessed that their byte-saving two-digit year fields would come back to haunt the world as the Y2K bug?

The IBM PC and commercial software changed my life in more ways than I can count.

THE INTERACTIVE AGE

BUT "WHO WOULD have guessed?" has been the theme of computing ever since my first frustrating encounters. When timesharing machines came of age and teletypes supplanted punched cards, the age of interactive computing began. You could write a program, run it, and debug it without having to deal with that guy behind the window. The program could ask users for input, process it, and answer with almost no delay. Who would have guessed that interactivity would be so powerful?

In 1982, my first IBM PC came with a green-on-black monitor, two 320KB floppy drives, 64KB of memory, a quasi–16-bit processor that plodded along at 4.77 MHz, and no hard drive. It cost more than the car I owned—and that's without counting the $2000 dot matrix printer, which churned out pages with the soothing rhythm of a machine gun.

It was a bargain. That PC and commercial software changed my life in more ways than I can count. Word processing freed my writing from the constraints of pen, typewriter, and Wite-Out. A spreadsheet made managing my financial life easy. Database software helped me organize my tax records. A 2400-bps (no kilos here) modem moved my documents across the country faster than FedEx.

Hard drives, CD-ROMs, fonts, color graphics, and public e-mail all came later, along with ever-increasing speed. Today's PCs run more than a hundred times faster, carry a thousand times more memory, and cost less than half as much (not even allowing for inflation).

Yet the differences between my first computer and current models are nothing compared with the improvement from the world of "before PC" to "after." The hard drive may make storage simpler, fonts may make pages prettier, ink jets may make printing quieter, but my most important uses of the computer today remain much the same as they were in 1983. The major exception: the World Wide Web, the ultimate who-would-have-guessed surprise.

SEEKING ASYLUM

WHAT HASN'T CHANGED is software's complexity, unreliability, and ability to suck up cycles. Don't expect information appliances to unshackle us; my new TV and VCR seem to have as many functions as Microsoft Word, but without the help system. As Alan Cooper points out in his excellent book, *The Inmates Are Running the Asylum*, everything digital tends to devolve into a computer, with the same poor design. When it comes to usability, the industry's mantra is "It won't be easy."

We can make sensible guesses about the coming marvels of the digital millennium, but it's harder to predict which ones will become indispensable and which will be merely interesting fads. If you suspect they will be the same kinds of surprises as the Y2K bug or the Web, you've probably guessed right.

PC World *Contributing Editor Stephen Manes is the cohost of* Digital Duo, *a series appearing on public television stations nationwide. For program information, see www.digitalduo.com.* ■

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[OH HECK, TAKE ONE SCOOP OF EACH.]

DELL INSPIRON 7500

LIFE IS FULL OF TIMES WHEN YOU CAN'T HAVE YOUR CAKE AND EAT IT TOO. THIS ISN'T ONE OF THEM. IN FACT, THERE'S QUITE A BIT OF CAKE HERE. BASICALLY WHAT YOU CAN GET IN THE NEW DELL® INSPIRON™ 7500 IS UP TO A 15.4 INCH SXGA SCREEN – PLUS A PENTIUM® III PROCESSOR – WHICH MEANS YOU'LL HAVE ALL THE MULTIMEDIA, MEMORY, SPEED AND RAW POWER OF MANY FULL-SIZED DESKTOPS IN THIS HANDY TRAVELING SIZE. AND WITH THE 4-SPINDLE CAPABILITY YOU CAN HAVE UP TO 75GB[4] OF STORAGE, OR YOU CAN RUN YOUR ZIP, FLOPPY AND CD DRIVES RIGHT OFF YOUR BATTERY, ALL AT THE SAME TIME. YES, COMPROMISE IS FOR THOSE WHO CAN'T DECIDE WHAT THEY WANT.

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- 32MB SDRAM (up to 512MB)
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- 3D Positional Sound with Wavetable, Lithium Ion Battery
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- MS® Works Suite 99 with Money 99 Basic
- 3-Year Limited Warranty[2]

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l® Recommended Upgrade:
econd Pentium® III Processor at 500MHz, add $347

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- MS® Windows® 98 and Works Suite 99
- 3-Year Limited Warranty,[2] 1-Year Next-Business-Day On-site[3] Service

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- 14.1" XGA Active Matrix Display ■ 32MB SDRAM (up to 256MB)
- 4.8GB[4] Ultra ATA HD (up to 10GB[4])
- Modular 24X Max[3] Variable CD-ROM and Floppy Drive
- NeoMagic® MagicMedia™ 256AV AGP Video
- 3D Surround Sound with Wavetable, Lithium Ion Battery
- MS® Works Suite 99 with Money 99 Basic
- MS® Windows® 98, SE ■ 3-Year Limited Warranty[2]

$1799 Business Lease[16]: $60/Mo.,36 Mos.
E•VALUE CODE: **03695-891117**

Dell® Recommended Upgrades:

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- Modular 24X Max[3] Variable CD-ROM and Floppy Drive
- NeoMagic® MagicMedia™ 256ZX AGP Video
- 3D Surround Sound with Wavetable
- Lithium Ion Battery w/ ExpressCharge™ Technology
- MS® Windows NT® Workstation 4.0
- 1-Year Next-Business-Day On-site[3] Service

$1899 Business Lease[16]: $64/Mo.,36 Mos.
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Dell® Recommended Upgrade:

- Upgrade to 6.4GB[4] Ultra ATA HD, add $99

NEW DELL® *INSPIRON*™ 7500 Notebook

Mobile Desktop

- Intel® Celeron™ Processor at 433MHz (up to *NEW* Intel® Pentium® III Processor at 500MHz)
- 15" XGA Active Matrix Display
- 32MB SDRAM (up to 512MB)
- 4.8GB[4] Ultra ATA HD (up to 25GB[4])
- Removable Combo 24X Max[3] Variable CD-ROM and Floppy Drive
- 2X AGP 4MB ATI RAGE Mobility™-P 3D Video (up to 8MB)
- 3D Positional Sound with Wavetable, Lithium Ion Battery
- MS® Windows® 98, SE
- MS® Works Suite 99 with Money 99 Basic
- 3-Year Limited Warranty[2]

$1999 Business Lease[16]: $67/Mo.,36 Mos.
E•VALUE CODE: **03695-891119**

Dell® Recommended Upgrades:

- Upgrade to *NEW* Pentium® III Processor 450MHz, add $300
- Upgrade to 3-Year Next-Business-Day On-site[3] Service, add $99

pentium® III

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- 17" (16.0" viewable, .28dp) M770 Monitor
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- 40X Max[5] Variable CD-ROM Drive
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- harman/kardon HK-195 Speakers
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$899 As low as $25/Mo., 48 Mo. Plan[13]
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Mobile Desktop

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- 64MB 100MHz SDRAM
- 6.4GB[4] Ultra ATA Hard Drive
- Removable Combo 24X Max[7] Variable CD-ROM and Floppy Drive
- 2X AGP 8MB ATI RAGE Mobility™-P 3D Video
- 3D Positional Sound with Wavetable
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Mobile Desktop

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- 15" XGA Active Matrix Display
- 64MB 100MHz SDRAM
- 4.8GB[4] Ultra ATA Hard Drive
- Removable Combo 24X Max[7] Variable CD-ROM and Floppy Drive
- 2X AGP 8MB ATI RAGE Mobility™-P 3D Video
- 3D Positional Sound with Wavetable
- Internal PCI 56K[11] Capable V.90 Fax Modem

$2499 As low as $68/Mo., 48 Mo. Plan[13]
E•VALUE CODE: **03695-801124C**

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Light Weight, Light Price

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- 14.1" XGA Active Matrix Display
- 32MB SDRAM
- 4.8GB[4] Ultra ATA Hard Drive
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- 2X AGP 8MB ATI RAGE Mobility™-M1 3D Video
- 3D Positional Sound with Wavetable

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- 17" (16.0" vis) M770 Monitor (up to Flat Panel)
- 8MB ATI AGP Graphics, 48X Max™ CD-ROM, Sound, 3Com® 10/100 NIC
- MS® Windows® 98 and Office 2000 Small Business
- 3-Year Limited Warranty' ■ 1-Year Next-Business-Day On-site' Service

$1599 Business Lease'': $54/Mo.,36 Mos.
E•VALUE CODE: **03696-591115**

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