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JANUARY 2002
VOLUME 20 ♦ NUMBER 1

COVER STORY

FUTURE TECHNOLOGY

66 What's New for 2002

What will everyday technology be like in 2025? Reply hazy; try again later. But what about in the next one to five years? In the near term, our crystal-ball gazers see far more clearly. So we've selected 20 products, trends, and technologies that will have an impact on our lives in the not-too-distant future. Are you wondering how useful? how big? how powerful? We've got answers.

Cover photography: Stan Musilek;
notebook screen: Diego Aguirre;
DVD display: Kodak Display Products

FEATURES

INK JET PRINTERS

80 All-Purpose Printers

Yes, Virginia, some ink jets can handle color photos as well as text and graphics. We gathered a baker's dozen of general-use printers—together with three photo-oriented units—to find the best deals.

THE NEW WEB

95 Web Survival Guide

On today's Internet, an eyeball's value has fallen. And as online advertising revenue evaporates, more companies charge visitors to access site content. As a result, end users find, information now has its price.

STORAGE SOLUTIONS

105 Smart Storage

Is your hard drive becoming hopelessly overcrowded? Alternative storage devices offer portability, flexibility, and lots of room for your files. Discover the range of choices for relieving disk-space crunch.

FREE ONLINE GAMES

117 Online Game All-Stars

Whether you want to match wits against card players, treat yourself to a challenging puzzle, or mix it up with aliens, you'll find great low- or no-cost entertainment options in our selection of Internet games. ►

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Digital Focus

Windows XP has image tools built in. Are they worth the upgrade?
find.pcworld.com/17801

NEWSLETTER

Office XP Tips

Use XP's Task Pane to share data among apps and to insert images.
find.pcworld.com/17802

COMING UP IN FEBRUARY

Personal Touch: With big brands' service declining, should you buy a PC from a mom & pop instead?
Internet Toolbox: Scott Spanbauer picks software to help make the most of your time online.
Word Processing Tips: Discover ways to work smarter and faster—

in both Word and WordPerfect.
High-Speed Hookups: Ready to join the broadband bandwagon? Don't miss our in-depth look at DSL, cable, and satellite ISPs.
Multifunctionalism: We examine six all-in-one devices for printing, copying, scanning, and faxing.

NEWS & TRENDS

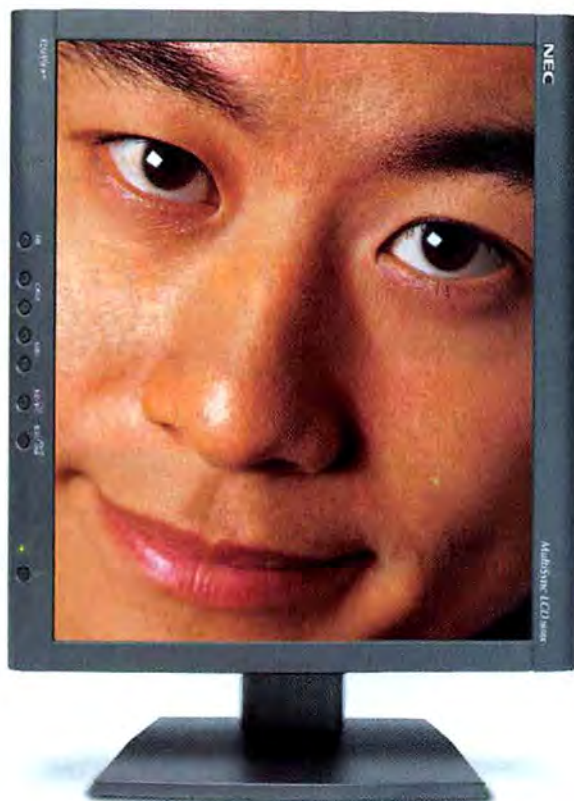
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To no one's surprise, Microsoft's new operating system suffers from a wide range of glitches and compatibility problems. Fortunately, patches began to appear the very day Windows XP shipped.
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Companies are incorporating new copy-prevention technology to restrict your ability to make copies of videos and music CDs, no matter who owns them. And their efforts so far may be just the beginning.
- 26 **Wireless LANs Speed Up**
Proxim's Symphony wireless home networking products are the first to comply with the HomeRF 2.0 protocol. The new standard is much faster than its predecessor, but can it match 802.11b?
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Two preproduction notebooks use power-saving processors from Intel and Transmeta to get the most out of a single battery charge.

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E-Press EasyOffice Premium 3, Sun Microsystems StarOffice 6
See page 51 for a complete list of new products reviewed.

HERE'S HOW

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Control Windows' audio commands, fix problem applications with fast access to the Task Manager.
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Make Google your default search engine in Internet Explorer, enhance AOL with PowerTools.
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Easy ways to set up a wired or wireless network.
- 156 **Hardware Tips**
Adjust your monitor and graphics card settings, shut down your modem after a fixed length of time.
- 160 **Answer Line**
Put multiple rescue disks on a single CD, transfer your Outlook Express installation to a new PC.

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Changing Views of Online Surveillance

To fight terror, most people are willing to give up some privacy. But how much?

IT'S BECOME A CLICHÉ to say how thoroughly the world has changed since the September 11 terrorist attacks, but how else can you describe it? Take the transformation in public attitudes toward online surveillance.

Prior to September 11, Carnivore—the FBI's ISP-based surveillance tool—was widely perceived as a potential threat to civil liberties. Today, many view it as a safeguard against mass mayhem. Talk of a national identification card is growing. And Congress gave unusually quick approval to the so-called USA Patriot Act, a broad antiterrorism electronic surveillance measure that might never have gotten out of committee before the attacks.

PC World readers, like most Americans, are divided as to how they feel about such changes. In a poll taken just weeks after the attacks, and before bombs started raining down on Afghanistan, some 60 percent of PCWorld.com visitors surveyed said they had serious concerns about giving the government more access to their personal e-mail. Another 38 percent, however, said they had little or no worry.

WHAT'S GOING ON

WHEREVER YOU stand on the matter, it's worthwhile to know exactly what's happening, and in this issue we supply some answers. Anne Kandra, our regular *Consumer Watch* columnist, dissects the Patriot Act and finds reason to be watchful but not worried (see page 37). And Andrew Brandt, creator of the *Privacy Watch* column, shows why there are no quick technological fixes to terror (page 38).



HIGH-TECH tools can help fight terrorism, Senior Associate Editor Andrew Brandt says, but they're not a foolproof solution.

Brandt's view of the matter is pragmatic: "Relying on new, unproven technologies in circumstances where lives hang in the balance makes me uneasy," he says. "For example, biometric hand and face scanners do work, but they don't work perfectly, and can serve only to supplement live human beings performing security checks, not replace them."

Beyond that, of course, there is a limit to the amount of security even scads of money can buy. The economy and tech sector were already in the doldrums before September. Since then, they've gotten worse, driven in part by a suffocating fear that threatens to paralyze our nation. I'm confident that we will work our way through this; even when you feel in danger, you ultimately have to take prudent precautions and then get on with the job. But I hope it happens sooner rather than later, before too many businesses and individuals are hurt.

BETTER BLUES

FINALLY, on a brighter note, when the magazine launched its new design last September, one of the most popular innovations was the printing of all Internet addresses in blue. Surveys we conducted showed that 80 percent of readers liked the highlighted URLs. But a few wrote to say they felt the shade chosen

was too light for easy reading.

Since then we've experimented with darker shades, and beginning this month a more readable blue has become standard throughout the magazine. So thanks for your feedback. And continue to write me at kevin_mckean@pcworld.com. ■

Kevin McKean is editorial director.

Tell Us What You Think: Visit www.pcworld.com/pcwininput and rate this issue—you could win \$500. You'll need your subscriber number from the mailing label to take this survey online. The Web site explains the official rules and also how to participate in the drawing if you're not a subscriber. You can enter from December 3 through December 31, 2001.

NEWS & TRENDS

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XP'S GOTCHAS

THOUGH THERE'S no good method of telling in advance how easy—or nightmarish—upgrading to Windows XP will be, here's some advice that applies to almost everybody: Prepare to patch.

In the weeks since Microsoft launched its new operating system—to a fairly cordial reception, judging from reports showing early sales approaching those of Windows 98—we have encountered or heard about dozens of glitches and pitfalls. In some cases, the fixes began rolling out along with the OS itself. Other problems will almost certainly be addressed in an initial service pack (though at press time, Microsoft had yet to announce a date for SP1).

On October 25, the day it shipped the new OS, Microsoft posted multiple bug fixes, compatibility updates, and enhancements on its Windows Update Web site—more than 18MB of them, all told. The

same day, Microsoft's Knowledge Base support site also listed hundreds of confirmed bugs found in Windows XP, most of which still don't have patches or solutions. And the company's general-purpose Windows XP newsgroup continues to receive thousands of new posts every day.

WINDOWS XP IS SELLING BRISKLY, BUT THE PATCH PARADE IS ALREADY IN FULL SWING. HERE'S A GUIDE TO THE TOP UPGRADE GLITCHES—AND THEIR FIXES.

BY SCOTT SPANBAUER

Some of the updates are important. The 1.9MB Windows XP Update Package, October 25, 2001, for example, includes fixes for bugs in such new and vaunted XP features as its CD burning software, the Files and Settings Transfer Wizard, Remote Assistance, and Windows Messenger's audio and video tools. Separate updates

to the CPU drivers for mobile Pentium III-based systems and Athlon-based systems enable those chips' power management features to function under Windows XP.

Not all of the updates are essential—or even desirable—for every Windows XP system, however. The fine print de-

For many users, however, problems within the OS itself are less pressing than compatibility problems with hardware devices and with third-party software.

LET'S GET COMPATIBLE

LIKE PREVIOUS Windows upgrades, the new OS lacks support for many legacy devices, particularly printers and scanners. Windows 2000 drivers available from manufacturers' Web sites work well in many instances, though not in every case. But even when Windows XP does support a particular device, the driver may be capable of only bare-bones performance or compatibility (especially if it's a driver for a graphics adapter). That's why it's always a good idea to check Windows Update or the manufacturer's Web site for more-recent XP-compatible versions after you upgrade.

Though most 32-bit Windows programs do run under



Windows XP, a few of them—notably, antivirus software, CD-burning tools, and drive-partitioning and -imaging utilities—won't work with Windows XP unless you upgrade them. As we went to press, a handful of major programs remained partly or completely incompatible. Roxio's Easy CD Creator 5.0 is among the most notable examples. Even though Roxio itself wrote the CD-RW driver built into Windows XP, the company had not yet posted the promised XP-compatible update for the basic version that ships with many new PCs (though an upgrade for the Platinum version sold in stores finally appeared in early November).

Complicating the issue are

Microsoft's own application compatibility updates. One of Microsoft's October 25 patches was a 2.2MB download that made XP compatible with applications such as McAfee's VirusScan 4.5, 5.16, and 5.21; Roxio's Easy CD Creator 4.02 (that's right, Microsoft made a fix for the earlier version but not for the later one); and Symantec's Norton AntiVirus 2001. The update also solved a heartbreaking problem for young media hounds: In its shipped form, Windows XP is unable to play Disney's *Snow White and the Seven Dwarfs* DVD (a problem that to Microsoft's knowledge does not affect other DVDs).

Though most compatibility upgrades are free, some are

not. And if you rely on Symantec's WinFax Pro 10.02, PowerQuest's PartitionMagic or Drive Image, or a few other programs that need costly upgrades, your software bill for achieving Windows XP compatibility could run hundreds of dollars beyond the cost of the OS itself.

THE KINKS CONTINUE

MICROSOFT has yet to address several reported bugs. Many upgraders report that Windows Messenger's voice chat feature fails to connect, even when other instant messaging programs, such as Yahoo Messenger or an earlier version of MSN Messenger, work fine. Numerous other Windows XP users report ▶

Product Pipeline

SHUTTERBUGS: Olympus is releasing its first \$499 3.2-megapixel digital camera: the Olympus C-3020 Zoom. Based on the popular C-3000 series, it has program modes (such as night scenes or sports) for easy shooting, noise reduction modes for sharper shots, and USB auto-connect for fast downloads. find. pcworld.com/17410



PDA BARGAINS: Just in time for the holidays, Palm has dropped the price of its high-end color M505 handheld by \$50, to \$399. Users can also get a free 16MB SD memory card and coupons for other accessories if they purchase an M125, M500, or M505 by January 7, 2002. find. pcworld.com/17408

BAG IT: With airlines now limiting passengers to one carry-on bag, what's a traveler with luggage and a laptop to do? Try out Atlantic Luggage's \$169 Upright Virtual Office, a compact, sturdy carry-on suitcase with wheels and a special side opening for easy access to a laptop-size section. find. pcworld.com/17461



NEW ATHLON XP: AMD's newest Athlon XP CPUs have gone from 1.53 GHz to 1.6 GHz with the new 1900+ model. It uses AMD's new naming scheme, which AMD says more accurately reflects the chip's performance. The chips will be in PCs from MicronPC, Compaq, and HP, among others.

that the operating system forgets your Explorer window view preferences (so you have to reenter them every time you launch Explorer), and that the Taskbar tool tips (such as the one that shows you the

date when you hold the mouse over the clock) display behind the Taskbar instead of on top, where they would be readable. Others report that Windows Update itself is forgetful, offering users patches that

they have already downloaded.

Like many previous Windows versions, XP occasionally freezes when shutting down. As we went to press, Microsoft's Knowledge Base reported that an interim fix

was available only by calling the company's product support number. And although the dreaded blue screen of death has been swept under the rug, Windows XP is not crash-proof. If a deadly driver

UPGRADE GUIDE

TOP WINDOWS XP PROBLEMS AND SOLUTIONS

PROCESS/PROGRAM	Problem	Fix
CD burning	CDs recorded using Windows XP are unreadable or are missing files or folders when read in Windows 95/98 or in an MP3 player.	Update available from Windows Update.
Power management	Pentium III and Athlon power management features are not supported, resulting in shorter-than-expected notebook battery life.	Update available from Windows Update. See find.pcworld.com/17545 (Pentium III) or find.pcworld.com/17546 (Athlon) for details.
Shutdown	During shutdown, the computer occasionally freezes when the screen displays a 'Saving your settings' message.	Update available from Windows Update Product Catalog. (Look in <i>Start>All Programs>Windows Update</i> , choose <i>Personalize Windows Update</i> , and click <i>Display the link to the Windows Update Catalog</i> .)
AOL 6.x	Some versions are incompatible with Windows XP.	Upgrade to AOL 7.0 or to a compatible version of AOL 6.0.x.
Ghost 2001	Program is incompatible with Windows XP.	Upgrade to Ghost 2002 (\$50). ¹
McAfee VirusScan (through 5.21)	Program is incompatible with Windows XP.	For versions 4.5 through 5.21, download the application compatibility update from Windows Update (compatibility not verified by product manufacturer). Earlier versions must upgrade to version 6.0x (\$40). ¹
Outlook Express	Files and Settings Transfer Wizard (for migrating to XP from an older Windows PC) loses account data or overwrites an existing account; or when run on the Windows 9x/Me PC, it corrupts the message store.	Update available from Windows Update.
PowerQuest Drive Image	Program is incompatible with Windows XP.	Upgrade to Drive Image 5.0 (\$50). ¹
PowerQuest PartitionMagic	Program is incompatible with Windows XP.	Upgrade to PartitionMagic 7.0 (\$50). ¹
QuickTime 5	Program doesn't launch automatically to play associated clips embedded in Web pages.	Download an IE 6 compatibility plug-in from Apple's Web site (find.pcworld.com/17781).
Remote Assistance	Remote Assistance fails when the system requesting help has more than one network connection (such as a network adapter and a modem) with Personal Firewall enabled.	Update available from Windows Update.
Roxio Easy CD Creator	Program is incompatible with Windows XP.	For version 5.0 Platinum, download the free version 5.1 update from Roxio's Web site. For version 5.0 Basic, download the 90-day trial of 5.1 Platinum, and use it until the Free 5.1 Basic upgrade appears. For version 4.02, download Windows Update (compatibility not verified by product manufacturer).
Symantec Norton AntiVirus 2001	Program is incompatible with Windows XP.	Download the application compatibility update from Windows Update (compatibility not verified by product manufacturer) or upgrade to Norton AntiVirus 2002 (\$30). ¹
Symantec WinFax Pro 10	Program is incompatible with Windows XP.	Upgrade to WinFax Pro 10.02 (\$50). ¹
Windows Messenger	Voice and video chat modes are incompatible with Internet Connection Sharing and/or ICS Firewall.	None.
	Audio is marred by popping and echoing.	Update available from Windows Update.
ZoneAlarm Pro	Some versions block all Internet access or cause the computer to reboot spontaneously.	Update to version 2.6.357 or later by clicking the <i>Configure</i> button and then <i>Check for Updates</i> .

¹ List price; discounts and rebates may be available.

XP RESOURCES

- ◆ Windows Update windowsupdate.microsoft.com
- ◆ Microsoft Knowledge Base support.microsoft.com
- ◆ Microsoft Product Support for Windows XP 425/635-3311 (installation and two subsequent incidents free; \$35 per incident for subsequent calls)
- ◆ Windows XP newsgroup find.pcworld.com/17541
- ◆ Roxio Windows XP updates find.pcworld.com/17542
- ◆ Symantec Windows XP compatibility find.pcworld.com/17543
- ◆ Creative Labs XP drivers find.pcworld.com/17544

or application incompatibility crashes the computer, the OS simply reboots by default (nostalgic users can revert to the old blue screen via a Control Panel/System setting). I met with this problem when I tried running non-XP-compatible versions of ZoneAlarm Pro and Easy CD Creator.

Early XP adopters have run

into a few other glitches that don't quite qualify as bugs. The most prevalent is a simple problem afflicting Outlook Express users: In many cases, the upgrade process fails to transfer existing mailboxes to the XP version. The mailboxes from the old setup are still on the computer, but users must either move them to the

current message store location manually or reconfigure Outlook Express to look for the files where they stand.

SAME OLD SAME OLD

WHAT DO ALL these pitfalls add up to? A version of Windows that is starting to look a lot like previous ones, upgradewise. Interface glitches, incompatible applications, missing drivers, shutdown problems, crashing—these classic upgrade snafus have plagued just about every version of Windows that Microsoft has produced.

And just as with previous versions, Microsoft has indicated that a follow-on to Windows XP is in the works. The ETA: no later than 2003.

Can you say Windows XP Second Edition? ►

UPDATE

PRODUCT ACTIVATION HACKED

WINDOWS XP'S antipiracy technology has apparently been hacked. Officials of the British software security company BitArts Ltd. say that, within hours of the operating system's launch on October 25, software to bypass the Product Activation feature was already circulating on the Internet.

HOW IT WORKS

JOHN SAFA, BitArts' chief technology officer, reports that his company has identified two main approaches to hacking Product Activation. One involves comparing the volume-license version of XP (which doesn't use Product Activation at all) to the single-copy code and extracting the other files in the single-copy versions. The second approach uses a patch to trick the OS into believing that the user is always only one day into the 30-day window allowed before an upgrade version of XP must be activated.

Either way, the user is spared being nagged to activate. (*PC World* is withholding technical details of the hack.)

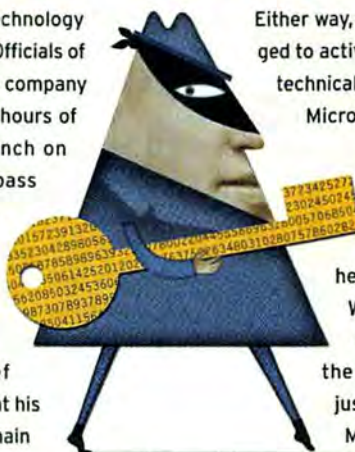
Microsoft product manager Chandler Myrick says that the company is aware of these attempts to work around Product Activation, but

he believes that relatively few Windows XP upgraders will locate and use them. "One of the primary goals for WPA was just to reduce casual copying," Myrick says. "And we think that even though these circumven-

tions are available, WPA is going to do what we intended it to do for the vast majority of users."

Safa says it's a shame that Microsoft isn't using antipiracy technology that really works, because it should in theory make software cheaper for paying customers.

"You either get it working 100 percent, or you don't bother," he says. —Yardena Arar



IN BRIEF

Tidbytes

HOTMAIL UPDATE: Hotmail users will have to log in at least once every 30 days or



the account will expire. Previously, accounts expired

after 45 days. In the United States, the change came into effect on November 1, 2001. Following deactivation, users have 90 days to reactivate the account. When the service deactivates an account, it deletes all stored e-mail and address books, and refuses incoming messages.

SOFTWARE IS SPEECH: A California appeals court has reversed an earlier order prohibiting people from publishing the code for the DeCSS program, which lets users bypass a DVD movie's copy-protection scheme. The court categorized the program as speech protected by the First Amendment, and ruled that it cannot be subject to prior restraint. People who publish the code may still be subject to prosecution under other laws for doing so, but they can't be restrained from publishing in the first place.

Did You Know?

SOME 32 million U.S. Internet users will view their bills online at the end of 2001, up from 20 million at the end of 2000. Since the start of the anthrax scare, the number of

32 MILLION consumers signing up with online bill-paying services has risen by 20 percent, according to some Gartner Group clients.

SOURCE: GARTNER GROUP

DIGITAL MEDIA

NEW SHACKLES ON YOUR CD, VIDEO COPYING

IN AN EFFORT TO STEM PIRACY, ENTERTAINMENT COMPANIES ARE PLACING NEW COPY RESTRICTIONS INTO THEIR PRODUCTS.

MAKING PERSONAL copies of things you've paid for—as backup, for example, or to use in multiple devices like your computer, MP3 player, and stereo—may soon be a thing of the past, or at least severely curtailed.

Supported by laws such as 1998's Digital Millennium Copyright Act (or DMCA), companies are preparing to incorporate copy-prevention technology into everything from audio CDs and online music to premium cable television and streamed video. Some of these plans are already in effect, with different levels of restrictions on the media playback.

"Digital technology makes it possible to monitor, record, and restrict what people look at, listen to, read, and hear," writes author and law professor Jessica Litman in her recent book, *Digital Copyright*. "Why, in the United States, would one want to do such a thing? To get paid."

In pursuit of that payment, companies are trying a variety of different models—it's all a work in progress.

And the latest copy-protection plans are the most controversial to date—especially those intended for the music industry. The battle between consumers and entertainment companies continues on Capitol Hill, where two important bills are in the works.



MANY PEOPLE have fun copying music to create custom CDs, or converting tunes to a digital format like MP3 for a party playlist. But music labels see such copying as an attack on their core business, and most are starting to act to prevent it. Digitally locked CDs—even some by major artists—are already on the market.

Sony Music Entertainment, for example, distributed a promotional Michael Jackson CD single that Windows PCs could not read. And 'NSync's label, Jive Records, is selling copy-protected versions of the band's CD *Celebrity*. Though reluctant to talk about specific plans, BMG, Sony, and Universal all confirm they're testing copy protection on several sample and promotional CDs.

Today, about 200,000 CDs in Europe and the United States use Macrovision's SafeAudio technology, says Brian McPhail, the company's consumer software vice president. Another copy-control firm,

SunnComm, reports that about 50,000 CDs in the U.S. use its MediaCloQ technology. Both companies expect those numbers to rise to the millions in 2002.

SafeAudio's protection scheme inserts small distortions that standard CD players filter out. CD-ROM and DVD-ROM drives can't block those distortions, so if you use your PC to play, rip, or burn such CDs the music will hiss and pop. Other technologies hide a CD's table of contents so your CD-ROM drive can't read it.

Some schemes may also prevent ordinary CD players from playing CDs properly: When BMG tested MidBar's secure CD technology in Germany in 2000, up to 4 percent of the 130,000 CDs sold were returned for that reason.

LEGAL ACTION

ONE LAWSUIT has been filed already by a California woman, Karen DeLise, who purchased the *Charley Pride: A Tribute to Jim Reeves* CD. Her suit claims copy protection constitutes an unfair business practice. She could not play or copy the CD on her PC and instead had to provide personal information in order to download encrypted song files.

Her attorney, Ira Rothken, contends in the suit that record labels should give reasonable notice to buyers about

"functionally inferior CDs" to let users make an informed buying choice.

The *Pride* CD does carry a disclaimer stating it is for play in audio CD players only, and that licensed song copies are available for download. It does not mention PCs specifically, and does not tell users they have to divulge personal data to get the tracks. (On 'NSync's *Celebrity*, a disclaimer printed in a corner states, "This CD is not playable on computers.")

FAIR USE?

FAIR USE and user expectations are at issue, says Lee Black, director of research at market research firm Webnoize. Fair use is a legal concept that basically says you aren't violating copyrights if you copy something you've bought, like a song, as long as that copy is for personal use, not for profit. Labels know users expect to be able to turn their CDs into MP3s, Black says, "but labels don't agree that is a consumer's right."

The DMCA backs the industry's view—it makes it illegal for anyone to bypass security measures to copy a disc, whether you're a pirate burning thousands of CDs for sale or a home user ripping a CD you own for a party playlist.

Plans are in the works to accommodate users' desire for digital tunes. In one scheme, CDs would come with both standard—but protected—CD music and pre-ripped tracks. The pre-ripped files would be bound by digital rights management (DRM) rules, which let the labels control which devices can play the tracks, and how often the tracks may be copied or transferred. This approach doesn't satisfy ►

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consumers who want true CD-quality (meaning uncompressed) digital music files.

The music industry is also acting online. Lawsuits forced out Napster's free music-sharing network; similar peer-to-peer services are now targets. Companies want to replace them with paid services that offer downloadable, but protected, tunes. In December, RealNetworks launched its RealOne service; AOL and Microsoft have offerings on the way, and the major labels are working on their MusicNet and PressPlay services.

"The music industry, with digital music services, is really trying to convert consumers to consume music as a service, not as a product," says P.J. McNealy, Gartner Group senior analyst. "It's a huge shift," and it's the labels' biggest challenge, he adds.



THE VIDEO industry is making its own moves, but consumers may be less resistant here because DVD movies have always carried copy protection and there's great familiarity with—and acceptance of—the pay-per-view model.

Copy protections appear in everything from VHS analog tapes to set-top boxes, and more. A pay-per-view movie can already be scrambled so it plays properly but won't allow a clean copy. Such technology

is so widespread that further restrictions could be applied easily—and they likely will be—once video-on-demand services launch.

Carol Flaherty, video technology vice president at Macrovision, a major player in this market, points out the company's technology will also accommodate DRM, so content providers can choose to allow one or more copies. Some movie studios are sensitive to users' arguments that under certain conditions, fair-use copying may be legitimate, she says.

As DVD recorders replace VCRs in coming years and as more cable systems go digital, even some cable TV may have DRM rules. Andy Parsons, senior vice president at Pioneer Electronics, speculates that once a purely digital connection exists between your TV and your recorder, the sig-

nal—say, an HBO movie—may have a code that lets you record to DVD once, but prevents copies from that disc.

And in 2002, five major studios will enter the downloadable video market with MovieFly, a service that will use a video rental model. At first, you won't be able to transfer the movie out of the PC you've downloaded it to; later versions may let you do so.

KILLING FREE STUFF

COMPANIES know protection schemes aren't foolproof—numerous high-profile hacks underscore the point. However, that problem will not cause content owners to withhold content, Flaherty says.

But that content will be restricted. Whether users will want it with such strings attached is a separate question.

—Frank Thorsberg and

Tom Spring ►

IN CONGRESS

TUG-OF-WAR OVER COPY LAWS

THE DIGITAL Millennium Copyright Act represented the first serious revision of federal copyright law in two decades. Even more changes may be around the corner.

One of the DMCA's original sponsors, Representative Rick Boucher (D-Virginia), now wants to amend it to balance the fair use rights of consumers with the protections afforded copyright holders.

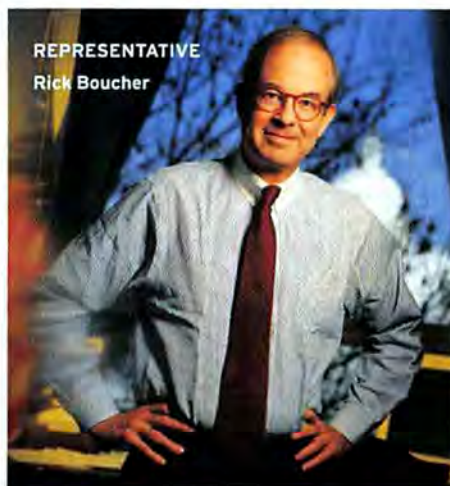
"What the DMCA does is try to outlaw burglar tools," Boucher says. But like hammers and wrenches, some of these technology tools have legitimate purposes and should not be outlawed, he says.

In his proposal, circumventing copy protection would be criminal only when its purpose is copyright infringement, such as in mass piracy cases. For exercising fair use rights or other benign purposes, circumvention would not be criminal.

Senator Fritz Hollings (D-South Carolina) believes the DMCA does not go far enough, however.

The Senate Commerce Committee chairman is readying legislation requiring that copy-protection controls be built into new PCs and other consumer electronics gear.

Even before the ink was dry on drafts, the Security Systems Standards and Certification Act had support from big content creators like Disney and News Corp., as well as major entertainment industry groups. The bill sets aside an 18-month period for computer, electronics, and entertainment experts to devise an industry-standard method of copy protection. There's no word about including representatives of ordinary users.

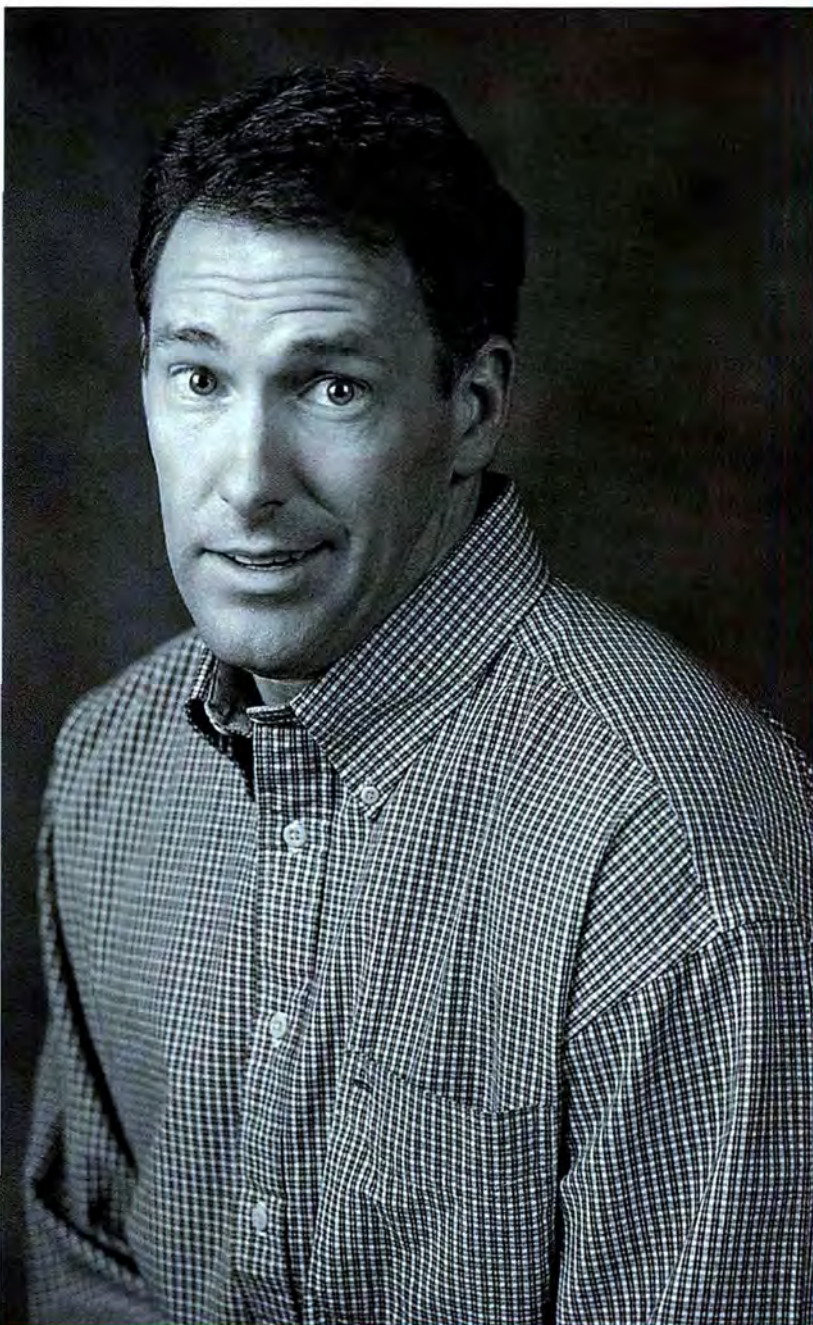


REPRESENTATIVE
Rick Boucher

Like much pending legislation since September 11, committee hearings on this bill, originally set for October 25, were postponed and were not reset at press time.

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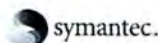
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Giving business presentations an ultra-professional look, the sleek Sony VPL-MX10 is ultra-compact and weighs only 3 lbs. 5 oz. And, with the built-in Memory stick slot, you get unsurpassed image brightness and quality.

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InFocus LP130

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Weighing only 3 lbs. the InFocus LP130 projector comes packed with features like 1100 ANSI lumens, seamless DVI connectivity and more perfect in the boardroom or on road.

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hp LaserJet 2200dse printer 19 ppm laser printer

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FIRST LOOK

WIRELESS LANS SPEED UP

FASTER VERSION OF THE HOMERF WIRELESS PROTOCOL ARRIVES—BUT CAN IT REALLY CHALLENGE WI-FI'S DOMINANCE?

CAPABLE OF speeds up to 10 megabits per second, Proxim's new Symphony HomeRF product line is the first wireless network to comply with the long-awaited wireless HomeRF 2.0 protocol. The line also has other enhancements that could make it a strong rival to products that use 802.11b (aka Wi-Fi), a popular competing wireless standard—at least on paper.

The greater bandwidth presumably puts this new version of HomeRF roughly on a par with 802.11b's maximum throughput of 11 mbps (original HomeRF products had a maximum speed of 1.6 mbps). In addition, HomeRF 2.0 provides many of the benefits of the original HomeRF standard.

BETTER SECURITY

BACKERS of HomeRF say its frequency-hopping technology makes it inherently more secure and less prone to interference than 802.11b. Home-

RF more easily integrates with existing cordless telephone products, too, so it's a good fit with the coming generation of voice applications for home networks, allowing you to add



PROXIM'S Symphony HomeRF Base Station (top right), PC Card (bottom), and USB adapter.

phone lines without adding more telephone wires. And HomeRF 2.0 is backward-compatible: People who have HomeRF adapters can use them with the HomeRF 2.0 Base Station, though they won't realize any speed gain.

Networks rarely reach their theoretical bandwidths, however, and in my tests with shipping models of the \$200 Symphony HomeRF Base Station and two \$99 PC Cards, HomeRF 2.0 lagged significantly behind 802.11b in speed. Transferring a 17MB file (which equals 136 megabits, at 8 megabits to 1 mega-

byte) between two notebooks equipped with the Symphony products took about 3.5 minutes, compared to just under 2 minutes when I performed the same test using the two notebooks and 802.11b hardware. That translates to about 0.65 mbps and 1.15 mbps, respectively, in real-world use, making HomeRF 2.0 about 40 percent slower than 802.11b in my tests.

UPHILL BATTLE

EVEN IF the new HomeRF delivered on speed, it would still be a dark horse in the wireless LAN competition. For starters, 802.11b has offered superior bandwidth for some time. And 802.11b enjoyed a head start because it originated in the corporate world with users who were happy to be able to use their enterprise-issued notebooks on a home network with the same Wi-Fi PC Card they used at work.

Though Symphony HomeRF products are attractively priced (the line also includes a \$99 USB adapter), comparably priced 802.11b products aren't difficult to find. Finally, 802.11b has received boosts from the increasing number of public networks that use the standard, and from notebooks that come with 802.11b clients built in.

Though Wi-Fi may not be flawless, HomeRF 2.0 doesn't shape up as its nemesis.

—Yardena Arar ►

IN BRIEF

Site to See



STUMPED FOR last-minute gift ideas? No matter what type of event you're shopping for, Surprise.com could save the day. The site offers thousands of gift suggestions that you can browse according to the occasion, the recipient (dad, mom, friend, coworker, and so on), or the recipient's characteristics (such as works too much, avid reader, or gadgeteer). The ideas originate with other users—you can contribute, too—and each suggestion is accompanied by a helpful list of places where you can buy the gifts. If you can't find help here, we don't envy you.

Downloads

GO TO find.pcworld.com/17441 to find these files.

TOP 5

- 1 **SurfingGuard Pro** 6870KB
Prevent virus and worm attacks without having to constantly update your software.
- 2 **Dimension 4** 292KB
Keep your system's clock correct by connecting to an Internet time server.
- 3 **Spotlight** 2250KB
Find and download MP3 files, using Napster networks.
- 4 **Cool Page** 2850KB
Publish Web sites with this easy-to-use, WYSIWYG HTML editor.
- 5 **Clean System Directory** 70KB
Remove all the stray DLLs from your system.

Symphony HomeRF

Proxim

★★★★☆

Competitively priced, easy-setup wireless networking system doesn't quite deliver on promised speed; not an 802.11b killer. List: Base Station, \$200; PC Card or USB Adapter, \$99.

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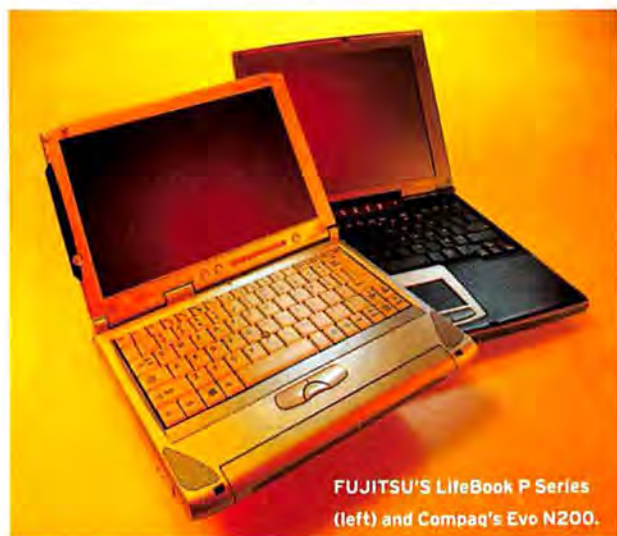
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ULTRALIGHTS

LONG-RUNNING PORTABLES

TWO NEW ULTRALIGHT NOTEBOOKS OFFER YOU INCREASED BATTERY LIFE.



FUJITSU'S LifeBook P Series (left) and Compaq's Evo N200.

EVERY NOTEBOOK OWNER who travels wants more battery life, especially today when a business trip can mean a 2-hour wait at the airport before boarding. But how much performance are you willing to sacrifice for extra work time?

Two new mini-notebooks propose different answers. Compaq's Evo N200 with Intel's 700-MHz Ultra Low Volt-

age Pentium III-M CPU is pricey, but it runs faster on AC power. Fujitsu's LifeBook P series with Transmeta's 800-MHz Crusoe TM5800 chip offers more for the money, but its performance lags.

POWER EVO

THE EVO N200 came with 192MB of RAM, a 20GB hard drive, 4MB of graphics RAM,

and a 10.4-inch display. But its \$1799 base price excludes a necessary optical drive: You have to pay \$239 to \$439 more for the clunky docking unit (depending on bundled drive).

The unit's CPU has Enhanced SpeedStep technology, which can switch it from 700 MHz to 300 MHz in battery mode, among other things. With that steep frequency drop and its on-board six-cell battery, it lasted just 2 hours, 5 minutes in our battery test. It weighs 2.5 pounds. A four-cell external battery costs \$179 and weighs half a pound. We recommend it; you'll get a few more hours' work time.

On AC power, the preproduction N200 notched an 83 on PC WorldBench 4. That score puts it on a par with notebooks of comparable processor speed. But note: At 300 MHz, the unit's performance could drop by up to 28 percent, according to our tests.

FRIENDLY LIFEBOOK

TRANSMETA often complains that comparing an Intel-based notebook running on AC power with a notebook using its Crusoe TM5800 is unfair because the Crusoe dynamically alters its frequency to provide "just enough" performance while using less

Evo N200

Compaq

(Preproduction unit, not rated)
Sharp-looking performer; but pricey with needed accessories.

Street: \$1799 (as tested)

find.pcworld.com/17203

Fujitsu LifeBook P

Fujitsu

(Preproduction unit, not rated)
Mediocre performance aside, a true mobile user's delight.

Street: \$1699 (as tested)

find.pcworld.com/17221

power on both battery and AC.

That's a plausible explanation for the preproduction LifeBook's poor score of 57 on our PC WorldBench 4 tests. The LifeBook fared much better in our battery test, however, running for 3 hours, 28 minutes on its standard three-cell battery. An optional six-cell battery is \$169.


Another mark in the LifeBook's favor: It weighs 3.4 pounds and comes with everything you need for a reasonable \$1699. That includes 256MB of RAM, a 20GB hard drive, 4MB of graphics RAM, a 10.6-inch LCD, an 8X DVD-ROM and 8X/4X/24X CD-RW combo drive in the modular bay, and a USB floppy drive.

We'd happily carry either unit on our next trip despite their smallish keyboards. We liked the slimmer Evo N200's slick design—and its performance—but the LifeBook impressed us more overall. The unit's PC WorldBench score underwhelmed us (shouldn't an 800-MHz chip run at 800 MHz?), but its price is good, and it has the oomph and the battery life to run standard apps and play a DVD while you're stuck at the airport.

—Tom Mainelli ■

TEST REPORT LOW-POWER CPUs

PLUGGED-IN, INTEL BEATS TRANSMETA

NOTEBOOK	Processor	Memory	Level 2 cache	PC WorldBench 4 
Compaq Evo N200	Intel Pentium III-M-ULV700/300	192MB SDRAM	512KB	83
Fujitsu LifeBook P	Transmeta Crusoe TM5800-800/366	256MB SDRAM	512KB	57
Comparison notebook	Intel Pentium III-750/600	128MB SDRAM	256KB	83
Comparison notebook	Intel Celeron-750	128MB SDRAM	128KB	83



HOW WE TEST: We test all systems with PC WorldBench 4, PC World's applications-based benchmark. See www.pcworld.com/benchmark for more details. A higher score is better. All systems ran Windows 2000 Professional. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

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- 3-Yr Next Business Day On-Site Service⁴

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- 40 GB* (7200 RPM) HD, add \$79
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¹¹Service may be provided by third party. Technician will be dispatched, if necessary, following phone-based troubleshooting. To receive Next-Business-Day service, Dell must notify service provider before 5 pm (depending on service contract) customer's time. Availability varies. For hard drives, GB means 1 billion bytes; accessible capacity varies with operating environment. Download speeds limited to 53Kbps. Upload speeds are less (about 30Kbps) and vary by modem manufacturer and line conditions. Analog phone line and compatible router required. Monthly payment is based on a 48-month 12.49% interest rate for qualified business customers. Your interest rate and monthly payment may be higher depending on your creditworthiness. Minimum transaction size of \$500 is required. OFFER VARIES BY CREDITWORTHINESS OF CUSTOMER AS DETERMINED BY LENDER. Taxes, fees and shipping charges are extra and may vary. Not valid on past orders or financing. QuickLoan is from CIT (Fid. Inc. Bank) to small business customers with approved credit. ¹²CompleteCare service excludes theft, loss and damage due to fire or intentional damage. CompleteCare is currently not available in all states. For complete details, visit www.dell.com/us/en/business/services/service-complete-care, see item ¹³Up to 11MB of system memory may be allocated to support 3D/ATI Graphics. ¹⁴Service may be provided by a third-party provider under contract with Dell. Technician will be dispatched if necessary following phone-based troubleshooting. For 5x10 service, Dell will dispatch a technician to the customer site within 4 hours of determining the hardware problem. The service technician may not arrive until the following business day if dispatched after 4:00 pm local time. Available within a 125-mile radius of our 80

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- MS® Windows® XP Home Edition, MS® Works Suite
- 1-Yr Mail-In Service, 1-Yr Phone Tech Support

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- 1-Yr CompleteCare® Service,² add \$99
- APC® Notebook Surge Protector, add \$30

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\$1959 QuickLoan: **\$52/mo., 48 mos.¹¹**
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- MS® Office XP Professional, add \$199

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E-VALUE Code:
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Recommended upgrades:

- 3-Yr Next Business Day On-Site Service,² add \$149
- Intel® Pentium® III Processor at 1.0GHz, add \$199

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E-VALUE Code:
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Recommended upgrades:

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LETTERS

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WHY PC SUPPORT HAS DIVED

THE KNOCK ON NEXT-DAY SERVICE

UTILITIES FIT FOR 2002?



WINDOWS XP-PRO AND CON

I HAVE BEEN WRESTLING with a prerelease version of Windows XP Professional for several weeks now ["Windows XP Inside and Out," November], and I must conclude that it is the most obstinate, unyielding, and uncompromising Windows I've encountered so far.

In particular, XP will not cooperate with other multiboot systems. (I use V Communications' System Commander.) As your coverage suggests, XP insists on its

I HAVE JUST completed the simple process of Product Activation for Windows XP. Everyone is making it more of an obstacle than it really is. You're not giving Microsoft any personal information—like your address, or for that matter your name. I understand the need to reduce software piracy. If you were losing billions of dollars a year, would you not attempt to stop it? For a change, Microsoft might actually be doing something that will benefit the entire software industry.

Joshua Liebman, Bohemia, New York

own multiboot method, which is feeble and limited to Microsoft's current OS offerings. This arrangement seems less than essential and resurrects the bogeyman of monopoly.

*Dwight L. Johnston
Grinnell, Iowa*

I'VE BOUGHT MS-DOS, Windows 3.1, Windows 95, Windows 98, and Windows Me. Now Windows XP is thrust upon me. Apart from full 32-bit coding, the new feature here is the activation code, which forces home users to buy multiple copies of the OS for upgrades or multiple PCs and permits only four reinstallations.

Microsoft has lost this customer.

Windows is known worldwide for its inability to work as a stable operating system. Maybe this time XP has gotten things right, but I doubt it. And I am not willing to spend more money to find out.

Chris Harper, via the Internet

WHITHER TECH SUPPORT?

THE REAL REASON for poor tech support ["Service Takes a Dive," November]: It has been farmed out to call centers. I trained at one recently for two days. If the tech people sound as though they are reading from a script or textbook, it's because they basically are. They input your info, and their computer pops up the answers to give you. All computer makers are beginning to use such farmed-out support.

Anita Pennington, Vernon, Alabama

NEXT-DAY SERVICE

AS A SYSTEMS administrator, I buy lots of next-day on-site service contracts for servers, but never for workstations [Consumer Watch, November]. I've learned that it's much cheaper, in terms of man-hours, to fix workstations in-house than to rely on manufacturers. For the average home user, service contracts are a waste of money, given the difficulty of obtaining service.

Mark T. Gibson, Murfreesboro, Tennessee

GRADING UTILITIES 2002

THE REVIEW BY Stan Miastkowski of Norton SystemWorks 2002 and Norton Internet Security 2002 [New Products, ▶

LETTER OF THE MONTH

What Price Security?

STEPHEN MANES, in his column "Security, Microsoft Style: No Safety Net?" [Full Disclosure, November] brings up issues similar to the national security issues facing us since September 11.

A free and open country like the United States provides more opportunities for terrorists and others wishing to disrupt our society than would be the case in a nation headed by a totalitarian regime. Some say it is the price we pay for the freedoms we have.

Microsoft made its name by providing an open architecture. Any hardware manufacturer could interface with DOS or Windows. Any software developer could develop applications for it. This made systems

more vulnerable in the same way that our ability to travel and go anywhere in our society makes us more vulnerable.

Having the country close its borders may make us more secure but it restricts our freedom. One of Microsoft's solutions to the threat of e-mail viruses was a patch that blocked most attachments. It provided better security but curtailed our freedom to receive executable files via e-mail.

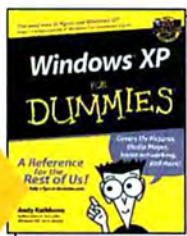
Certainly software security should not be taken lightly. As long as we insist on instant access to anywhere from anywhere, we will have to realize that our computers and our country will never be totally secure.

Paul Freedman, via the Internet

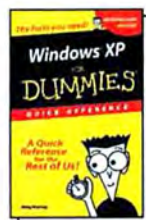
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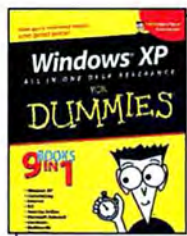
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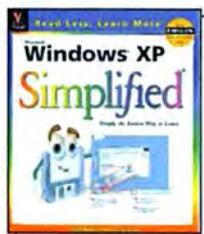
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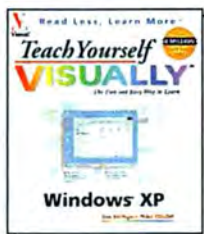
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LETTERS

November] couldn't possibly have been written after thorough use of this version.

SystemWorks 2002 is just a stripped-down version of SW 2001. Symantec has taken out CleanSweep and the hardware diagnostics. The Disk Doctor runs about 50 percent slower.

The antivirus program takes about 30 percent longer to do a full scan. When I uninstalled SystemWorks 2002 and put SystemWorks 2001 back on, I found it does not get along with Norton AntiVirus 2002 at all. NAV 2002 detects false intrusions and will not clear the alert icon.

The Personal Firewall, too, is a real bust, especially if you have a cable modem. It will grab about two-thirds of your bandwidth and will not let it go—period.

Ron McLendon, La Vergne, Tennessee

Author's response: I stand by the conclusions of my review. We always receive complaints of installation problems and conflicts when these reviews appear. But I've installed the various incarnations of Norton products over the years on all sorts of systems and have never run into any problems whatsoever. The same goes for SystemWorks 2002 and Internet Security 2002. And I do push review products hard.

—Stan Miaszkowski ■

PC World welcomes your letters to the editor. Send e-mail to letters@pcworld.com.

CORRECTIONS

AFTER OUR November review of the PhotoMax PDC 640 Modem camera went to press (*New Products*, page 72), we learned that its manufacturer, Polaroid, filed for reorganization under Chapter 11 of the U.S. Bankruptcy Code. The company is continuing to operate, however. For further information on the restructuring, call 800/386-0145.

In "Essential Patches for the Worst Security Holes" (November), the section "Browsers and Office" (page 138) should have referred to Netscape 4.7.

In November's "More Zip for Your Files" (*New Products*, page 80), we should have said that PKZip Suite 4.5 is shipping, and that WinZip 8.1 is available only in a public beta version.

PC World regrets the errors.

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CONSUMER WATCH

ANNE KANDRA

**LOOSENING THE REINS
ON CARNIVORE**

**PRIVACY WATCH: TECH
DEFENSE AGAINST TERROR**

**ON YOUR SIDE: THE
MISSING E-MAIL**

National Security vs. Online Privacy

The new antiterrorism law steps up electronic surveillance of the Internet.



BY NOW, YOU'VE probably heard a lot of debate over the USA Patriot Act, the federal legislation passed in October to give investigators more tools for apprehending terrorists. Proponents of the law say we need it to protect ourselves. Opponents say it threatens our constitutional rights. But whatever position you take on these issues, it's important to know how the new law will affect your life online.

The Patriot Act is complex and powerful. It broadens the definition of terrorism and increases the penalties for terrorism.

Some of the more sweeping changes in-

volve electronic surveillance. The act permits federal investigators to use more powerful tools to monitor phone calls, e-mail messages, and even Web surfing. We all hope that means agents will be better able to arrest terrorists and foil their plans. But the changes also mean we now have even less guarantee of privacy on the Net. The new law, along with new surveillance tools, will create a dragnet wide enough that anyone's e-mail note, text chat, or search inquiry might be snared.

What are the implications of this new type of surveillance for your Internet pri-

vac? It's difficult to say exactly. The Patriot Act is vague on many key points. And understandably, law enforcement officials aren't eager to reveal details about tools like the controversial Internet surveillance system, DCS1000 (more commonly recognized by its previous name, Carnivore). "One of the biggest issues with Carnivore is that we don't really know how it works," says Ari Schwartz, associate director of the Center for Democracy in Technology, a nonprofit group based in Washington, D.C., that focuses on preserving privacy and civil liberties on the Internet.

It's probably fair to say that joking in an e-mail about planting a bomb is a very bad idea these days. And researching biological terror techniques over the Internet could conceivably draw suspicion.

WATCH WHAT YOU SAY

AM I SAYING that the FBI will break down your door if you run a Google search on anthrax? Of course not. Surveillance will naturally focus on people about whom authorities have a solid basis for suspicion. Investigators will treat most other traffic as just so much white noise. But the new security measures do make some old advice even more valuable: Never write anything in an e-mail that you wouldn't write on the back of a postcard.

The Patriot Act extends to Internet-based communications the use of pen-register and trap-and-trace orders, techniques designed in the '60s and '70s to capture numbers dialed to and from a particular telephone. Investigators can get permission to use the techniques fairly easily. They need not establish probable cause—reasonable suspicion that a ►

targeted individual has been or will be involved in a crime—and judges are required to approve all reasonable requests related to criminal investigations.

Now that such surveillance will apply to Net communications, though, investigators could gather much more than just phone numbers. When a suspect sends an e-mail message, investigators could discover not only the recipient's identity, but also the subject line and perhaps even the body of the message. The act doesn't clearly define what constitutes electronic content that can permissibly be captured. The FBI's solution: Let federal agents make the decision and take responsibility for excising inadmissible material.

The new law opens the door for increased use of Carnivore and similar broad-based electronic surveillance systems. Used at an Internet service provid-

er, Carnivore gives authorities easy access to all Internet communications to and from the ISP's entire membership. Although the act requires the FBI to work with the ISP, it places few restrictions on who can be monitored, so theoretically any subscriber identified by law enforcement as relevant to an investigation could be targeted. Investigators don't need to establish probable cause in advance.

The act also loosens the rules for roving wiretaps, conferring broad authority to listen in on a suspect's communications. Under previous laws, officials had to specify certain phone lines they wanted to monitor, along with proof that their suspect used them. Federal authorities said that the old rules were outdated, since many people have phone lines at home, a mobile phone, and Internet access at home, at work, and even at Starbucks.

The act lets agents wiretap any phone line—again, without showing probable cause—and monitor everything on that line whether the suspect is using it or not.

Suppose that investigators believed a terrorist was using Internet connections on PCs at a library. Under the new law, authorities could monitor all PCs with Internet connections at that library and monitor the e-mail, Web browsing, and other traffic of everyone who used them—all for an indefinite period.

Our national security depends on improved electronic surveillance, according to Senator Patrick Leahy (D-Vermont), a key player in crafting the new legislation. "To prevent future terrorist attacks, we must improve our intelligence-gathering capabilities, and make sure that intelligence about potential terrorists is shared with necessary actors throughout the ►

PRIVACY WATCH

Technology Has Its Limits in Terrorism Fight

FOR OBVIOUS REASONS, I have a predilection for seeking technological solutions to problems. But unfortunately, when it comes to combating terrorism, many proposed technological solutions just aren't solid enough to be entrusted with such a critical job.

Following the September 11 attacks, a lot of very smart people recommended that we use new technologies to fight terrorism on our soil. Law enforcement and government officials proposed using biometric scanning devices in transit systems. And companies large and small expressed interest in face recognition software, which could be used to identify and track suspected criminals.

Much of the ensuing debate has centered on the loss of privacy that employing these techniques might cause. But that focus ignores another important point: These technologies have fundamental flaws that terrorists could exploit relatively easily.

Biometric devices turn physical characteristics—such as fingerprints or patterns in the eye's retina—into data that computers can use to identify people. When they first appeared, biometric devices had severe accuracy problems. When set at their most sensitive level, these devices might lock you out of your workstation because of a paper cut on your thumb. When reset to a lower level of sensitivity, they might grant access to someone with a fingerprint or retinal pattern similar to yours. Biometric products work better

now than they did two years ago, but they still aren't faultless and can't be relied upon when lives are at stake.

And the accuracy of the scanners isn't the only weak link in the system. Behind a hand-scanner biometric network at an airport, for instance, is a database containing the handprint data of all people authorized to enter secure areas. To get around the scanners,

determined terrorists could use an insider or a hacker to plant counterfeit data in the database, associating their own handprints with the names of legitimate airport employees. The terrorists then wouldn't need fake fingerprints or high-tech contraptions to fool the biometric network—they could simply use their own hands to gain access to the airport tarmac.

Face recognition software has a similar technological vulnerability. The software takes images from security cameras and turns people's faces

into sets of data that can be used for subsequent identification. But even the companies that make such software admit that the angle of the camera, the lighting—even a hat—can perplex the system and ruin its effectiveness.

Regrettably, there's no quick technological fix to the problem of terrorism. But that's a vitally important fact to know. Trusting a bad security system is worse than having no system at all.

— Andrew Brandt



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government," Leahy said during a recent congressional hearing on terrorism.

Civil libertarians counter that the Patriot Act erodes fundamental freedoms and may even make some investigations more difficult. "First Amendment rights are also at stake since communications and associations will be chilled if they're subject to government snooping," says Nadine Strossen, a professor at New York Law School and president of the American Civil Liberties Union. With the new law, Strossen says, investigators may be so deluged with data that spotting the real threats will be impossible. "This sweeping surveillance is at best inefficient, at worst counterproductive," she says.

If you're like me, you may find yourself agreeing, at least in part, with both Leahy and Strossen. Striking the right balance between security and individual liberty in these scary times is a difficult and contentious undertaking. It's a debate whose outcome we all have a stake in. Visit [find](#).

pcworld.com/17241 to read the text of the USA Patriot Act. Go to www.congress.org to contact your senators and your congressional representative.

The national tragedy of September 11 changed almost every facet of American

life. It's sad—but not surprising—that it will change our virtual lives as well. ■

Anne Kandra is a contributing editor, Grace Aquino an associate editor, and Andrew Brandt a senior associate editor for PC World.

ON YOUR SIDE

Bumpy Road With ISP Takeover

I'VE BEEN UNABLE to access my e-mail since EarthLink bought my ISP, OneMain.com, and integrated my account into EarthLink's servers. Days passed, and then the company said there was a snafu that would be fixed soon. I contacted the company's technical support, and the rep talked me through changing my settings, but to no avail. Weeks later, I still have no e-mail or news from EarthLink. I run a business on the Web, and without online access, I'm losing customers. Please help.

M. Kay Domke, Auburn, California

On Your Side responds: I've received many letters from readers who've had the same problem. EarthLink spokesperson Brian Kovalesky says that the company had a glitch during the transition. As a result, "Domke's e-mail in-box did not exist," he says. After I contacted the company, an EarthLink technician "gave [Domke] new mail settings and a new access number, as well as helped her import the new settings into a browser," Kovalesky says. The company also gave her a three-month credit.

—Grace Aquino

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Here's Looking at You, Webvan

There are Web sites that I'm sad to see go—and some that I'm not.

BY ALL ACCOUNTS, 2001 was a Darwinian year for the Web. The well-run and (dare I say) lucky companies with a good idea made it, while hundreds that had no business even dreaming of an IPO fell off the face of the Net. Some failures left users in the lurch (see "New Web Survival Guide" on page 95). We're still learning what does and doesn't work on the Web, and it turns out that success isn't always determined by what customers want.

There are several defunct Web companies I'll miss, but I won't lose sleep over others. The weeding-out will surely continue in 2002. I'm hoping the insightful Web magazine Salon.com and the informative health site Drkoop.com make it. And if Efax were ever to close down, I'd be dejected. Only time will tell.

A FOND FAREWELL

PIONEERS ARE OFTEN the first casualties in any new venture. Take, for example, Internet-only banks, which became irrelevant once major offline financial institutions began to offer their services on the Web. WingspanBank.com, an online-only bank launched by Bank One, forced the Citibanks of the world to catch up

with the times and roll out new services. As a result, the Web has become an important part of how people handle their money—moving it, paying bills, and reviewing statements.

Another site I liked was **HotOffice**. For small companies with employees in different locales, this virtual office site served as an ideal, Web-based intranet. It included e-mail, chat, scheduling, document tracking, and more. The service, however, will be back online in a new incarnation by the time you read this. Thruport Technologies recently acquired and merged the HotOffice technology with its own program. Thruport HotOffice will cost \$5 a month per person.

Cynics say that no Web failure depicts the folly of Internet-mania better than online grocer **Webvan**. But Webvan and its rivals in the grocery delivery business were great at what they did, even though they delivered only to select cities. This type of service is bound to make a comeback. Online items cost a bit more than those purchased at a store (when you factor in delivery costs and factor out in-store specials), but when the Net grocer sends



you an e-mail coupon for milk the day you run out, or a notice saying the cold medicine you bought has been recalled, you'll appreciate the service.

Still, I wasn't surprised that **Kozmo.com** failed. Kozmo specialized in rapid delivery of snacks and movies in urban areas where such items were often available within walking distance. Yet Kozmo did what it promised—delivered Coke, Doritos, and a copy of Monty Python's *The Meaning of Life* in a half-hour or less.

DON'T LET THE DOOR HIT YOU

ONLINE CURRENCY seemed like a good idea until we grew more comfortable using credit cards online. **Flooz.com** and **Beenz** were two that didn't last.

And who expected people to buy furniture online (**Furniture.com**) based on tiny photos? At least when you order from the Pottery Barn catalog, you can stop by a store to sit on the couch first.

The list of failures—**Biztravel**, **CDWorld**—goes on and on. Surely Charles Darwin is watching somewhere—and jotting down field notes in his Apple Newton. ■

Contact PC World Contributing Editor Brad Grimes at websavvy@pcworld.com.

GIMME FIVE

Consumer Protection Sites

1. **SafeChild.net**: Important info about protecting children, whether they're at home, on vacation, or at play. www.safechild.net
2. **Consumer Reports Online**: Unbiased buying advice and must-read sections on product safety and recalls. Subscription fee required. www.consumerreports.org
3. **U.S. Consumer Product Safety Commission**: Everything from statistics and

recalls, to a place where you can report faulty products. www.cpsc.gov

4. **Federal Trade Commission**: Its consumer protection arm tackles telemarketing, identity theft, and other key issues. www.ftc.gov/ftc/consumer.htm

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Keep your money—and your identity—safe while you're on the Web.

HEY, HACKERS! Wanna steal my credit card number? I'll save you some time. It's 4264-6553-2876-6583. That's a valid account, so be my guest. The problem (if you're a thief, at least) is that the account has a limit of \$1 and expires this month. I may not be impervious to bad guys intent on purloining my credit card number—or my identity—but I've learned how to throw some obstacles in their way.

Although I like buying online, I'm squeamish about using my credit card. What if a sleazy merchant reuses my credit card number? Even when I'm dealing with a reputable seller, the number could be intercepted on the Internet, or the merchant's servers could be hacked. My unease has led me to experiment with credit cards that use one-time numbers. And I'm tickled with the way they work.

The concept is brilliant: Each time you shop, your credit card provider assigns you a unique, disposable number that's silently linked to your credit card account. Many credit card companies offer this type of service for free. I use MBNA's ShopSafe single-use credit card (www.mbnashopsafe.com)—not because it's better than the competition, but because I've used the company's card for a decade.

SECURE SHOPPING

TO USE SHOPSAFE I simply downloaded and installed a small program that generates the single-use number. Now when I'm ready to buy something, I load the program, generate the number, and drag it to the online store's order form. I can

even drag my shipping and billing information a line at a time if I wish.

The beauty of single-use numbers is that I also specify the amount of money and an expiration date. Let that sink in for a minute. I can limit how much of my dough the online store is able to get, and how long it can take to cash in. If an online merchant—or a hacker, for that matter—tries to take more money or use more time than I've allotted, the credit card company simply rejects the charge.



Just as risky as online purchases (or maybe more so) is buying by phone with a credit card. So why not use ShopSafe? There's no reason not to take advantage of the service all the time. Merchants needn't do anything special, and they don't have a clue it's a one-time number. And you maintain your right to dispute a payment if the product is unsatisfactory, or if the order is incomplete or incorrect.

One quibble: The ShopSafe software unnecessarily sticks an icon in the system tray. Head to find.pcworld.com/16743 for a short tutorial on how to remove the icon and to see two images of the software.

Ask your credit card company or your bank if it offers similar free services. A

few good places to start include Discover Deskshop (www.discovercard.com), MasterCard's e-wallet (www.mastercardintl.com), and American Express's Private Payments (www.americanexpress.com).

SELF-DEFENSE

I LIKE MY IDENTITY, and I take steps to keep it safe from thieves. For instance, I refuse to give out my Social Security number willy-nilly. This isn't easy: Even my cable company asks for it. For more on your SSN rights, visit find.pcworld.com/16745 to check out Chris Hibbert's FAQ.

Opting out of receiving unsolicited, preapproved credit offers by mail is essential. If the letter falls into a thief's hands, you may be liable. You can't do it online—call the toll-free number set up by major credit bureaus to opt out at 888/567-8688. For details, go to find.pcworld.com/16744 to read the FTC's

Consumer Credit File Privacy alert.

If (heaven forbid) you ever find yourself a victim of identity theft, check out the Identity Theft Resource Center (at www.idtheftcenter.org). There you'll find links to the three major credit reporting agencies, as well as tests to determine whether you and your business are doing everything possible to keep your identity safe. And on the Privacy Rights page at www.privacyrights.org/identity.htm you'll find great fact sheets on protecting your identity. Just don't tell them who sent you. ■

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached at steve_bass@pcworld.com.

Experience OneTouch



Visioneer OneTouch scanners are so easy you'll jump for joy!
Press a button to Scan, Copy or Email your photos. With 12 models designed for Windows XP and more on the way, there is sure to be a Visioneer OneTouch scanner that is perfect for you.

 visioneer

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8700 USB

\$99.99



- 1200 x 4800 dpi
- 48-bit Color
- 7 OneTouch buttons
- USB Interface
- Windows 98/2000/ME/XP



See a list of Visioneer's Windows XP scanners at www.visioneer.com

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BUGS & FIXES

STUART J. JOHNSTON

Holes Galore in Microsoft Programs

Get fixes for the latest problems with Windows XP, Office applications, and IE.

WOULD YOU LIKE the folks at Microsoft to see your company's confidential budget documents? If you use Windows XP or Office XP, they might. Here's how: If any Office XP application or any program running on Windows XP crashes, a dialog box pops up asking permission to send a bug report to Microsoft. If you approve and click *Send Error Report*, the transmission may tack on parts of the file or Web site you were viewing. Microsoft does tell you what kind of data it might gather—but you must click another link on the dialog box to find out more.

To prevent your private files from visiting Redmond, you can do one of two things: Click *Don't Send* each time the dialog



box appears, or disable the entire thing by editing the Windows Registry. Browse to find.pcworld.com/16642 to obtain Microsoft's instructions.

Two other, unrelated Microsoft security problems have

surfaced. One of them affects Excel and PowerPoint; the other crops up in Internet Explorer. So far, nobody has reported a hack attack, but you should download the patches to be on the safe side.

The more important hole appeared recently in Excel 2000/2002 and PowerPoint 2000/2002. Discovered by Peter Ferrie of Symantec Security Response, the bug exploits Excel's and PowerPoint's ability to run macros. By crafting a file with specially malformed macros, a hacker could do anything on your computer that you could do. All the villain would need you to do is open that file.

The misbegotten file could come as an attachment in an e-mail, or it could lurk behind a link on a Web site. Go to find.pcworld.com/16360 for links to separate patches for Excel and PowerPoint.

A new IE hole could enable someone to trick the browser into loosening its security settings, which would leave you open to possible attacks. By exploiting a quirk of IE 5.01 and 5.5, a hacker could create a URL or a link that confuses the browser into behaving as though it weren't on the Internet but on an intranet instead.

IE has a separate collection of security settings for intranets, and many corporations

IN BRIEF

LiveUpdate— or LiveVirus?

HACKER GROUP Phenoelit recently discovered a glitch in versions 1.4 and 1.5 of Symantec's LiveUpdate. An intruder could send you a bogus file purporting to be a LiveUpdate. As a precaution, you need to install LiveUpdate 1.6. Go to find.pcworld.com/16381 to grab the download, and visit find.pcworld.com/16382 for Symantec's description of the problem.

and individuals adopt relatively lax security settings for intranet surfing. Your browser may be in a mode for surfing safely around your home network when really you're out cruising the Web with your guard down—it's sort of like sleepwalking while crossing a busy street. Theoretically, if your shields are down, someone could take full control of your PC uninvited. Visit find.pcworld.com/16380 to obtain Microsoft's fix. ■

Stuart J. Johnston is a contributing editor for PC World.

BUGGED?

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

BUG EXTERMINATOR

Hey, Where's My E-Mail?

I BEGAN HAVING a serious problem with my e-mail in-box after installing the corporate edition of McAfee's VirusScan 4.5. I instructed the program to scan all e-mail messages. With Outlook Express, when I want to view my e-mail messages, I click the Inbox subfolder. But since I installed VirusScan, clicking the Inbox deletes all messages. I e-mailed McAfee tech support (on a different PC) and didn't get a response. *Charles Gelm, via the Internet*

Bugs & Fixes responds: I contacted McAfee on Gelm's behalf. Product manager Ryan McGee said this is a known issue with VirusScan 4.5 and 4.5.1. Fortunately, there's a hot fix. To get it, corporate users must go to www.mcafee2b.com, select *Support*, click *Technical Support*, and choose the proper product version. Then click *E-mail Technical Support* and type in the grant number (an ID code). Gelm finally got the fix, and it solved the problem.

NEW PRODUCTS

EDITED BY ANNE B. McDONALD

Pop 4 Megapixels Into Your Pocket



PETITE PIXEL POWER: The Pentax Optio 430 (left) and the Olympus Camedia D-40.



DIGITAL CAMERAS

IF YOU'VE BEEN looking for a pocket-size digital camera that packs lots of pixel power, your search is over. Check out the Canon **PowerShot S40**, the Olympus **Camedia D-40 Zoom**, and the Pentax **Optio 430**. Each offers 4-megapixel resolution for stunning photos, both on screen and on 8-by-10-inch prints. But be prepared to pay a premium for these sharp-shooting gadgets: At \$799, each is a serious investment.

MOVING PICTURES

THE CAMEDIA D-40 Zoom and the PowerShot S40 include features that most competitors lack, such as the ability

to capture short video clips with audio. Both models are equipped with a built-in microphone that, for example, lets you record annotation for your video clips. In addition, the two cameras sport a tiny—and somewhat tinny—speaker that allows you to instantly review the sound quality. If it isn't to your liking, you can easily re-record the sound.

Until now, features of this sort were unavailable in many digital cameras—including the Optio 430, which records only video. In some scenarios, lacking sound defeats the purpose of having a moving image in the first place. But if you are happy with silent movies, the Optio should work fine.

The 20-second video clips I recorded using a shipping

version of the Canon and an early-production model of the Olympus looked very bright on my 17-inch monitor. The Canon rendered accurate skin tones, but it also introduced a slight degree of graininess over the entire video clip. Conversely, the Olympus unit delivered crisper video overall, but it generated somewhat ruddy skin tones. Moreover, the frames in the Olympus clip changed from light to dark every couple of seconds, as if someone were fading the light on and off. The Pentax's no-audio video clip was well lit but had a touch of graininess.

On the still-image front, all three cameras delivered nice-looking photographs overall. The Canon PowerShot produced the best color of the group, creating wonderfully saturated, warm colors in almost every image. But in pictures taken indoors, all three cameras tended to lose details in the dark areas of the photos' backgrounds.

PowerShot S40

Canon

★★★★☆

If versatility and image quality are your top priorities, consider the slightly larger S40.

Street: \$799

find.pcworld.com/17162

Camedia D-40 Zoom

Olympus

★★★★☆

A small but slightly bulky camera that shoots handsome photos and short videos.

Street: \$799

find.pcworld.com/17081

Optio 430

Pentax

★★★★☆

The best-looking compact camera here, but captures less-than-stellar snapshots.

Street: \$799

find.pcworld.com/17163

50 4-MEGAPIXEL DIGITAL CAMERAS

Canon PowerShot S40, Olympus Camedia D-40 Zoom, Pentax Optio 340

51 DESKTOP PC

Dell SmartStep 100D

52 VIDEO RECORDER

Pioneer DVR-9000 DVD recorder

KEYBOARD Inpace Flexi Keyboard

54 3D GRAPHICS BOARDS

ATI Radeon 8500, VisionTek Xtasy 6964

ONLINE SERVICE MSN 7

56 PDA PHONE

Samsung SPH-1300

MULTIFUNCTION DEVICE

Hewlett-Packard PSC 950

58 OFFICE SUITES

E-Press EasyOffice Premium 3, Sun Microsystems StarOffice 6

PDA KEYBOARD TT Tech

SnapNType

59 PC SPEAKERS

Logitech Z-560 4.1 system

60 UTILITY

Sensiva Version 3 desktop shortcuts

In design, the Pentax Optio 430 is the clear winner, thanks to its svelte design and its attractive brushed metal finish. The Canon is a bit larger and bulkier than the other two. The Olympus is light and nicely square in shape but a tad chunky. The solidly built shipping Pentax is a smidgen wider but noticeably slimmer than the Olympus.

LOOK TO THE FEATURE

BOTH THE PowerShot S40 and the Camedia D-40 Zoom have a sliding front panel cover that also functions as the camera's power switch. Although this feature does make the camera look slick, it forces you to be extra careful when moving the cover to turn the camera off, since the lens needs a bit of time to retract.

All three models' ease-of-use features include several on-camera buttons that offer convenient access to controls for such options as quickly reviewing pictures on the LCD screen. Image quality for the Canon and the Olympus was crisp, clear, and color-rich; and both screens refreshed quickly when I thumbed from one image to the next. The Pentax's LCD screen, on the other hand, showed a blurred image for a second, and then quickly focused in on a photo. Heads up: On all three cameras, some buttons—in com-

bination with the on-screen menus—can be puzzling (and even frustrating) for first-time users. Read the manual carefully to ensure that you properly adjust the right settings.

All three come with a 16MB memory card and image editing software. But the Canon and the Pentax also include a rechargeable battery and a charger, while Olympus bills \$50 for its kit. Which camera is best? It's a tie between the Canon PowerShot S40 and the Olympus Camedia D-40 Zoom. Both deliver beautiful pictures and plenty of versatility. Possible tiebreaker? The Olympus wins on size.

—Grace Aquino



SLIGHTLY LARGER:
The Canon PowerShot S40.

A PC for Bargain Hunters

DESKTOP

TEST AT \$599, THE Dell Center SmartStep 100D is about the cheapest PC you can buy from a major manufacturer, beating entry-level competitors from Compaq, Gateway, and HP.

Bargains like this one don't come without compromises, though. Unlike most built-to-order Dells, the SmartStep comes in only one configuration: a 1-GHz Celeron CPU, 128MB of SDRAM, a 20GB hard drive, and a basic 48X CD-ROM drive.

The SmartStep's no speed demon, either. Its score of 75 on PC WorldBench 4 makes this PC the slowest Windows XP-based system we've tested. Still, that mark puts it only a few points behind some other budget PCs we've seen, and the SmartStep is certainly fast enough to handle tasks like word processing, e-mail, and browsing the Web.

Unfortunately, performing text-intensive activities might be difficult on the smallish 15-inch Dell E551 monitor. When viewing Internet Explorer and our standard test screen of a Microsoft Word document containing a 12-point font, I found text a bit blurry at resolutions of 800 by 600 and 1024 by 768. Images

fared better, however. Our test screen—while not stunningly rendered—had acceptable colors and detailing.

Most other aspects of the shipping model I looked at were also acceptable or better. Though the diminutive Kinyo speakers won't impress audiophiles, they had more power and better sound fidelity than most other low-cost speaker sets I've heard.

New users will appreciate Dell's high-quality documentation—but not the skimpy 90 days of warranty and tech support. Upgrading to Dell's standard one-year plan will cost you an extra \$50.

In spite of the SmartStep's nice price, you may be better off spending a bit more. One example: Dell's \$799 Dimension 2100 (find.pcworld.com/15104), which comes with a clearer, 17-inch monitor; an easy-access, upgrade-friendly case; and a one-year warranty. With the SmartStep 100D, you get what you pay for.

—Sean Captain ▶

SmartStep 100D

Dell

★★★★☆

A well-built basic PC with a very low price but a small monitor.

List: \$599

find.pcworld.com/17141

Lean, Mean, DVD Recording Machine

VIDEO RECORDER

TEST RECORD VIDEO, transfer old VHS tapes onto DVDs, and play those DVDs in a standard DVD player—that's the lure of Pioneer's **PVR-9000** recorder. It lets you do these things, but with a few gotchas, including a hefty \$2050 price tag.

The preproduction unit I tested is aimed at the professional video market; the consumer version, the DVR-7000, is nearly identical in function and price. Both can record to

trickier and involved some new choices. For instance, you must decide whether to record in video mode (for later playback in most DVD players and drives) or in VR mode.

MORE OPTIONS

VR MODE offers more options regarding video quality and time, with manual and auto-optimized settings. It also has more editing features, lets you create playlists, and offers periodic thumbnails of stored video for easier navigation.



THE PIONEER PVR-9000 would be a videophile's dream machine, with its DVD-recording capabilities—but for its high price tag.

DVD-R or DVD-RW media.

Setup was fairly simple—it took me about 15 minutes—and the PVR-9000 has all the ports you'd expect, including component output video, S-Video, and an IEEE 1394 link for your digital camera. (Note: the PVR-9000 has BNC video connections instead of typical RCA ones.) The procedure for playback was easy and familiar, but recording was a bit

Pioneer PVR-9000

Pioneer

List: \$2050

★★★★☆

If you're a DVD enthusiast and have the bucks, a good addition to your digital entertainment set. find.pcworld.com/17161

Unfortunately, VR playback is limited to the Pioneer unit and the very few compatible players out there.

In video mode, you can title the video segments, but you don't have full control over inserting chapters. You can only insert them automatically every 3, 5, or 10 minutes.

Video mode lets you record at highest quality for 1 hour or at standard quality for 2 hours. To use video mode, you must perform a process of initializing DVD-RW discs and later finalizing both DVD-RW and DVD-R media, which takes a few minutes total. With a DVD-RW disc, you have the option of unfinalizing and then adding to or modifying

the video you've recorded, but only in VR mode. I would be much happier with the PVR-9000 if it would let you add to or modify your DVD-RW disc using either mode.

You cannot mix modes on a single disc. When you reuse a DVD-RW disc and record in another mode, you will erase the existing video. As with VCRs, you can preprogram the unit to record. Unlike a VCR, the unit takes several moments to load, read, and stop recording a disc.

The PVR-9000 turned in better-quality playback than either my PC's DVD-ROM drive or my two-year-old Pioneer DVD player, likely because the decoder in the PVR-9000 is much superior. I was impressed that my player could read the discs at all; don't assume that your older player—especially if it's from a different maker—will be able to do so.

STANDARDS DIFFER

GIVEN THE PVR-9000's price and the high cost of media (\$6 to \$10 per disc for DVD-R and \$15 per disc for DVD-RW), this device isn't for everyone. Also, compatibility with older drives and players is far from universal. And currently there are three competing standards for rewritable DVD; you can't be sure this one will survive. That said, however, this unit can do anything your VCR can do, while offering you better video quality in longer-lived and more compact media.

—Anush Yeghazarian ▶

QUICK TAKES

Bent Any Keyboards Lately?

DID YOU EVER wish that you could fold up a PC keyboard and tuck it into a laptop case? Are you prone to dribbling food and drink on your Ps and Qs? If so, check out Inpace's \$40 **Flexi Keyboard**, which weighs less than 8 ounces and can be rolled up like a newspaper. The Flexi's circuitry is sandwiched between two layers of thin, clear polyurethane, so spills can't reach the electronics. If you've had trouble with kids' sticky fingers on your PC, this might be the answer. Overall, it exudes plastic placemat (it can be scrubbed like one), but the company says that it's UV-resistant and won't crack or yellow.

At first, typing on the Flexi was like pounding marshmallows—but gradually it grew on me. It has several drawbacks to get used to. The Flexi is so flexible that you must use it on a solid surface (don't even think of typing on your lap), its spongy keys respond best only if you hit them dead center, and it would have benefited from a larger spacebar and left shift key. It's not at all an essential accessory, but its versatility might win you over. Inpace, find.pcworld.com/17681.

—Anne B. McDonald



VIRUSSCAN ONLINE

FROM VIRTUAL EVIL

```

[1] Scan Date      6/14/01 3:07:01 PM
[2] Scan Status   Scan Completed, 1 virus detected
[3] Folder(s)     Scanned: c:\
[4] Scan Options  Include Subfolders, Scan All Files
[5] File(s)       Scanned: 7272
[6] File(s)       Infected: 1
[7] Scan Results  Infected with W32/QAZ.worm

```

NEW GENERATION OF SOLUTIONS FOR A NEW GENERATION OF THREATS

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High-Performance 3D-Graphics Brawl

GRAPHICS

NEW GRAPHICS boards using ATI and NVidia chips rank among the fastest we've ever tested. We ran tests on shipping versions of ATI's **Radeon 8500** and VisionTek's **Xtasy 6964**; the latter is one of the first boards based on NVidia's GeForce3 Ti 500 graphics

ATI's drivers had optimization tweaks to improve Quake III speed, but a bug prevented the 8500 from attaining the highest image quality possible. And NVidia's drivers produced some strange texturing

still waiting for games written for DirectX 8 to arrive.

If our earlier test results hold true, GeForce3 Ti 500-based boards should enjoy a slight lead over the Radeon 8500. Less-expensive GeForce3 Ti 200 boards should compete with the ATI on price and should perform comparably.

The included features won't change. Most boards designed for DirectX 8, including GeForce3 Ti cards, cut costs by omitting features such as TV tuners and multimonitor support. The Radeon 8500 comes with the latter, courtesy of built-in VGA, DVI, and S-Video connectors, plus ATI's HydraVision software. A variation on the Radeon 8500 All-in-Wonder including a TV tuner should be out soon.

SPEED DEMONS:

Our tests saw great graphics performance from VisionTek's Xtasy 6964 (top) and ATI's Radeon 8500.

chip to appear on the market.

In our 3D-gaming tests, the boards turned in impressive speeds on our PIII-933 test system with 128MB of RAM, but the drivers released with the cards showed some bugs. In our MDK2 tests, the \$350 Xtasy 6964 held a significant advantage, with 102 frames per second to the \$299 Radeon 8500's 73. But the scores were closer in other tests: Both boards had very playable frame rates in Quake III, even at 1600 by 1200 resolution with 32-bit color.

anomalies in our Test Drive 6 tests. Both companies are constantly engaged in fixing driver problems like these, but 3D glitches remain common as ATI and NVidia race to wring out as much performance as possible. And we're

So far, your choices with the newcomers remain much the same as with the previous generation of graphics boards: ATI's products have more features and often a slight price advantage, and NVidia's chips continue to preserve that company's performance lead.

If you're a graphics enthusiast and want the fastest 3D speed around, a board like the VisionTek is the way to go right now—but stay tuned.

—Eric Dahl ▶

Radeon 8500

ATI

★★★★☆

This is a high-performance, feature-packed graphics board offered at a good price.

List: \$299

find.pcworld.com/17122

Xtasy 6964

VisionTek

★★★★☆

Has the fastest 3D graphics available...as do all boards based on NVidia's GeForce3 Ti 500 chip.

List: \$350

find.pcworld.com/17121

QUICK TAKES

Microsoft Updates the Look of MSN

MICROSOFT HAS revamped the look of its MSN Web site, adding content and Net-based tools. The stylish **MSN 7**, as Microsoft calls it, includes handy new features, notably six .Net Alerts that you can configure to blast instant messages to an e-mail in-box, a cell phone, or a Microsoft instant messaging service. The different user-configurable alerts keep tabs on real-time information and can apprise you of everything from local traffic conditions to flight delays.

Microsoft claims that the MSN page loads 30 percent faster for both dial-up and broadband users. In my tests with a dial-up modem, however, MSN.com didn't load perceptibly faster. Still, I liked the new MSN Broadband Highlights page, with its content from MSNBC and ample links to high-quality third-party broadband content. Also new: MSN now offers DSL broadband service from providers such as BellSouth, SBC, and Verizon.

Most MSN.com services require you to have a .Net Passport—to get one, you must supply your e-mail address and a password—and the services are optimized for Microsoft's Internet Explorer Web browser. Even so, IE users of Hotmail.com and MSN Messenger will appreciate the slickly integrated array of MSN services that are assembled neatly at one MSN.com domain. Microsoft, find.pcworld.com/17164.

—Tom Spring

SONY

DREAM ON™ >>>>

Recording video isn't just a point and shoot proposition. You've got to make sure there's enough battery power. And enough light. You've got to hold the camera steady. Or, you've got to get a Sony. Only Sony Handycam® camcorders have Worry-Free Recording™ — a virtual safety net of features that ensures the best possible video, in virtually any situation. For instance, our InfoLithium® rechargeable battery with AccuPower™ meter lets you know exactly how much recording time you have left. And it's on every Hi8™, Digital8®, and MiniDV Handycam camcorder. Because every moment is too important to miss. www.sony.com/di

Handycam®



You'll also get great video of your newborn's first bath.



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Graceful Palm Phone With Color Screen

PDA PHONE

LONGING FOR a merger of your cell phone and PDA? Samsung's on the right track with its **SPH-1300**, a CDMA/analog cell phone that's also a Palm. Lightweight (6 ounces), compact (4.9 by 2.28 by 0.82 inches), and graced with a bright color screen, a built-in Web browser, and a cornucopia of phone features, it's a gadget-lover's dream.

Fairly priced at \$500 from Sprint's Web site, the SPH-

1300 looks more like a Palm than like a phone. The 160-by-240-pixel, 256-color display is smaller than a regular Palm screen, but its exceptional crispness and clarity make it fairly easy to read. Colors are less brilliant than on a Pocket PC, but they look better than the dull hues of Palm's M505. You get 8MB of RAM.

Samsung integrated the phone functions nicely into the Palm OS: You can access a screen-based keypad either by tapping the phone icon on the main screen or by pressing the phone button situated next to the power on/off button on the device's right side. A small, monochrome LCD on the unit's top displays battery life and other information

about the phone's status.

You dial phone numbers by scrolling through the contact database screen by screen (it's tedious if you have hundreds of contacts). Alternatively, you can tap out a number on the screen keypad, or create up to 20 entries in a voice-dial database. Voice quality is on a par with other Sprint PCS phones I've used.

The unit has a port for accepting hands-free kits, but a headset is not included. In my tests with a shipping unit, the battery lasted a full three days with moderate PDA and phone use, not far from the promised 100 hours of standby time and 4 hours of talk time. Note: If you are using Windows XP, upgrade the in-



BOTH A PDA and a cell phone.

cluded Palm Desktop software to the XP-compatible version 4 before attempting to hot-sync; otherwise, Palm apps won't install properly.

—Yardena Arar

SPH-1300

Samsung

★★★★☆

This sleek, light, color Palm/cell phone oozes innovation.

List: \$500

find.pcworld.com/16580

Fax, Copy, Scan—And Print Digital Photos

MULTIFUNCTION DEVICE

HEWLETT-PACKARD'S new **PSC 950** combines an ink jet printer, a flatbed scanner, a color copier, and a stand-alone fax, and adds features for digital camera users—all for \$399.

Besides serving as a SOHO workhorse, the PSC 950 can function as a photo printer.

Three slots on its case accept SmartMedia cards, CompactFlash cards, and Sony Memory Stick media. The device also carries image editing software, which enables you to manipulate photos on your PC.

Alternatively, you can print photos directly from a memory card—no computer necessary. Press one button

after inserting the card, and the PSC 950 produces a proof sheet/printing order for all photos on that memory card. Choose photos, photo sizes, and paper type; then scan the form into the device. It will automatically print them on

the paper you've chosen (you must first load the correct paper tray). In my tests, the PSC 950 reproduced bright colors and flesh tones well on photo paper, though it lost some detail and sharpness.

The device does a reasonably good job of printing standard office documents.

I timed its text print speed at approximately 4 pages per minute and its graphics speed at about 1 ppm—comparable to stand-alone ink jet printer speeds. On plain paper at the default of 600 by 600 dots per inch, text looked sharp, though on graphics the unit did a better job of rendering color than of preserving detail.



A USEFUL addition to the small or home office: HP's PSC 950.

Flatbed copying and scanning are extremely easy, each requiring you to press two buttons. The PSC 950 copies text quite well, too, although color copies looked foggier than originals. Scanning was smooth at 600 by 1200 dpi—the scans looked bright and rich. The PSC 950 faxes directly from the flatbed panel but you have to load the fax one sheet at a time.

I found the PSC 950 capable and easy to use, especially for a small or home office.

—Lisa Cekan ▶

PSC 950

Hewlett-Packard

★★★★☆

One device that contains all the multifunction capabilities you need, plus easy photo printing.

Street: \$399

find.pcworld.com/16802

Some VoIP conversations should be interrupted, but never by power problems

APC provides all the components necessary for an end-to-end power protection solution for the VoIP environment.

The 7 pieces of the VoIP availability puzzle

- **Clean, continuous power** as well as "ride-through" power during brownouts, surges and spikes.
- **Extended back-up power** in the event of an extended power outage.
- Redundant, hot-swappable and scalable components to **allow growth** as well as **service without interruption**.
- **Instant notification of critical power/UPS issues**.
- Ability to remotely control selected power outlets in order to **reboot hung switches**.
- Ability to **ensure optimal temperature and humidity** within remote closets.
- Ability to keep track of and **maintain health of power protection systems** across the WAN, over time.

APC provides all the components necessary for end-to-end power protection solutions for the VoIP environment – visit apcc.com/buy/ and see what Legendary Reliability™ can do for your business.

Symmetra® RM

The new Symmetra RM puts the high availability of the proven and patented Symmetra® Power Array™ technology in a rack-mountable form. Through the included Web/SNMP Management Card, you can monitor and configure your APC Symmetra RM to shut down and reboot your systems, receive e-mail alerts and view the event log.



Remote Monitoring

APC monitors all UPS parameters, tailored to your desired response. Regular UPS parameter and event reports are issued with event frequency, duration, and resolution, offering immediate enhancements to your investment.

MasterSwitch™ VM

Provides the ability to monitor the current draw and set alarm thresholds, based on customer requirements, while still providing the remote on/off/reboot capabilities found in the MasterSwitch series. In addition, it mounts vertically, requiring zero U of valuable rack space.



Tivoli



Symmetra RM is easily manageable with the industry-leading network platforms.

Environmental Monitoring Card

Works with your APC Smart-UPS®, Matrix-UPS® or Symmetra to monitor ambient temperature, humidity and other environmental conditions.



PowerChute® Inventory Manager

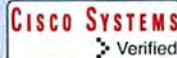
An invaluable software tool for anyone with a large number of APC UPSs spread across a wide geographic area. Enables you to capture, organize, and assess vital information concerning your entire APC Power Infrastructure.



Other APC products for the VoIP/Rack environment:

- **KVM Switches** provide one centralized control point for up to 64 servers.
- **ProtectNet** rack-mounted data-line protection.
- **PowerNet Manager** collects UPS/power status information for fast problem diagnosis
- **Cable Interface Kits** provide direct communication between UPSs/desktops and workstations/servers
- **2-Post Racks / 4-Post Open Frame Racks**

By utilizing APC's PowerNet for CiscoWorks2000, which integrates APC's power management software with CiscoWorks2000, Cisco customers now can easily manage APC power protection and network power control devices from the same Web browser as Cisco equipment.



Verified



APC was named to the 2000 InformationWeek 500 ranking of the top IT innovators (09/11/00).

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Low-Cost Microsoft Office Alternatives

OFFICE SUITES

MICROSOFT OFFICE is the big gun of office suites, but its high price (Office XP Professional, purchased new, costs \$579) and its aggressive copy controls may encourage con-

sumers to seek alternatives. the features of Microsoft Office, StarOffice has the look of a replacement package. The word processor falls short of matching Microsoft Word's feature list by only a grammar checker and macro recorder;

Based on a wizard-like system, the presentation manager offers a full set of special effects, and can automatically create a presentation from a word processing document. All applications can default to save in standard Microsoft Office 97/2000/XP file formats.

On the downside, the lack of macro-recording tools limits users' ability to customize, and the software's dialog boxes and help topics are thick with technical jargon. Third-party training materials and support are minimal. StarOffice is best suited for technically oriented firms that use a mix of Windows, Linux, and Solaris operating systems (it's available for all three).

EasyOffice Premium 3 has a lot less going for it as a Microsoft Office alternative. Though it offers voice recognition and speech synthesis tools, a book-keeping application, and contact management—as well as word processing, spreadsheet, and presentation programs—it stacks up more as a competitor for the less powerful Microsoft Works.

EasyOffice can open and save files in Microsoft Office formats, but its main applications lack integration, and its feature sets are limited. For example, charts are available only in the spreadsheet and can't be pasted into a word processing document. And the interfaces of the various applications aren't standardized. Macro capabilities and toolbar and menu customization are missing.

Corel's WordPerfect Office 2002 (\$490 for the Professional Edition) remains the best

QUICK TAKES

All Thumbs? Try This PDA Keyboard

HAVE TROUBLE using Graffiti handwriting recognition technology to write a message in a Palm OS-based device? TT Tech's **SnapNType** is a Blackberry RIM-like keyboard that slides easily onto the bottom of most Handspring Visors (the company says that Compaq iPaq and Palm M500 and M505 versions are in the works).

It's a lot easier to use your thumbs to peck out an e-mail message or a to-do entry on the tiny buttons than to use Graffiti or the on-screen keyboard. You can hold your PDA and type at the same time—something that isn't always possible with rival models. The sturdy casing on the \$40 unit covers the buttons and the Graffiti and



menu area of your PDA, but most are duplicated so that you can leave it in place most of the time. TT Tech, find.pcworld.com/16805.

—Alan Stafford

Microsoft alternative. However, some users—particularly technically oriented SOHO businesses—might want to take a look at StarOffice 6, in view of its affordability.

—George Campbell



BUSY, BUSY: Whenever you right-click in EasyOffice Premium 3's word processing program, an interface packed with oversize icons appears.

sumers to seek alternatives.

I looked at two low-priced suites trying to nose into the office suite tent: Sun Microsystems' **StarOffice 6** (currently free as a beta download; its previous shipping version cost about \$40) and a shipping version of **EasyOffice Premium 3**, \$40 from E-Press.

With a full complement of well-integrated applications, each offering a standard Windows interface and almost all

its tools include as-you-type spell-checking, built-in charting, styles, a nice set of templates, HTML manipulators, and completely customizable toolbars and menus.

StarOffice's spreadsheet application is similarly well endowed, with a DataPilot feature to help create useful Excel Pivot Table-like views. (Pivot Tables select parts of a worksheet and then move the parts around for different views.)

EasyOffice Premium 3

E-Press

★☆☆☆☆

A limited feature set, lack of integration, and a quirky interface disqualify it from the list of full-fledged office suites.

List: \$40

find.pcworld.com/16804

StarOffice 6

Sun Microsystems

(Beta software, not rated)

This suite is full-featured, but has a fairly challenging learning curve and limited third-party training and support.

Free in beta version

find.pcworld.com/16803

Powerful PC Speaker Set

PC SPEAKERS

IN ITS FIRST attempt to produce a high-end speaker set for PCs, Logitech pushes THX-certified surround sound below the \$200 price point with its new **Z-560** 4.1 system.

I cranked up a preproduction version of the Z-560, and the speakers sounded great

with DVDs, CDs, and MP3s. The \$199 Logitech system's performance was dramatic, shaking the room with a commanding subwoofer and enveloping the listening area in powerful sound. To my ears, the Z-560 speakers almost matched the audio quality of the more-expensive THX sur-

round systems, such as the Klipsch ProMedia 4.1 System (find.pcworld.com/16822). This is an impressive feat, indeed, for a speaker system that costs about one-third less. The system did perform inconsistently at low volume.

The Z-560's four-satellite-speaker configuration does a good job of reproducing surround effects in movies and 3D games. The included M3D feature adds surround effects to stereo audio tracks, as well. Overall, I didn't have the feeling I was listening to sound from small satellite speakers.

Logitech's Z-560 setup also showed impressive attention to detail. Screw-in terminal connectors permit you to hook up the four satellites with any speaker wire you choose, and

Logitech Z-560

Logitech

★★★★☆

Crisp, powerful, and affordable surround-sound speaker set.

List: \$199

find.pcworld.com/16807



GET ROOM-SHAKING SOUND from Logitech's 4.1 PC speaker system, the Z-560.

the well-designed mounting brackets can be rotated for use as stands or as wall mounts.

A headphone jack is included on the system control pod. But beware: Any reasonable headphone volume will generate neighbor-deafening sound if you simply unplug your headphones without dialing the sound down.

Want great sound to go with the movies or games you play on your PC? Logitech's Z-560 system is an excellent choice.

—Eric Dahl ▶

cure for the blue screen blues

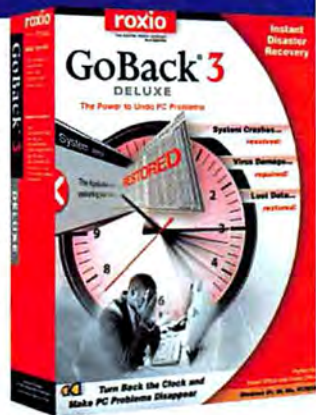
Instantly undo any system crash, file loss, virus attack, botched installation, or operator error with GoBack[®] 3 Deluxe from Roxio, the # 1 selling system recovery software*.

"If Norton SystemWorks is a lifesaver, then GoBack is the entire cast of Baywatch"—*Home Office Computing*

"...the utility with the best bag of tricks is GoBack...To travel back in time and salvage your system, there's no better choice than GoBack."—*PC Magazine*

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Dandy Desktop Shortcuts

UTILITY
WENDING your way through Windows involves so many tedious tasks. When you want to maximize or minimize a program, for example, you have to bring your pointer up to the top right-hand corner and click. When you want to launch an application that doesn't load at start-up, you must either double-click an

Sensiva Version 3

Sensiva

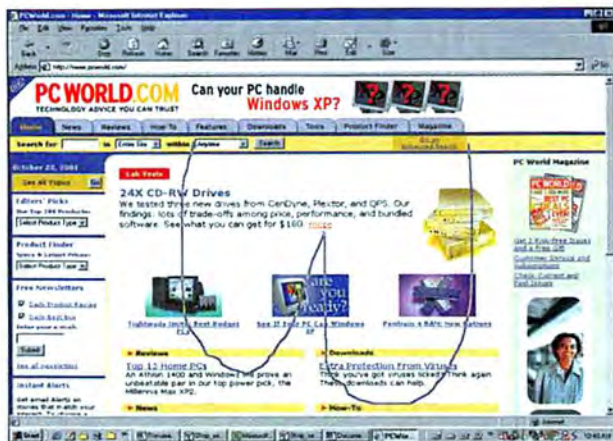
★★★★☆

Super-useful tool cuts the drudgery out of typing, clicking, and remembering passwords.

List: \$30; free 30-day trial use
find.pcworld.com/16621

icon on your desktop or click Programs in the Start menu. **Sensiva Version 3** offers various shortcuts for tiresome, repetitive actions, which is great for impatient people like me.

To test the shipping software, I downloaded a 1.41MB file on a free 30-day trial offer from www.sensiva.com. Then I right-clicked my mouse, held down the button, and followed Sensiva's cheat sheet to draw letters or symbols, anyplace on my screen, that keyed to my other applications. (The version 3 software also allows you to customize Web sites—and bypass log-in screens.) For instance, you would draw **W** to launch Microsoft Word,



TO OPEN Microsoft Word with Sensiva, right-click with your mouse, hold down the button, and scribble a **W** anywhere on your PC's screen.

draw a slash (/) downward to minimize the program you were in, or draw **L** to insert your signature file in any application. The software has 19 customizable symbols.

Priced at \$30, Sensiva works

on all flavors of Windows (including 95 and XP) and with all kinds of mice. But draw the symbols just as shown on the cheat sheet. If you don't, Sensiva won't recognize them.

—Aoife McEvoy ■

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Build & Automate:

- Fastest Engine
- Transparent On-line Defrag
- Smart Scheduling
- Full Network Controls
- Push Installation

Full Compatibility:

- Windows 9x
- Windows ME
- Windows NT
- Windows 2000
- Windows XP

New Technology Breakthrough!

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- **New!** "Push Install" eliminates the time and cost of manual installation with fast, two-click remote operation.
- **New!** Microsoft recommended lightning fast boot-time defrag for important system files — remotely control & schedule across site.
- **Exclusive:** "Smart Scheduling"™ monitors and maintains peak system performance intelligently and unobtrusively without requiring assistance.
- **Certified** at the highest level for Windows XP/2000/NT® and fully compatible with Windows 9X.



"Disk fragmentation can cause performance problems. You should consider running a defragmentation program on a regular basis."* — Microsoft Windows NT Server Resource Guide

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mobilemanager

A Traveler's Guide To Anywhere, Anytime Deals



Admittedly, business travel is anything but glamorous. Most often it's racing to meetings in strange towns, sometimes to meet even stranger people. Most of the sightseeing you do is at 400 mph, through the plane's window. Or at what seems like 400 mph—in a New York taxicab.

On the positive side, business travel puts some distance between you and office politics at home. What's more, it affords some freedom of movement. This is very helpful if, for instance, you want to prowls the online Help Wanted classifieds for new job openings, or scan the Web for novel ways to bring in some extra money. Now *there's* a productive use of the time spent waiting in departure lounges or hotel

lobbies. On the Internet, of course, the watchwords are *caveat emptor*—let the buyer beware—and the same could be said for the seller. But there are some safe ways to generate extra cash and clean out that guest bedroom at the same time.

Virtual Garage Sales

You can unload almost anything—from aardvarks to zircons—on eBay (www.ebay.com). But technology items are pure gold.

There's a practical reason for that vibrant market in gently used technology: it's called upgrading. Like most people who rely on technology to help them with their work, you probably have useful but unneeded equipment stacked here and there. Sure,

the equipment isn't as fast or as lightweight as your current handheld, projector, or laptop, but it's still a bargain for someone who doesn't have the same requirements that you do. All you need to do to transform that equipment from a liability into a revenue stream is to reach the potential buyers. On eBay, that could take as little as five minutes a day.

Here's how to do it. First, in your mind's eye, identify

Continued on page 3

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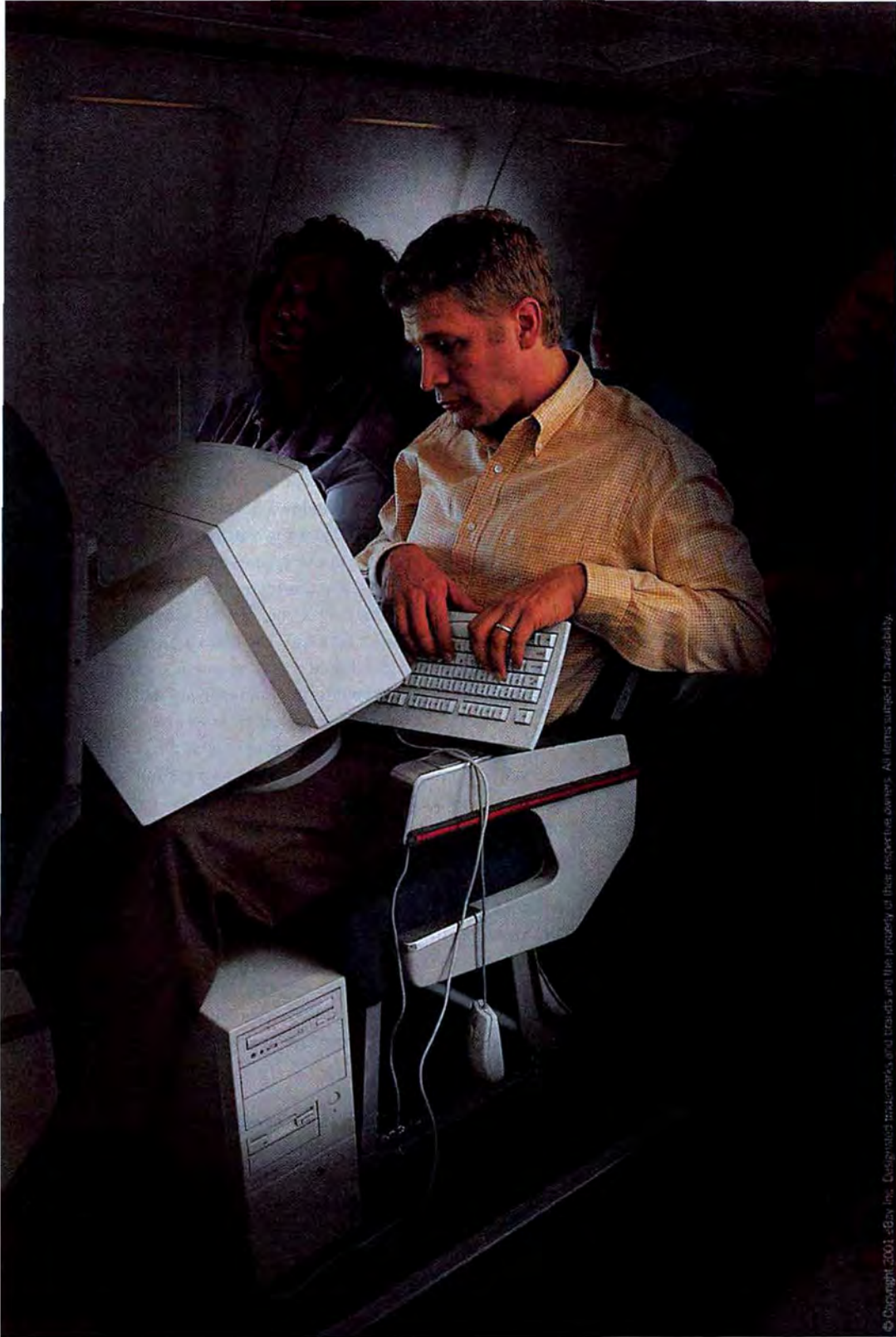
www.ebay.com

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mobilepro/p300



Titanium Notebook



Portable PC



Portable DVD Player



Electronic Organizer

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Everybody needs something. And the odds are you can find a good deal on that something at eBay.

With millions of items listed every week, we've got just about every computer product you could want, new or used. So before you go spending weeks searching for a bargain, you might want to check us out first. Go to

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Continued from page 1

the items you want to sell. Create accurate descriptions. If possible, obtain digital photographs of the items to post with your online ad. Next, set a reasonable price for the items. What's fair? Check out the prices of similar equipment for sale. Your next step is to register as a seller by completing eBay's simple online registration process.

Questions? Take advantage of the online tutorial! The tutorial will answer such questions as the length of time to set for your auction or when to use the handy "Buy It Now" feature that immediately ends the auction when a buyer accepts your asking price.

After a successful sale, communicate with the buyer to finalize the transaction using eBay's simplified "Checkout" feature. Or send them an e-mail message. Consider using eBay's online payment feature, which makes accepting payment by credit card easier and more convenient. After payment is received, ship the item promptly.



■ **eBay's Technology page: A great place to shop for technology products, and a great place to sell them too.**

As a courtesy to other members and as a safeguard to assure the deal's integrity, take a few moments to post feedback about the buyer and the just-completed transaction in the Feedback Forum. This online "reputation" is one method by which eBay members maintain a high level of confidence in one another.



■ **NEC's feature-rich and lightweight MobilePro 300 sports 32 Mbytes of DRAM for fast data handling.**

Ultimate Recycling

In sales, as in every other aspect of business, timing is everything. With a ready outlet for your older equipment, upgrading sooner rather than later makes sense, especially if you can get more done with less—that is, less weight and in less time.

An example of such hardware is NEC's feature-rich and lightweight MobilePro 300. This 5" x 3" x 3/4" ultra-compact powerhouse runs Microsoft's Windows Pocket PC software, so if you know how to use Window applications—and who doesn't?—you already know how to use the pocket versions of Outlook, Word, and Excel. The 300's 3.8" reflective liquid crystal screen displays 65,000 colors to make working with applications easier under all light conditions. Speaking of adapting to

your environment, the 300's stylus and touch-screen display are perfect for responding to e-mail messages during a meeting—or anywhere else where discretion is advised or required.

At seven ounces, the MobilePro 300 is lightweight in heft but not in features. It sports 32 Mbytes of DRAM for fast data handling. Internal compact flash (CF) and secure digital card (SD) slots provide fast data transfers and secure data storage, a critical consideration for travelers. Other I/O ports include a built-in USB host for quickly connecting peripherals.

Keeping It Private

Whether you are responding to an invitation to the company's picnic or transmitting competitive marketing information, you don't want to worry about eavesdroppers. The 300's wireless connectivity includes the ability to set up a secure virtual private network (VPN) that can securely exchange data with your company's network. Add NEC's optional server software and the 300's remote-to-host Synchronization System software, and you've got an extra degree of protection against losing critical information, plus you can access data stored on the head office's servers.

So what if life on the road isn't glamorous? With the right combination of online services and hardware to provide the connectivity, it can at least be convenient, productive, and rewarding.



NETWORKABLE. UPGRADEABLE. EXPANDABLE. AND SHINY.

The NEC® MobilePro™ P300 Windows® Powered Pocket PC is designed expressly for business. Not only does it come packed with the core applications demanded by corporate professionals, like pocket versions of Microsoft® Outlook®, Word, and Excel, it also supports wireless connections and secure remote VPN access to your company's network. So you can be as productive on the road as you are at your desk.

Complete with internal CF and SD Card slots plus a built-in USB Host, your MobilePro P300 gives you multiple options for storage, backup, software upgrades, and peripheral connectivity — giving you the flexibility to keep up as your business needs change. And the embedded MobilePro Synchronization System software offers an extra layer of protection against losing critical information and extends enterprise data to your mobile workforce.*

The NEC MobilePro P300 Corporate PDA complete with Microsoft Pocket PC 2002 Software.
The handheld that means business.

MobilePro™ P300
CORPORATE PDA

Available at select resellers. www.neccomp.com/mobilepro/p300 888 632 7003

NEC

Empowered by Innovation



*Requires purchase of server software from NECC.

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20/20 Foresight

OLED SCREENS like this prototype (with a simulated image) from Kodak Display Products will be thinner and brighter than LCDs, and will use less power.

20 products, trends, and technologies that will change PCs in 2002—and beyond.

Hot economies cool down and Net empires collapse, but technology continues to move at light speed. Digital tools are not only getting smaller, faster, and cheaper, they're also insinuating themselves into every corner of life. And these days they're as likely to be found in your pocket as on your desk.

We've picked 20 trends and technologies that will have the greatest impact on personal computing for business and home use. We polled trend watchers, technologists, industry experts, and our own editors to uncover the products that will change how you work—and possibly even how you live.

BY DANIEL TYNAN
PHOTOGRAPHS BY STAN MUSILEK

Not surprisingly, many of these innovations help bring the power of the Internet to mobile devices. Others ensure that your PC's performance continues to scream along (leaving software even farther behind). And most of them will hit the scene within the next two years.

Of course, the road to digital Nirvana is littered with the remains of "can't-miss" products (Internet appliances, anyone?). So we've outlined bumps in the road that each technology will encounter. We've also scored each technology on a scale of 1 to 10; the higher the number, the greater the technology's impact on users.

You'll be amazed by what's ahead. The future of high-tech has never looked brighter. ►

“The biggest challenge will be applications and operating software. What will the software world come up with that will use all the processing power Intel is throwing at this market?”

—Kevin Krewell, *Microprocessor Report*

400 Gigs and a Cloud of Dust

AFC Hard Drives

What is it? Antiferromagnetically coupled media, a new way to coat hard drives. **What's cool?** By sprinkling disks with the element ruthenium—impishly termed “pixie dust” by IBM—drive manufacturers can pack more data onto each hard drive platter. Today most drives fit about 20 gigabits per square inch; AFC hard drives will ultimately fit five times as much—which means a 400GB drive will soon cost about the same as today's 80GB models. **When's it coming?** Pixie dust and other high-density storage technologies are already here, but drives won't hit 400GB before 2003. **What's the catch?** Like CPU speeds, today's hard drive capacities already exceed most users' needs. **Impact meter:** 8

It's a PIM, It's a Phone, It's Super-PDA

The 1-GHz Palmtop

What is it? Palmtop processors that run at speeds from 250 MHz to 1 GHz. **What's cool?** They'll need all that power to handle the high-speed cellular, Bluetooth, and other wireless technologies soon to be standard on handhelds. A business traveler might use the power to access a corporate database and then update information stored there using a mini-spreadsheet. Consumers might use the horsepower to download MP3s and to play short videos. Combine these high-speed chips with inexpensive mass storage, and pocket companions should become powerful enough to handle natural-language speech input—no more fussing with handwriting recognition. **When's it coming?** The first 250- to 400-MHz handhelds are expected in the first half of 2002. **What's the catch?** Don't expect a ton of battery life. You might want to wear an oven mitt, too—these chips generate a lot of heat. **Impact meter:** 5

Scintillating Screens

Organic Light Emitting Diodes

What is it? A replacement for LCD screen technology. **What's cool?** OLEDs rely on organic materials that emit light, so they require no backlighting. That makes them cheaper to produce and less power-

hungry than LCDs. They're a natural choice for portable devices when battery life is a key concern.

WIRELESS networks get a speed boost to 54 mbps from products like Intel's Pro/Wireless 5000, one of the first 802.11a network hubs.

OLED screens are also thinner than LCDs, and the technology can be printed on flexible materials such as plastic. Imagine a computer screen that rolls up and down like a window shade. **When's it coming?** Two to three years for PDAs and cell phones; five to ten for laptops and desktop displays. **What's the catch?** It's early. Color fidelity can be a problem. Building active-matrix OLED displays—in which each pixel is controlled by two transistors, or twice as many as on a standard notebook LCD—erodes some cost and power advantages. **Impact meter:** 5

The Message Is the Medium

Next-Generation Instant Messaging

What is it? A whole lot more than text. **What's cool?** Instant messaging may have started as a toy for teenagers, but it's poised to become the mass-communication tool for the 21st century. Microsoft has made IM a key component of Windows XP: Besides sending simple text messages, with Windows Messenger you can exchange files, conduct audio or video conferences, and collaborate on documents over the Net. The big advantage for business users? When you see that a colleague is online, you can set up a conference or work session instantly—no more telephone or e-mail tag. AOL is working with Sun and Lotus on standards that will allow their IM products to communicate with each other.

Others are exploring ways that IM can help to drive e-commerce and deliver online music and games. **When's it coming?** Windows Messenger



is here already, and its competitors are sure to respond soon. **What's the catch?** The AOL and Microsoft IM clients still can't communicate with each other. And in the workplace, IM could replace Web surfing as the goof-off activity of choice. **Impact meter:** 7

Tireless Wireless

802.11 Networks

What is it? A high-speed wireless network protocol. **What's cool?** In the office and at home, wireless networks will leave you free to roam while connected to the Internet at full speed. With an 802.11b home network, consumers can surf the Net, download files, and print documents from their laptop or handheld—no wires required. Companies like Wayport (www.wayport.com) and MobileStar (www.mobilestar.com) are installing 802.11b in hotels, airports, and cafés across the country. Meanwhile, corporate users will enjoy an 802.11a standard that's five times faster at 54 mbps. **When's it coming?** Wireless 802.11b and 802.11a networks are already here; broad deployment will start in 2002. **What's the catch?** Speed drops as you get farther from a LAN access point, 802.11a isn't backward-compatible with 802.11b, and wireless networks can be less secure. **Impact meter:** 7

In Search of a Common Language

Markup Languages for Everything

What is it? The lingua franca of the Internet. **What's cool?** By surrounding data with simple text tags, an XML (Extensible Markup Language) programmer can tell a computer to access corporate data no matter where it resides and then display it in a browser. Though the XML 1.0 spec was finalized in 1998, huge companies like Fidelity Investments have only begun to convert all their data to XML, while scores of industry-specific dialects have been developed for finance, medicine, and other sectors. Applications written in XML will also let search engines distinguish between, say, the name Price on a Web page and the price of an item on that page, leading to faster, more accurate searches. **When's it coming?** Markup dialects are just starting to become commonplace. **What's the catch?** Converting existing data to XML can be slow and expensive: To permit search engines to work optimally, corporations must adopt a consistent approach to coding data in XML, covering such points as how to label data fields (for example: *last name, surname, or family name?*). **Impact meter:** 9

Getting a Little Hyper

Hyper-Threading

What is it? A more efficient way to use processing power. **What's cool?** That 2-GHz Pentium 4 chip might be a barn burner, but parts of it are always sitting idle, waiting for your software to use them. Intel's Hyper-Threading technology will put those indolent circuits to use, allowing network servers to handle up to 30 percent more users. Desktops may see a similar gain once applications are written to take advantage of it, but the benefits would likely be felt first by compulsive multitaskers who like to play

CELL PHONES

Bandwidth on the Run

NEW CELL PHONE NETWORK

What is it? Mobile phones that will be able to access the Internet at blistering speeds.

What's cool? Significantly more bandwidth. The third-generation (so-called "3G") cellular network promises

data rates from 384 kbps to 2 mbps—more than 100 times the puny rate today's cellular networks employ. The speed increase should open the way for a host of applications for cell phones and PDAs, from streaming audio and video to sophisticated real-time data manipulation. **When's it coming?** Verizon and Sprint were slated to begin U.S. trials in late 2001,

but broad deployment is still three to five years away. **What's the catch?** Warring cellular standards in Europe and the United States could sow confusion and slow consumer acceptance. And the cell carriers have yet to prove that they can make voice transmission—let alone data transmission—as reliable as users want. **Impact meter:** 6



SANYO'S SCP-5000, one of the first color-display U.S. phones.

games, download files, and print databases at the same time. **When's it coming?** Later in 2002 for servers; in 2003 for desktops. **What's the catch?** Windows XP and Linux support Hyper-Threading, but apps tuned for it are years away. **Impact meter:** 7

Good-Bye PCI, Hello Arapahoe

Third-Generation Input/Output Bus

What is it? A faster data pipe. **What's cool?** Today's multigigahertz chips demand a constant stream of data, and the aging PCI and AGP bus standards won't be fast enough at shuttling data between your PC's components. That's why Intel is developing a third-generation input/output interconnect specification, code-named Arapahoe, that's up to ten times quicker than today's fast PCI-X bus. PCI-X moves data in parallel along 64 wires, reaching a top speed of about 1GB per second. Arapahoe can employ from 1 to 32 lanes; each lane consists of a pair of wires and can shuffle more than 200MB of data per second between the CPU and add-in cards or integrated parts. Arapahoe can also prioritize ►

“For the past ten years, companies have talked about speech recognition, social interfaces, and software that understands more about what you want. And with incredible consistency, customers have rejected these things. They just want computers to behave themselves.”

—Jeffrey Tarter, *Softletter*

data, so that, for example, real-time streaming data is processed faster. **When's it coming?** Early 2004. **What's the catch?** PC makers will have to support both standards as systems make the transition to Arapahoe, which may increase PC costs. **Impact meter:** 9

Peers Looking at You

Peer-to-Peer Networking

What is it? A way to create ad hoc networks within a corporation or across the Net. **What's cool?** Peer-to-peer networking is more than just a way to swap MP3s. It will let businesses cache files, such as the latest virus definitions from Symantec or McAfee, on employees' hard drives. Files download more quickly when

cached locally, and using employee hard drives will save money on server storage while preserving precious bandwidth. Tools like Groove (www.groove.net) employ file sharing, instant messaging, voice transmission, and more to help far-away colleagues collaborate on projects. Collaborative search software like Open-Cola Folders (www.opencola.com) will let consumers stream content recommended by users who share their interests—a faster, smarter way to roam the Web. **When's it coming?** Apps are here now, but it will be a few years before peer-to-peer networking is broadly adopted. **What's the catch?** Network administrators who hate decentralization see peer-to-peer apps as sources of security and administration headaches. **Impact meter:** 5

CHIP MAKING

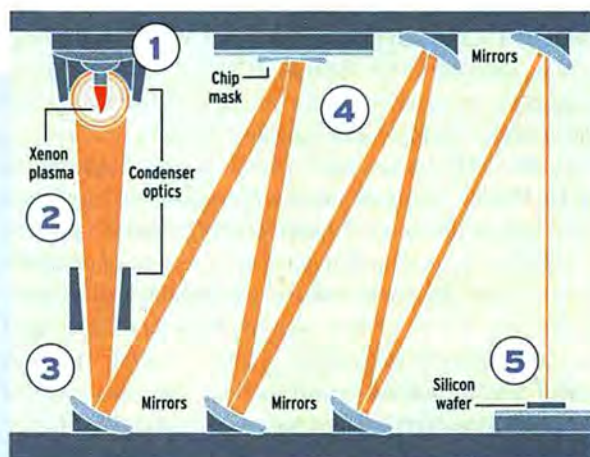
To 10 GHz and Beyond

EXTREME ULTRAVIOLET

LITHOGRAPHY: What is it? A way to make processors that are up to 100 times faster than today's chips. **What's cool?** Even Moore's Law eventually gets trumped by the laws of physics. In a few years, the current method of packing ever greater numbers of transistors onto a chip will hit a wall. But a technology called Extreme Ultraviolet Lithography may break that barrier. Intel estimates that EUVL chips will boast 400 million transistors—about ten times more than the Pentium 4's 42 million. **When's it coming?** In three to five years. **What's the catch?** Software that's capable of taking advantage of all this processing muscle is nowhere in sight. **Impact meter:** 8

How It Works: Chip makers create today's processors by focusing ultraviolet light—first through a mask (which acts like a photograph negative) and then through quartz lenses—to carve circuits one-fourth the size of the mask into a silicon wafer. Chip makers have made circuits smaller and faster by using light with progressively shorter wavelengths. But when light waves get too short, they are absorbed by the lenses, as well as by the air. The solution? In a vacuum, use specially constructed concave mirrors, instead of lenses, to reflect and focus extreme ultraviolet light.

- 1 A high-energy laser is concentrated on a jet of xenon gas, creating plasma.
- 2 The xenon plasma emits a powerful glow of ex-



treme ultraviolet light with a wavelength of 13 nanometers—one-thirtieth the wavelength of violet visible light.

- 3 A condenser gathers the light and directs it toward the mask, which contains a stencil image of the circuit pattern on a mirror.
- 4 The image of the circuit pattern reflects off the mask mirror and then off a

series of four to six concave mirrors, which reduce and sharpen the image and then project it onto a silicon wafer coated with a light-sensitive material (called a resist).

- 5 Wherever the light hits it, the resist hardens, shaping the circuit. A chemical wash removes the unhardened resist material, exposing the silicon beneath.



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The See-Through PC

TFT Computers

What is it? Computers that can fit on a pane of glass.

What's cool? Portable

computers not much larger than their displays—namely, much smaller handhelds, tablet PCs, and notebooks. Manufacturers have been attaching low-speed circuits to glass for years—that's the basis of every thin-film transistor notebook screen. But LCD makers have been unable to put high-speed chips onto devices without heating the glass past its melting point. Now engineers at Fujitsu have found a way to affix microprocessors and fast circuits to LCDs at lower temperatures. **When's it coming?** Fujitsu expects to ship integrated processors and memory on glass by 2003. **What's the catch?** At press time, Fujitsu had yet to create glass sheets large enough to sell to manufacturers. **Impact meter:** 6

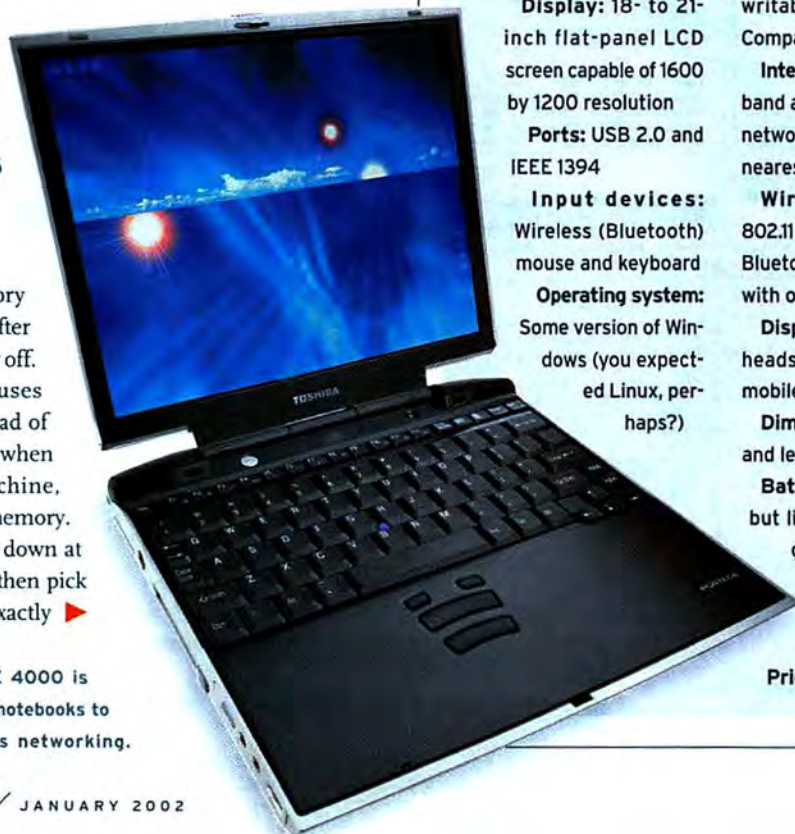
Data Magnet

Magnetic RAM

What is it? Fast memory that retains data even after you've turned the power off.

What's cool? MRAM uses magnetic charges instead of electricity to store bits; when you turn off your machine, your data remains in memory. You'll be able to power down at the end of the day and then pick up the next morning exactly ▶

TOSHIBA'S PORTÉGÉ 4000 is one of the first U.S. notebooks to integrate wireless networking.



FUTURE PC SPECS

2004: Your Next PCs

YOUR DESKTOP PC IN

2004: Two years from now, your desktop system will be slimmer and trimmer. Flat-panel screens will replace bulky CRTs, and rewritable-DVD drives and fast graphics subsystems will turn your PC into a movie lover's dream.

CPU and RAM: 4- to 5-GHz microprocessor with 512MB of DDR memory and a 600-MHz system bus

Hard disk: From 300GB to 400GB on a Serial ATA bus

Removable storage: Rewritable DVD and—yes—the unsinkable 1.44MB floppy

Internet connection: Cable or DSL broadband if you're lucky; 56-kbps modem if not

Video: 3D graphics card with 128MB of video RAM

Display: 18- to 21-inch flat-panel LCD screen capable of 1600 by 1200 resolution

Ports: USB 2.0 and IEEE 1394

Input devices: Wireless (Bluetooth) mouse and keyboard

Operating system: Some version of Windows (you expected Linux, perhaps?)

Other: An 802.11b wireless network designed for users with more than one PC
Price: \$1500 to \$2000

YOUR NOTEBOOK PC IN

2004: By 2004 a notebook will be many users' only PC. These mobile monsters will have the power to replace desktops, but will stay slender enough to tuck into a briefcase. Screens won't get much larger than 15 inches, though—any bigger and you would lose portability—and battery life will improve, but not as much as most users would like.

CPU and RAM: 2- to 3-GHz chip with 256MB of RAM

Hard disk: 60GB to 80GB with Serial ATA interface

Removable storage: Rewritable DVD; some form of CompactFlash card

Internet connection: Broadband access through wireless networks in your office or the nearest Starbucks

Wireless technologies: 802.11 for connecting to a LAN; Bluetooth for communicating with other devices

Display: 15-inch LCD; video headset accessory for truly mobile (and private) work

Dimensions: 2 to 3 pounds and less than 1 inch thick
Battery: No fuel cells yet, but lithium ion units will be good for 5 to 10 hours of life per charge

Operating system: Windows

Price: \$2000 and up



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“I think we'll see a much greater variety of hybrid devices. It will be like, 'Did you get chocolate in my peanut butter or peanut butter in my chocolate?' Did the PDA become a cell phone or did the cell phone turn into a PDA?”

—Phil Pampa, Alchemy Semiconductor

where you left off—giving your system “instant-on” capability. Unlike traditional memory chips, MRAM doesn't require a constant flow of electricity to retain data. That means big power savings for portable devices. It's also faster and sturdier than flash memory. **When's it coming?** MRAM will start to appear in 2004. **What's the catch?** It needs to be cheaper and offer more storage capacity than DRAM—and it ain't there yet. **Impact meter:** 8

Present and Accounted For

Presence Technology

What is it? A way to find people on the Net. **What's cool?** Call it the end of phone tag. Presence technology will let you know when your friends are logged on and what Internet device each is near—a PC, a PDA, or a even cell phone. Some presence apps will figure out which device you're using and then choose the best medium for the message: video if you're at your PC, text if you have your Palm, audio if you're in your car. The GPS technology built into some mobile devices may let you pinpoint a person's location within 30 feet. **When's it coming?** Throughout the upcoming year. **What's the catch?** Want to be left alone? You may have to pay for the privilege, just as you do to block Caller ID or to keep your phone number unlisted. **Impact meter:** 7

It Keeps Going and Going and Going...

Fuel Cells

What is it? An endlessly renewable power source for portable devices. **What's cool?** Imagine notebooks that work 20 hours at a stretch or cell phones that never run out of juice. Both may be possible thanks to new developments in fuel cells. The Fraunhofer Institute in Germany has built prototype handhelds that use solar panels to recharge a tiny hydrogen fuel cell. New York-based Medis Technologies says it has developed a fuel cell for cell phones and laptops that uses ethanol and water—a safer and cheaper alternative to hydrogen. Meanwhile, researchers at Motorola and Los Alamos National Labs are developing a methanol fuel cell that's about the size of a postage stamp. **When's it coming?** One to three years for initial products. **What's the catch?** The first fuel cells could be pricey, and they run hot and expel waste. You'll need to replace the fuel periodically, too. **Impact meter:** 6

DIGITAL CAMERAS like Sony's 5-megapixel DSC-F707, are closing in on the quality of film cameras.

The World's Biggest Brain

Distributed Computing

What is it? A way to share computing resources across a network. **What's cool?** For the past few years, researchers have linked supercomputers across the Net to collaborate on divining the origins of the cosmos or predicting the weather. Companies like IBM and Sun aim to bring that kind of computing power to your desk. Soon, IT departments will be able to send computationally intensive problems to a grid of computers—a relatively inex-

DIGITAL CAMERAS

Multiplicity of Megapixels

NEW CAMERAS: What is it?

Digital cameras that start to rival film cameras' output. **What's cool?** Camera makers continue to increase resolutions, making for sharper, more detailed digital photos. Meanwhile, companies like Sony and Minolta continue to increase the bit depth digital cam-

eras use to capture color values. That should help render more-subtle highlights and shadows. Once it's ready, you can expect OLED technology to make its way into camera viewfinders, where power savings over standard LCDs will boost battery life. **When's it coming?** Cameras that offer 5-megapixel resolution are here now, and manufacturers are already increasing bit depth beyond 32 bits. Expect prices for 4- and 5-megapixel models to come down to more reasonable levels over the next year. **What's the catch?** Most people don't need more than 3.3 megapixels. Resolutions may start to climb slowly as fewer people need the added detail provided by higher resolutions. **Impact meter:** 5





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“Windows XP... is going to turn every PC into a real-time communications device. If you're about to e-mail someone an Excel spreadsheet, Windows could detect if they're online at the moment and give you the option to instant-message them instead.” —Jeff Pulver, *The Pulver Report on Presence and Instant Messaging*

pensive alternative to investing in new computers. Millions of consumers already use distributed apps like the SETI@Home screen saver. **When's it coming?** Some apps are already here, but large-scale deployment is several years away. **What's the catch?** Building grid “server farms” could cost billions. **Impact meter:** 3

Guided by Voices

Voice Portals

What is it? Voice-driven Web sites. **What's cool?** Next time you call your bank or your travel agent, that pleasant-sounding woman who answers the phone may be a Web server. Voice portals running high-end speech recognition and text-to-speech software will let you browse the Web and check your e-mail by phone more easily, as well as get information from financial service centers, airlines, and directory assistance. Thanks to advances such as AT&T's Natural Voices software, computer voices will sound much more like people. The software's “voice fonts” let application vendors create different accents, languages, and moods, or even mimic celebrities. **When's it coming?** Initial deployment has begun; widespread use is expected in three to five years. **What's the catch?** Speech recognition isn't 100 percent accurate, and on-the-fly synthesis still sounds a bit robotic. **Impact meter:** 6

May We See Some ID, Please?

Electronic Wallet

What is it? A single storehouse for personal and financial data. **What's cool?** With all your information in one place, you'll be able to buy anything on the Web with a single click, or check your schedule from any Net-connected device. But first you may have to show your Passport. Microsoft's scheme for verifying user identities, Passport is central to the company's upcoming .Net My Services initiative, which will encompass e-mail, an address book, a scheduler, a wallet, and other Net-based services. Although the concept of online IDs isn't new, the release of Windows XP may make them unavoidable. Want to use XP's Messenger or Net telephony features, log on to Hotmail, or buy a Microsoft e-book? You'll have to sign up for Passport. **When's it coming?** Passport's already here, and .Net My Services and competing schemes are due later in 2002. **What's the catch?** Do you really trust the Redmond Giant to safeguard your information? Privacy watchdogs don't—they've filed suit to alter key provisions of Microsoft's plan. **Impact meter:** 8

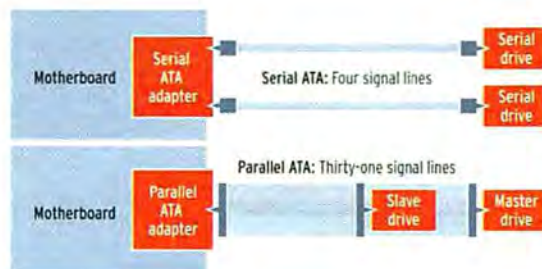
Contributing Editor Daniel Tynan lives in Wilmington, North Carolina, where nothing could be finer.

STORAGE

A Serial Thriller

SERIAL ATA: What is it? A faster interface for disk drives. **What's cool?** Speed, baby. The serial ATA interface is capable of transferring up to 600MB of data per second—six times the rate of the current parallel ATA interface. That should keep data flowing smoothly to your CPU for years to come. Serial ATA can operate at lower voltages, which becomes necessary as low-voltage microprocessors become standard. It

also uses longer, thinner cables that won't block airflow inside the system case, which lets systems run cooler and allows PC makers to build more-compact desktops and notebooks. The chart here illustrates how it compares with today's standard. **When's it coming?** The first half of 2002. **What's the catch?** It requires more motherboard electronics than parallel devices do, increasing initial system costs. **Impact meter:** 9



FEATURE	Parallel ATA-100	Serial ATA
Data transfer speed	100 MBps (burst mode)	150 MBps to 600 MBps
Maximum cable length	18 inches	3 feet
Number of signal pins	26	4
Minimum voltage	5 volts	500 millivolts
Drive bandwidth	Shared	Dedicated

Here's a concept: The best person to determine what goes into a PC
is the person that will actually be the one using it.



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Dell | Home Notebooks



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¹³Prices, specifications and availability may change without notice. Taxes and shipping charges extra, and vary. Valid for U.S. Dell Home Systems Co. new purchases only. ¹⁴For a copy of our guarantees or Limited Warranties, write Dell USA LP, Attn: Warranties, One Dell Way, Round Rock, Texas 78682. ¹⁵At-Home or On-Site Service provided via third-party contract with customer. Technician will be dispatched as necessary.



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- 48X Max CD-ROM Drive
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- NEW 64MB NVIDIA® GeForce2 MX Graphics Card with TV-Out
- 16X Max DVD-ROM Drive
- 16X/10X/40X CC-RW Drive with Roxio's Easy CD Creator®
- SB Live! 1024V Digital Sound Card
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Recommended upgrade:

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Dell | Standard Features

Each DELL system shown here has a number of standard features, including:

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- Inspiron™ Notebooks shown here include 1-Yr Mail-In Service†, 1-Yr Limited Warranty†, 1-Yr 24x7 Phone Support

Dell | Solutions

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- Epson® C80 Color Printer, \$179
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- Lexmark® All In One Print Center, \$199
- HP® 318 Camera, \$199

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How about some peace of mind to accompany your new Dell™ system?

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Inspiron™ Notebook Service Upgrades:

- Upgrade Inspiron™ Notebooks with 1-Yr Ltd Warranty† and 1-Yr Mail-In Service to: 3-Yr Ltd Warranty†, 3-Yr Next-Business-Day On-Site Service† and 24x7 Lifetime Phone Support, add \$219

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WHY choose between great photos & crisp text?

We test 16 ink jets and find models that do it all at the right price. **BY DAN LITTMAN**

IS THE ONE-HOUR film lab down the street too slow for you? With a digital camera and a low-cost ink jet printer, you can enjoy instant gratification: Snap pictures during a dinner party and print digital images as guests nibble on dessert. More than ever, an ink jet printer can turn your PC into a surprisingly effective digital photo mart.

Keeping an ink jet handy to print your own snapshots offers advantages over sending a roll of film off to a lab: You can use a graphics application to clean up images before printing them, and resize and combine them in layouts any way you want. ►



LEXMARK Z43

EPSON

STYLUS C80

ALL-PURPOSE ALL-STARS:
Lexmark's Z43 Color Jetprinter (top)
and Epson's Stylus C80 (below).

And best of all, you don't have to pay for the images that you don't like.

Unless you're a professional photographer, however, photos won't be the only files you'll need to print. Some printers are marketed as being designed especially for photos, while others are supposed to be general-purpose units. Most photo-oriented ink jets do a respectable job of printing letters, spreadsheets, and so on; and many ordinary ink jets print photos pretty darn well. We tested 16 ink jet printers for this review, 13 of which were tagged as general-purpose printers. Of these 13 printers, our panel of image-quality judges gave 9 a photo-quality rating of Good or better. The remaining 3 units were designated as photo printers; these models rated higher for photos, but they cost more. Because they differ substantially from nonphoto models, we did not rank the photo-specific printers in our chart, but at find.pcworld.com/16801 you can read reviews of them.



FROM TOP:
Lexmark Z53,
Canon S600, and
Canon S300.

FEATURES COMPARISON

TOP 10 ink jet printers

	INK JET PRINTERS	Street price (10/26/01)	Overall rating	Vendor's rated speed for mono-chrome/color (ppm)	Tested speed for plain text/full-page graphics (ppm)	Maximum resolution	Print quality for text	Print quality for graphics	Print quality for photos
1	Best Buy Epson Stylus C80 find.pcworld.com/16660	\$179	93	12/5	6.9/1.5	2880 by 720	Adequate	Good	Very good
2	Best Buy Lexmark Z53 Color Jetprinter find.pcworld.com/10560	\$130	92	16/8	5.9/0.6	2400 by 1200	Good	Very good	Adequate
3	Lexmark Z43 Color Jetprinter find.pcworld.com/10561	\$100	91	12/6	4.6/0.6	2400 by 1200	Good	Good	Adequate
4	Canon S600 Color Bubble Jet Printer find.pcworld.com/10568	\$149	90	15/10	6.2/0.7	2400 by 1200	Very good	Good	Good
5	Canon S300 Color Bubble Jet Printer find.pcworld.com/16641	\$99	87	11/7.5	5.1/0.8	2400 by 1200	Very good	Good	Good
6	Canon S500 Color Bubble Jet Printer find.pcworld.com/16644	\$149	85	12/8	5.8/0.7	2400 by 1200	Good	Very good	Very good
7	Epson Stylus C60 find.pcworld.com/16647	\$99	84	12/8	5.6/1.4	2880 by 720	Adequate	Adequate	Good
8	HP Deskjet 940c Color Inkjet Printer find.pcworld.com/16681	\$149	80	12/10	4.7/0.7	2400 by 1200	Good	Good	Good
9	HP Deskjet 845c Color Inkjet Printer find.pcworld.com/16680	\$99	79	8/5	3.8/0.5	600 by 1200	Adequate	Good	Very good
10	Lexmark Z33 Color Jetprinter find.pcworld.com/16682	\$80	71	8/5	3.8/0.5	1200 by 1200	Good	Very good	Adequate

The 13 all-purpose ink jets—all from Canon, Compaq, Epson, Hewlett-Packard, or Lexmark—range in price from \$80 for Lexmark's Z33 Color Jetprinter to \$399 for HP's Color Inkjet Cp1160. Why such different prices? It's partly output speed: In our tests, these models printed text anywhere from 3.8 pages per minute to 6.9 ppm, and showed an even greater spread in graphics—from 0.3 ppm to 1.5 ppm. But the biggest distinctions are in print quality. Epson's Stylus C80 printed beautiful photos but slipped on text, while HP's Cp1160 delivered great output in several categories. (Despite its print quality and attractive features, the latter's steep \$399 price kept it off our chart.)

PHOTO INK JET PRINTERS

WHAT DISTINGUISHES an ordinary ink jet from a photo ink jet? To a degree, it's the brains under the hood—how precisely the printer and its drivers translate the camera's data into instructions for the

BEST buy ink jets

Best BUY EPSON'S STYLUS C80 is a high-quality photo-printing system disguised as an inexpensive home printer. At \$179, it costs only about \$55 more than the average ink jet printer in this roundup, but its photo image quality

nearly matched that of the much pricier photo-specific models we tested. For home office users who print mostly text and graphics, along with the occasional photo, the Lexmark Z53 (our number two Best Buy) is a fine choice. Text output from this \$130 ink jet appeared bright and clean; it also printed crisp parallel lines and detailed color graphics.

printer's ink sprayers. In addition to the traditional cyan, magenta, yellow, and black inks, some photo printers include dilute (as well as regular) versions of cyan and magenta to place more ink dots on the paper, producing richer colors and more accurate highlights in the final output than can be obtained with four inks.

Another, not-so-obvious distinction between the two types of printers involves the inks they use. Photo printers typically employ pigment-based inks, rather than

the dye-based inks in most ordinary ink jets. For the first time, pigmented inks have made their way into a non-photo-specific printer, Epson's Stylus C80, which captured first place on our chart. See "Secrets to Print Longevity," page 86, to learn more about advances in photo inks and ink jet photo papers.

The photo printers that we tested for this review also differ from each other. Canon's S800 Color Bubble Jet Printer, which costs \$300, uses a six-ink engine to produce photos and has a CompactFlash reader. The \$199 Epson Stylus Photo 785EPX sports a PC Card slot and an adapter for reading memory cards. You can attach an optional \$99 miniature screen to view, modify, and group photos without a PC. Meanwhile, HP's \$399 Photosmart 1315 Color Inkjet Printer comes with an infrared receiver for printing from infrared-equipped notebooks and cameras; a built-in LCD screen; and slots that read CompactFlash, SmartMedia, or Sony Memory Stick cards.

One surprise: Photo printers print regular text noticeably slower than ordinary ink jets: Our three photo units averaged 3.1 pages per minute, while the 13 all-purpose models averaged 5.3 ppm. (Both types averaged about 0.8 ppm for graphics.)

PRINT TESTS

TO RANK the printers, we judged text, line-art, graphics, and photo output from each, using the manufacturer-recommended paper and inks. We used plain paper for all nonphoto

	Input/output capacity (sheets)	Cost per page for monochrome/color (cents)	Comments
	150/30	3.8/12.5	The lightning-fast Stylus C80 uses pigment-based inks, so photos should last longer than those from other printers on the chart. ★★★★★
	100/50	5.1/18.9	The Z53 printed text considerably faster than the Z43, but is otherwise very similar. Colors appeared too bright in photo tests. ★★★★★
	100/50	5.1/18.9	The Z43 delivered clean text; crisp, narrow parallel lines; and detailed, realistic color graphics. Photos were washed out and somewhat fuzzy. ★★★★★
	100/50	2/10.7	The S600 produced clean text in our tests. Though dark in places, color graphics showed subtle shading and good detail. ★★★★★
	100/50	2.3/12.1	The S300's text output quality was clean with fine details. Photo output looked good, though slightly washed out. ★★★★★
	100/50	2/10.7	Canon bundles digital photo album and panoramic photo-stitching software. Graphics quality ranks among the best. Photos showed good detail. ★★★★★
	100/30	5/15	The Stylus C60 printed subtle details quite well in test photos. Photos looked good, but showed a slightly red cast. ★★★★★
	150/50	6/13.8	Gray-scale images looked wonderful in our tests; glossy photos displayed great detail and texture, but were too dark. ★★★★★
	100/50	6/13.7	Unit delivers smooth, detailed gray-scale images and superb highlights and shadows on photos. A bit slow, but an excellent option for inexpensive photo printing. ★★★★★
	100/50	7/18.6	Text looked clean and evenly weighted, though its grayish tone lacked the punch of some black inks. Photos were grainy and fuzzy. ★★★★★

tests and photo paper for photos. We timed how long each unit took to produce prints and factored in price, ease of use, features, support policies, and cost of ink.

Several models produced attractive prints, but the Epson Stylus C80 outshined the rest. It was the fastest printer we tested—at both text and graphics—by a healthy margin, and its photo output rivaled that of the photo-specific printers. Nevertheless, other printers, such as the Canon S600 and S300 Color Bubble Jet printers, produced better text.

A note on speed: We previously tested printers over parallel connections. For this story, we retested all units over USB connections, and they posted much better performance numbers, in some cases printing graphics three times as fast.

1 Epson Stylus C80

Best Buy **WHAT'S HOT:** First, speed. The Stylus C80 tops the chart at 6.9 ppm for text and 1.5 ppm for graphics. We liked the good shading and lighting of its color graphics, and glossy photos looked luscious, with realistic detail and textures. Epson also cuts you some slack on ink costs, at only 3.8 cents per page for black and 12.5 cents per page for color. Because the Stylus C80 uses pigment-based inks instead of dye-based ones, photos are less susceptible to the effects of light, humidity, and air pollution—and therefore should last much longer.

WHAT'S NOT: The Stylus C80 produced pale, rough text. In our line pair tests, it made narrow parallel lines that overlapped into a pinstripe pattern.

WHAT ELSE: The Stylus C80's boxy, oddly attractive shape bears a passing resemblance to a toaster oven, but the unit feels sturdier than most low-cost printers.

UPSHOT: This \$179 unit makes a fine choice for high-volume home-office printing, and it doubles as a great photo printer.

2 Lexmark Z53 Color Jetprinter

Best Buy **WHAT'S HOT:** At a zippy 5.9 ppm, the Z53 Color Jetprinter printed text considerably faster than its Z43 sibling in tests, but otherwise the two per-



FROM TOP:
Epson Stylus C60,
HP Deskjet 940c,
Canon S500.

formed similarly. In fact, we could barely tell their black-and-white print samples apart, though the Z53's color prints were slightly better on detail and shading.

WHAT'S NOT: Lexmark's price for black ink is 5.1 cents per page of text, and color prints are a daunting 18.9 cents each.

WHAT ELSE: The Z53 produced lackluster photos in tests. When we used photo paper with ordinary inks, however, we got some attractive photos.

UPSHOT: Home-office users looking for an inexpensive, speedy text printer will find value in this \$130 model.

3 Lexmark Z43 Color Jetprinter

WHAT'S HOT: The Z43 Color Jetprinter bags third place thanks to its low \$100 price tag and consistent output. In our tests, the printer delivered clean text; crisp, narrow parallel lines; and detailed, realistic color graphics.

WHAT'S NOT: There's no bypass feed for printing a single envelope or sheet of letterhead without emptying the paper tray. In addition, the output tray seems flimsy.

Earning a score of Adequate in our photo tests, the Z43's photo prints looked a bit fuzzy and washed out. The Z43's ink costs are the same as those for the Z53: 18.9 cents per page of color and 5.1 cents for text. Lexmark sells a specialized photo ink cartridge for the Z43, but even using that cartridge's inks failed to yield great results on our photo test.

WHAT ELSE: The Z43's speed scores of 4.6 ppm for text and 0.6 ppm for graphics were a tad slow.

UPSHOT: This model is a good deal for anyone who wants high-quality text output. For photos, another printer on this chart would be a better choice.

4 Canon S600 Color Bubble Jet Printer

WHAT'S HOT: Canon's \$149 S600 produced clean, attractive text and accurate narrow parallel lines in our tests. Color graphics showed subtle shading and good detail, though they were dark in places. In photos, we saw lifelike flesh tones with realistic highlights and shadows. The

S600 printed text at a zippy 6.2 ppm and graphics at 0.7 ppm. Its ink costs tie with those of the S500 as the lowest on the chart, at 2 cents a page for black text and 10.7 cents per page for color. The separate ink tanks each have a low-ink sensor that alerts you when the well is almost dry.

WHAT'S NOT: The S600 had trouble with gray-scale graphics: Output was unappealingly gritty and dotted, with an occasional missing line that left a white stripe across the image.

WHAT ELSE: The driver packs special features, such as a duotone effect to simulate old-fashioned sepia, and a way to combine your document with any external image file—for example, stripes, photos, even a scan of a business form—to give the appearance of stationery. The software CD includes panoramic stitching and digital photo album software.

UPSHOT: A reasonable price tag and modest ink costs make the Canon S600 a good choice for the frugal, but its fast text printing means that you can use this model in the home office, too.

5 Canon S300 Color Bubble Jet Printer

WHAT'S HOT: Canon priced the S300 at only \$99, yet gave it enough oomph to churn out text at a speedy 5.1 ppm and graphics at 0.8 ppm. And despite the low buy-in, ink costs only 2.3 cents per page of black and 12.1 cents per color page. We also liked the S300's text output quality, which was clean throughout and preserved serifs and other fine details.

WHAT'S NOT: Photo output looked good, although slightly washed out with some feathering on the edges. However, the S300 did not fare particularly well on our test file of narrow lines, and it rendered rough-looking, streaked gray-scale graphics with little detail. The unit also makes a racket, even when idle.

WHAT ELSE: Canon provides an excellent online manual with wizards. This printer offers only a USB connector—you won't find serial or parallel connectors. The software CD-ROM includes PhotoRecord digital photo album software. ▶

PRINT SAMPLES

TEXT photos & graphics

This is 5 point text
This is 6 point text
This is 7 point text
This is 8 point text
This is 9 point text
This is 10 point text
This is 11 point text
This is 12 point text



HP Cp1160: This printer's \$399 price may have kept it off the chart, but its output for text, photos, and graphics was by far the best. Multisized fonts appear sharp, even at small sizes. The pilot's eyes and owl's feathers show an impressive amount of detail.

This is 5 point text
This is 6 point text
This is 7 point text
This is 8 point text
This is 9 point text
This is 10 point text
This is 11 point text
This is 12 point text



Epson C80: Even though it earned a score just below the Cp1160's, this model's realistic details and shading in photos make it a great bet for penny-pinching photogs. We weren't as impressed with the pale, rough text on our page of multisized fonts.

This is 5 point text
This is 6 point text
This is 7 point text
This is 8 point text
This is 9 point text
This is 10 point text
This is 11 point text
This is 12 point text



Canon S600: Photos looked generally good, with lifelike flesh tones and realistic highlights and shadows. Clean, attractive text also caught our eye. We did, however, notice a grainy effect on photos and a slight halo on the pilot's helmet.

This is 5 point text
This is 6 point text
This is 7 point text
This is 8 point text
This is 9 point text
This is 10 point text
This is 11 point text
This is 12 point text



Lexmark Z43: Text is what this Lexmark handles best. The unit also excelled at color graphics, where output was realistic and detailed. But as the grainy photo shows, this inexpensive model does not perform as strongly on photo printing.

UPSHOT: The S300's low purchase price plus its reasonable ink costs equal a great value for this all-purpose printer.

6 Canon S500 Color Bubble Jet Printer

WHAT'S HOT: The S500's graphics quality ranks among the best on our chart. We especially liked the great detail and realistic highlighting and textures of photos

on glossy paper. Another advantage: cheap ink. With this printer, your cost is only 2 cents per text page and just 10.7 cents per page of color graphics—the S500 ties its cousin the S600 as the least-expensive model on our chart to operate. Over its USB connection, the S500 also performed quickly, delivering text at 5.8 ppm and graphics at 0.7 ppm.

WHAT'S NOT: The ink bled somewhat on

our text samples, and letters appeared slightly jagged in places. Though the paper trays look sturdy, they fall off if you bump them accidentally.

WHAT ELSE: The S500 sports a parallel port for legacy PCs. Its useful software bundle includes Canon's PhotoRecord digital photo album software and Photo-Stitch for combining several side-by-side photos into one panoramic image. ▶

FADE TESTS

IF YOU'VE EVER stuck a print of a digital photo on your refrigerator, you've likely seen it fade quickly. That's because sunlight, fluorescent light, air pollution, and humidity all take a toll on digital prints. So what's the secret to making those prints last?

Keeping photos framed under glass, instead of tacked onto the fridge, offers some protection. Photo longevity also depends on the ink you use. Most photo printers—and a few lower-priced general-purpose ink jets, such as Epson's C80—use pigment-based inks, which contain small, waterproof color flecks that make the inks more fade-resistant than the water-soluble, dye-based inks that typically last only six months to a year without fading.

PICKING PERFECT PAPER

PAPER IS ANOTHER important factor in print longevity. Though there are many different kinds of paper, most fall into either of two groups: porous and nonporous. Nonporous (sometimes called swellable polymer) coatings are composed of ozone-resistant polymer materials, but ink takes longer to dry on them. Microporous coatings, on the other hand, suck up ink like a sponge. The paper dries almost instantly because inks are absorbed into the surface and are held there, but they never completely seal. Microporous paper is so absorbent that it's more susceptible to fading from harmful light and ozone.

Vendors optimize their printers for specific kinds of paper and ink—usually their own proprietary blend—so if you use paper other than what's recommended, your prints may fade quickly.

"Papers that are designed to be compatible with all brands of printers suffer from serious design constraints," says Henry Wilhelm, founder and president of Wilhelm Imaging Research. "These papers can't be optimized any particular printer. Unless there

SECRETS
to print longevity
revealed



is specific information on the permanence [of prints] on the paper, you are really flying blind."

LONGEVITY TESTS

WILHELM'S LAB derives the longevity of glass-filtered and unprotected papers and inks by conducting accelerated light exposure tests that simulate typical fluorescent-lit indoor display conditions. By putting prints in a controlled environment and increasing the amount of light a typical room would receive in a day, Wilhelm can induce fading, changes in color balance, and staining normally occurring over months or years of display.

In his tests, prints made with Epson's C80 printer, using Epson's Dura-Brite pigmented inks and Archival Matte Paper, were extremely lightfast, lasting up to the equivalent of 70

years on display before any fading occurred.

Prints from HP's Deskjet 970, when used with that company's Colorfast Photo Paper and HP cartridge number 78 dye-based inks, can last 18 to 20 years when displayed under glass, says Wilhelm, and 10 to 13 years without glass (about the same longevity as prints from the silver halide film used in a traditional camera).

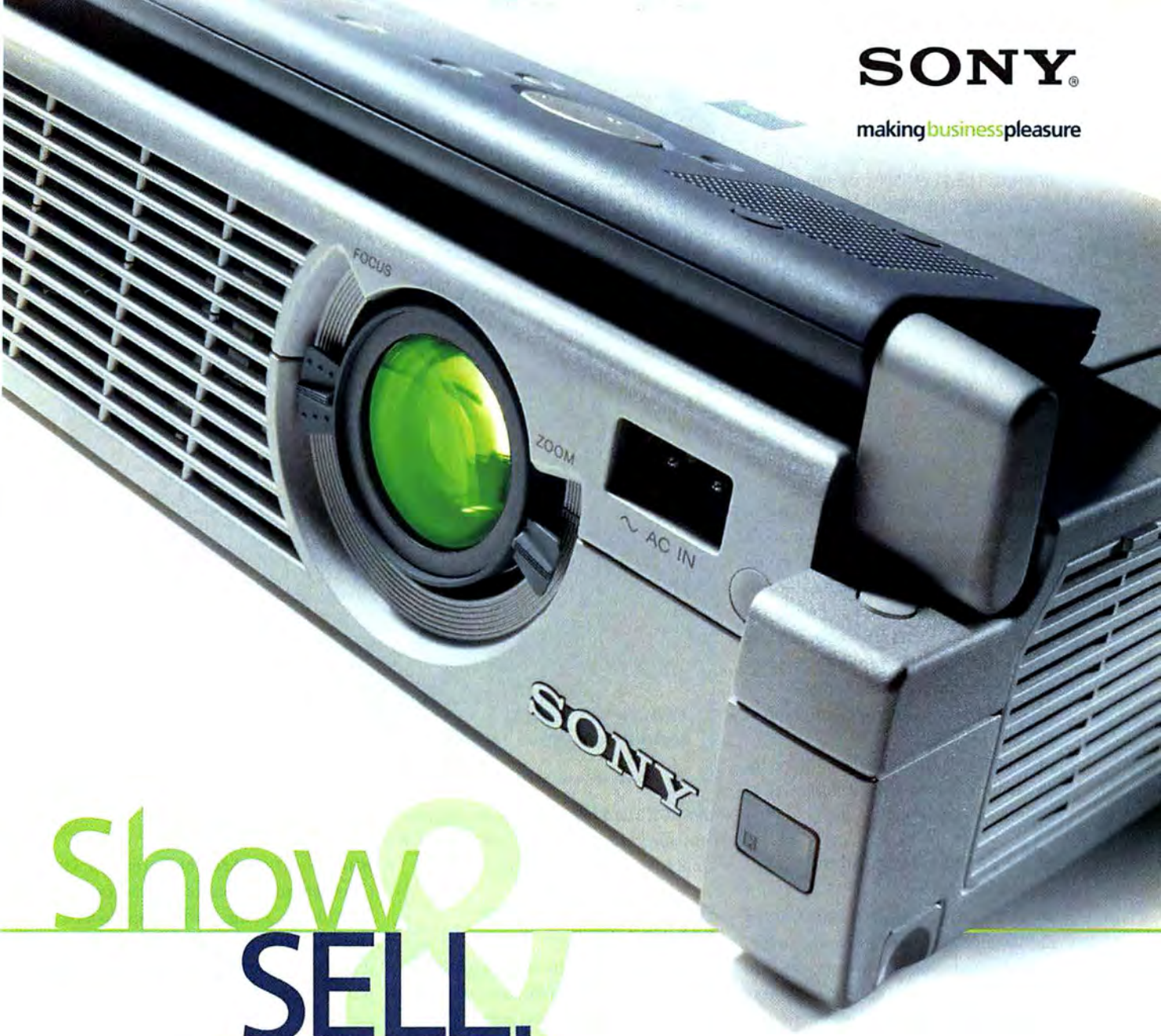
On the other end of the spectrum, consider Wilhelm's tests of the now-discontinued Lexmark Z51 Color Jetprinter with its 12A1990 Photo inks and Lexmark Photo Paper (one introduced in 1998 and another in 1999). The 1998 paper showed noticeable fading after the equivalent of two to three years, while its 1999 paper showed fading occurring in less than a year.

Lexmark has developed new inks for the Z23 and Z33 Color Jetprinters that it says last longer, but it hasn't made claims about archivability. Wilhelm is currently conducting longevity tests.

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UPSHOT: The \$149 S500's combination of print quality and ink value makes it well suited for personal use, but its middling text quality may deter business users.

7 Epson Stylus C60

WHAT'S HOT: The Stylus C60's blazing graphics speed (1.4 ppm) tops that of all other recent ink jets except its bigger sibling, the Stylus C80, and it prints text at the rapid clip of 5.6 ppm—an impressive rate for a \$99 machine. We also liked its subtly detailed, glossy photos.

WHAT'S NOT: Most of the C60's print results didn't wow us: Text was marked with hatching along the edges and exhibited a slight waver or wiggle; narrow parallel lines printed with a patchwork pattern. Gray-scale images looked grainy and lacked shading; and even color graphics failed to capture detail and texture.

WHAT ELSE: Color ink costs run high at 15 cents per page.

UPSHOT: The C60 won't win converts for most forms of output, but it works well as a penny-pincher's photo printer.

8 HP Deskjet 940c Color Inkjet Printer

WHAT'S HOT: The Deskjet 940c printed narrow lines well, and gray-scale images looked wonderful in our tests, even on ordinary paper. Graphics and glossy photographs retained fine detail and texture, but graphics had too much cyan and glossies were somewhat dark. A superb online manual includes informative animations. The driver's handy graphics mode makes graphics legible for copying or faxing.

WHAT'S NOT: HP provides a miserly 90-day limited warranty with only 30 days of telephone support and no toll-free number. We rated the printer's speed as average, at 4.7 ppm for text and 0.7 ppm for graphics in tests. Output text looked grayish, and large letters showed minor hatching around the edges.

WHAT ELSE: An \$80 duplexer lets you print on both sides of a page. HP's black ink costs a steepish 6 cents per page; color prints are a reasonable 13.8 cents each.



FROM TOP: Lexmark Z33 and HP Deskjet 845c.

UPSHOT: The \$149 price is right, and performance and print quality are fine, but a chintzy warranty gives us pause.

9 HP Deskjet 845c Color Inkjet Printer

WHAT'S HOT: Despite its \$99 price, the Deskjet 845c delivers impressive-quality output: smooth, detailed gray-scale and color graphics, plus superb highlights and shadows on glossy photos. It even does well on narrow parallel lines. The Deskjet 845c's power supply, though enormous, has unusually long cords on both ends so you can stow this printer under a desk.

WHAT'S NOT: Text pages printed at a leisurely 3.8 ppm in our tests. Most other units we tested outperformed the 845c's speed of 0.5 ppm on graphics. Black ink is pricey at 6 cents per page; color ink runs 13.7 cents per page. HP covers the 845c with a very short 90-day warranty.

WHAT ELSE: HP includes a great online manual. The 845c supports USB only.

UPSHOT: Despite its slow printing speeds, HP's Deskjet 845c provides top-notch graphics quality for the money.

10 Lexmark Z33 Color Jetprinter

WHAT'S HOT: At \$80, the Lexmark Z33 Color Jetprinter is one of the least expensive ink jets on the market. Text looked clean and evenly weighted in our tests, though its grayish tone lacked the solid punch of some black inks. Graphics looked better, with bright, realistic colors and subtle shading.

WHAT'S NOT: The Z33's ink costs are steep at 7 cents per black text page and 18.6 cents per graphics page. Photos looked attractive on glossy paper. The unit ran slowly: Text came out at 3.8 ppm and graphics at 0.5 ppm. The Z33 has only a USB port—no parallel port.

WHAT ELSE: The printer's driver features an interesting innovation: On-screen flags stick out from each tab to display a summary of all the settings you've selected.

UPSHOT: The Z33's price is attractive, but ink costs may catch up with you later. ■

Dan Littman is a contributing editor, and Alexandra Krasne is an associate editor, for PC World.

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NEW WEB SURVIVAL GUIDE

Hard times for dot coms mean tough choices for users. Here's how to make the most of the Net ahead.

BY GLENN McDONALD ILLUSTRATIONS BY DAN PICASSO



Well, it was a good long ride.

But events of the past year have left a lot of bumps and potholes on the information highway, with the final results still to be determined. As the economy continues to weed out bad ideas, poorly executed business plans, and unrealistic expectations, we're beginning to see road signs for the landscape ahead. Instead of "Next stop: Dougey's Diner. Eat free—in exchange for your personal information!" the signs say, "All you can eat—in exchange for as much of your cold, hard cash as we can charge."

For users, the Web differs strikingly from what it was a year ago, with more hazards to avoid and hard choices to make—about ensuring privacy, paying for formerly free services, and gauging the solidity of sites with whom you do business. Nothing is certain anymore. Consider the casualty count of online companies caught in the pile-up: EToys, Furniture.com, Kozmo.com, Pets.com, ►

Quokka Sports, Webvan, Zing, and many more.

Search engines and directories now offer privileged placement to online companies that are willing to shell out some dough for it. The broadband arena is morphing rapidly too, as DSL providers wink out of existence and the cable modem market consolidates.

Consumers haven't gone unscathed. Some customers of online currency service Flooz and incentive retailer CyberRebate.com lost serious money—thousands of dollars, in the worst cases—when the companies died. And some users taken in by the wild promises of eager broadband providers have been stranded on the side of the road, waiting for a tow.

But the journey hasn't been all bad, and there is still plenty to enjoy on the Web—as long as you keep your eyes peeled for blind curves and slippery conditions. Here's your map for the road that lies ahead.

FEE AT LAST

WITH THREE NOTABLE exceptions—specifically, a few focused-information services (such as Consumer Reports Online), various gaming sites, and countless, um, clothing-optional domains—subscription-based Web services have not fared well on the Net.

But neither have sites offering free services. Companies scrambling to find new sources of revenue are being forced to alter their strategies. What used to be free now often comes for a fee. No two sites seem to take the same approach to charging customers for previously gratis goods. For several years, many sites have offered a limited area of free services and content, with a charge for “premium” versions

“I TRIED TO USE [my Flooz currency] weeks before Flooz actually went under, but its Web site was down with no explanation and no way to reach the company.”



Dawn Czajak, Rockland, Massachusetts

that include extra features. After attracting users to the free product, these sites hoped to convince them to migrate to the fee-based version. Whit Andrews, research director with market analysis firm Gartner, expects that we'll see the free versions of many sites get skimpier.

“When it started, the idea was only to charge for really [advanced] services,” Andrews says. “Premium service now means less than it did.”

Two years ago, for example, the online storage site FreeDrive provided 20MB of storage space at no charge; premium deals let you buy more space for a fee. But today, FreeDrive offers only a tiered sys-

tem of subscription plans that are priced at up to \$10 per month, and users must agree to accept outside ads sent by e-mail. FreeDrive's competitors—Driveway, I-drive, and My Docs Online—have all suspended their free services, too.

The venerable Encyclopedia Britannica made a splash a couple of years ago by offering the unabridged content of its volumes at no charge on its Web site (www.britannica.com). But last July, amid a round of layoffs at the company, the site changed its policy. It now charges \$8 per month or \$50 per year for access to the encyclopedia. The site's spokesperson, Tom Panelas, says the change has been a success, with many users of the formerly free service signing on.

“We believe that there is a value to what we offer that customers are willing to pay for,” Panelas says. “People are realizing that not all information on the Web is quality information. And people have always been willing to pay for quality.”

Online magazine Salon.com is another content site that introduced a subscription plan. Though some of the site's articles remain free, for \$30 a year readers gain full access to all of the site's news, political stories, and columnists. Patrick Hurley, Salon's senior vice president of business operations, says the change has been well received by readers. The magazine signed up 20,000 subscribers in the first six months of the plan's launch. More important, according to Hurley, the amount of traffic to the site has not decreased since the changeover.

Another strategy some sites pursue is to charge for services that are available for

free elsewhere. For example, the site www.555-1212.com now charges variable amounts for its residential and business phone directory services. One option lets you buy a block of 100 lookups for \$10. At 10 cents a call, it's cheaper than dialing directory assistance over the phone. But of course, you can get the same information for free at every major Web portal.

So what's a savvy Web user to do? As always, exercise caution. Be wary of long-term commitments, especially since so many dot coms are disappearing without warning (see "Dealing With a Dead Service," on this page). And carefully read the terms of any fee-based premium service before putting your money on the line.

PAYMENT PLANS

THE TREND TOWARD subscription-based services translates into more hassles for users. Even if you're willing to pay a nominal fee for Web content, the work of establishing and tracking dozens of different subscription plans can be a pain.

Enter micropayments, an idea whose time has come but may not stay. Micropayments enable you to pay for content as you go—50 cents here for a Wall Street Journal Online article, or a dollar there for a PDF file containing some market analysis.

Micropayments (which never exceed \$10 and can be as low as a few pennies) are drawn from a credit or debit account maintained either by the Web retailer that sells you the product or service or by a third party that partners with online retailers to manage individual customers' micropayments. For instance, a number of media companies—such as Consumer Reports Online, The New York Times, and The Wall Street Journal Online—use a payment system called Qpass. If you're looking for an archived article that's more than a week or two old, you can pay a small amount via your Qpass account to

gain access to that article. Qpass simply monitors all of your micropayment purchases across various publications and then bills your credit card monthly.

But micropayments haven't caught on among sellers in a big way. Many Web content providers already have their own methods of delivery and billing, and they are reluctant to switch to a payment approach that involves a third party.

CHANGING NET

Old Web vs. New Web

FEE VS. FREE: As Web sites try to figure out new ways to make money, you can expect to start paying for content and services that were previously offered gratis. Look for an increase in subscription-based services and possibly in micropayment models (such as per-item fees) as well.

WHEN DOT COMS DIE: As smaller, independent dot coms fail, there's a danger of your getting caught in the undertow. If you've accumulated points, be aware that if the company folds, your points go down the drain.

PAID PLACEMENT: Many well-known search engines, including AltaVista, LookSmart, and Overture, allow advertisers to pay for prominent positioning on your search results page. Look twice to make sure you distinguish between what's paid for and what isn't.

BROADBAND WOES: Rampant consolidation in the cable modem industry and a steadily dwindling number of independent DSL providers mean less competition for broadband Internet access. Less competition often translates into higher prices and shabbier customer service.

"The technology has emerged to support micropayments at almost any level," says Gartner's Andrews. "You just don't have any real passionate desire from content publishers to adopt it." And that brings us back to square one—dozens of accounts with different providers.

Andrews suggests there may be an incentive for sites to switch to a micropayment model in the future.

"Where micropayments might [be] relevant is [as] a third-party system that's more of a metering...model, cell-phone style. 'This person has listened to x percent of their allotment of downloadable music,' for instance, or '[has read] x percent of

articles from participating publishers.'"

Time will tell whether this type of purchasing model gains wide adoption.

DEALING WITH A DEAD SERVICE

THE RAMIFICATIONS of the changing Web can be much more painful to consumers than a simple conversion from free to fee services. Just ask Dawn Czajak, who lost several hundred dollars when Flooz.com went under.

Flooz, which sold online gift certificates that consumers could use to buy products from affiliated online retailers, filed

for bankruptcy in August. This event left thousands of people stuck with worthless certificates that retailers refused to honor because they in turn couldn't collect the price of the purchases from Flooz.

"I purchased \$650 worth of [Flooz currency]," says Czajak, "and had only spent \$124.94 from my account when Flooz went out of business. I tried to use it weeks before Flooz actually went under, but its Web site was down with no explanation and with no way to reach the company."

Little more than a week after Flooz folded, Beenz.com, a similar gift certificate-based site, announced that its members would have ten days to redeem their online currency.

Consumer rights lawyer Edgar Dworsky, who runs the watchdog Web site Consumer World (www.consumerworld.org), advises consumers to cash out of troubled programs early, before bankruptcy laws enter the picture.

"Look for warning signs," he says. "If they cut half their staff, you'll want to pay attention. Convert whatever you have to some real-world equivalent [if possible]—real airline miles, hard currency and goods, or paper gift certificates." ▶



Probably the most egregious case of a dot com pulling consumers down with it came when online retailer CyberRebate.com filed for bankruptcy and left a reported 200,000 customers with more than \$80 million in unfulfilled rebates. Until it folded, CyberRebate.com offered consumers a tempting deal: 100 percent rebates on electronic and household goods that it sold. The catch was that the site's prices were higher than those of other retail sites, and you had to wait 90 days after purchasing to get your refund. The idea spread faster than a computer virus—at one point CyberRebate was the number three Web retailer, after eBay and Amazon.com. And for the first year at least, CyberRebate (which was founded in 1998) delivered as promised.

"The consumers who got in early had empirical proof that this wasn't a scam—they got their merchandise and they got their rebate," says Dworsky.

But eventually the plan imploded.

"My guess is that [CyberRebate] had to keep raising prices [to pay rebates that were coming due]," Dworsky continues, "to the point where they were charging up to ten times the usual retail price. When you've got to get new people in to pay the old ones, that [might be] called a Ponzi scheme [named for scam artist Charles Ponzi]. The point is, consumers lost, and they lost big."

One CyberRebate victim, Janice Leverentz, lost \$4300 when the company folded. "I was willing to pay the grossly inflated prices, figuring I'd be making about 10 percent on my time and money investment," she says.

Leverentz appealed to her credit card company to recoup her loss—to no avail. Credit lenders are required to investigate when a cardholder has a problem with a purchase bought on credit. But there's no guarantee your lender or card company will agree that you have been swindled.

Dworsky has seen hundreds of complaints from CyberRebate victims. "[Cred-

it lenders] seem to be saying, 'You got your merchandise; it's not our fault you didn't get the rebate,'" he says.

It's unclear whether CyberRebate did anything illegal, but the end results mirrored those of any pyramid scheme: The people who got in early made out fine, and those who came in late got burned. The lesson: If it sounds too good to be true...

COMING UP: PAID PLACEMENTS

THE SHIFTING economics of the Web are also producing a number of subtler—but potentially equally vexing—effects.

The stalwart search engine, an entity nearly as old as the Web itself, is undergoing significant change as some search sites begin charging other sites for listing them on their search results pages.

There are two practices at work here:

THE RAMIFICATIONS of the changing Web can be much more painful to consumers than a simple conversion from free to fee services.

paid inclusion and paid placement. Paid inclusion means that a Web site pays to get itself listed in a search engine's results for relevant topics. Paid placement means that a site pays for premium positioning of its listing at or near the top of a search results page. Both practices are common, in one form or another, at virtually every big-name search engine or Web portal.

Paid placement isn't new; your local Yellow Pages is a nondigital form of the same thing. But the practice gets shifty when search engines do not clearly distinguish between results that were bought and results that weren't.

Overture Services (formerly GoTo.com), which syndicates its service to thousands of other search services, is wholly predi-



CYBERREBATE, FLOOZ, and Beenz.com are three sites that left consumers in the lurch.

cated on paid placement. The practice's pioneer, Overture is so forthright about its policy that it reports next to each listing on its results page the amount a site pays Overture every time a user clicks on its listing.

Other search engines, like AltaVista, LookSmart, and Lycos, are less forthright about who has ponied up and who has not. These companies identify paying sites as sponsored links or—even more ambiguously—as featured listings. The Ralph Nader consumer group Commercial Alert has filed a complaint with the Federal Trade Commission asking that search engines be required to clearly mark as ads any listed links that third parties have paid for (see "Nader Group Bashes Search Engine Ad Policies," at find.pcworld.com/17341).

Marissa Gluck, a market analyst with Jupiter Media Metrix, says paid placement is useful to consumers in certain kinds of searches. "When it comes to searches for transactional information, for commerce or retail—yes, it's a good thing for consumers," says Gluck.

For example, in response to our query "motorcycle insurance," AltaVista, LookSmart, and Overture all gave the top listing to paid-for links of national insurance providers that offer and/or specialize in motorcycle coverage. The paid-for rankings may be less distinguishable than they ought to be, but the results are useful when you're looking for a specific item or service that you want to buy—search engines with paid placement spit out Web

sites that want to sell. The same query at Yahoo's site yielded some insurance companies, but they were mixed in with FAQ pages and motorcycle fan sites.

The primary drawback of paid placement comes when you're looking for simple information on the Web and you have to wade through a river of e-commerce listings in order to get to the content sites that you really want to consult.

For example, in response to our query "J.D. Salinger," all of Overture's top five returns led to online bookstores that offer the author's literary works for purchase. In contrast, the editorially driven Yahoo returned a healthy cross section of academic sites, biographical resources, fan pages, and FAQs. It should be noted that Yahoo does permit a commercial Web site operator to pay a fee to expedite the review process in which Yahoo considers including the site in the directory's index. But Yahoo's site states that payment "does not guarantee inclusion in the directory, site placement, or site commentary."

Search services that provide paid and unpaid links should clearly mark the two types. Consumers should let search engine operators know when that doesn't appear to be the case. Regardless, you need to use an eagle eye when paid place-

ment is involved. Remember, the inclusion and placement of a link on a results page doesn't always mean it's among the most relevant or informative results.

BROADBAND NARROWS

AS IF YOU needed more to worry about: The high-tech economy's drift into the doldrums has also affected the availability and price of broadband Net connections.

For several years now, *PC World* has noted the advantages of a Digital Sub-

scription Line over cable modem service—such as more-reliable performance and better security. Unfortunately, the DSL industry has been hit hard by the changing economic climate of recent months.

In the past year, numerous national and regional DSL providers have gone bankrupt, including 360networks, PSINet, Rhythms NetConnections, and Winstar Communications. Another major player, NorthPoint Communications, had upward of 100,000 business customers when

it abruptly shut down, leaving its clients in the cold land of dial-up connections. Some DSL providers are accusing the major phone companies of trying to squeeze them out of business. The Baby Bells, such as Verizon and SBC's Pacific Bell, are required by law to provide leased phone lines and other services to third-party DSL providers. But that doesn't mean they have to make it easy—after all, the Baby Bells offer their own, competing DSL plans. Last summer, several ISPs in

California filed a complaint with regulators, charging that Pacific Bell was unfairly trying to stifle competition within the high-speed Internet market.

While this is clearly a dire situation for DSL providers, consumers are adversely affected, too. Stretched as thin as they are, many remaining

DSL providers are having trouble providing basic customer support. And long-term, lack of competition is likely to mean higher prices, poorer service, and fewer promotional perks for consumers.

"I think it's less a problem for residential consumers than for small businesses," says Lynda Starr, Probe Research's vice president of U.S. carrier research. "When a provider like NorthPoint or Rhythms goes down, it has a large impact, obviously."

Starr says that the Baby Bells are ▶

ONE CONSUMER GROUP has filed a complaint with the Federal Trade Commission asking that search engines be required to clearly mark as advertisements any listed links that third parties have paid for.

DSL providers are having trouble providing basic customer support. And long-term, lack of competition is likely to mean higher prices, poorer service, and fewer promotional perks for consumers.

Searcher Beware: Paid Placement Moves In

OVERTURE SERVICES (formerly GoTo.com) was the first search engine to use paid placement. The results page clearly indicates how much a site pays Overture each time you click the site's link.

overture

Search

Results for Ford F150

1. Ford F150 (Cost to advertiser: \$0.34)

2. Ford F150 (Cost to advertiser: \$0.34)

3. Ford F150 (Cost to advertiser: \$0.34)

4. Ford F150 (Cost to advertiser: \$0.34)

5. Ford F150 (Cost to advertiser: \$0.34)

LYCOS IS LESS CLEAR than Overture about identifying the sites that have paid for top placement in its search results. The search engine refers to these links ambiguously as "Featured Listings."

LYCOS SEARCH

Search for Ford F150

Results for Ford F150

1. Ford F150 (Featured Listing)

2. Ford F150 (Featured Listing)

3. Ford F150 (Featured Listing)

4. Ford F150 (Featured Listing)

5. Ford F150 (Featured Listing)

WEB DEALS

Three Web Services Worth Paying For

SURE, THE WEB's free ride is over. But there are still some online services that we would happily pay good money for.

① **CARFAX.COM:** In the market for a used car? Carfax.com's vehicle history reports can help protect you from scams and lemons. For \$15 (single report) or \$20 (unlimited reports in a two-month period), Carfax.com will tell you whether the car you're considering was previously reported in an accident or belonged to a rental agency. Each report also lists title history and odometer readings (recorded at the time of emissions tests, for instance) as checks on possible illegal rollbacks. Best part? The report arrives instantly via e-mail, or you can view it on the Web site.

② **OFOTO.COM:** This printing service for digital camera users gave out ridiculous quantities of free prints in the past, but we like the quality of the prints so much we'd cheerfully pay for them now (50 cents for each 4-by-6 print and \$1 for each 5-by-7 print). The

site is well designed and turns orders around quickly. And though it charges for prints, it still offers free online photo sharing.

③ **CONSUMERREPORTS.ORG:** What more can we say about the granddaddy of consumer publications? For \$24 a year, you can get all of the great, unbiased reports about thoroughly tested products that you're used to getting in the print magazine, and save a forest of trees to boot. Now that's advocacy for the masses.



dragging their feet because they're essentially monopolies that have been told to open their lines to competitors.

"The Bells are stuck in the middle. When you open yourself to competition, there's only one place your market share can go, and that's down. It's like a child's reaction, you know: 'You can make me do it, but not happily.'"

Making matters worse, DSL troubles have left cable modem services with less competition than expected. The recent spate of substantial price hikes (up to 25 percent) by major providers is likely a result of that lack of competition.

The cable industry may consolidate further. Cable giant Comcast tried to buy out AT&T Broadband last summer, and AOL Time Warner is rumored to be planning a bid. One firm could end up controlling a huge percentage of broadband access—and that's bad news for users.

So where does all this leave broadband customers? Forced to choose from among a dwindling number of DSL providers, consolidating cable modem services, and a handful of distant-third options such as satellite connections, users may want to play it safe by going with a big company that's unlikely to fold. Kathie Hackler, senior analyst with Gartner, suggests that having many options among smaller car-

riers is probably not as important for consumers as being able to pick what they want from a handful of reliable, competing broadband providers.

"If you use the long-distance telephone market as a historical example, after divestiture there were thousands of little long-distance companies," Hacker says. "Over time they came together, and you ended up with a top three and some secondary players. That's likely what's going to happen in this environment as well."

RIDING OUT THE STORM

THE JOLT BACK to grim economic realities has been painful, but many analysts believe it may be positive for the Web, overall. Gartner's Andrews sees the dot-com implosion as a necessary weeding-out process. Only sites that successfully leverage the Web's strengths will survive.

"The grassroots Internet, the Web sites created for the like-minded—by the passionate for the passionate—will still be there," Andrews says. "We'll see a refocusing of free sites and personal publishing projects"—sites with useful content run by dedicated people. On the business end, Andrews foresees similar growth.

"We'll see a steady, relevant, and in-

creasingly visionary exploitation of the Web by established companies and well-funded—but not radical—smaller companies. Generally there will be a more sensible use of the Web to drive new models of entertainment and information delivery—and the development of new takes on old models."

The good old days of the Web won't return. But the new Web will likely be a harder construct, with a sturdier internal economic base. That may mean you'll have to pay for some things or put up with more-intrusive advertising. But the Web will right itself.

Janet Daly, communications director of the nonprofit World Wide Web Consortium (W3C)—the closest thing the Web has to a standards body—believes we haven't seen the best the Web can offer.

"It's only been 11 years since the first successful implementation of the Web, where a browser communicated with a server and got an answer," Daly says. "The Web is still in its infancy."

Glenn McDonald is a freelance writer living in North Carolina.

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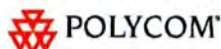
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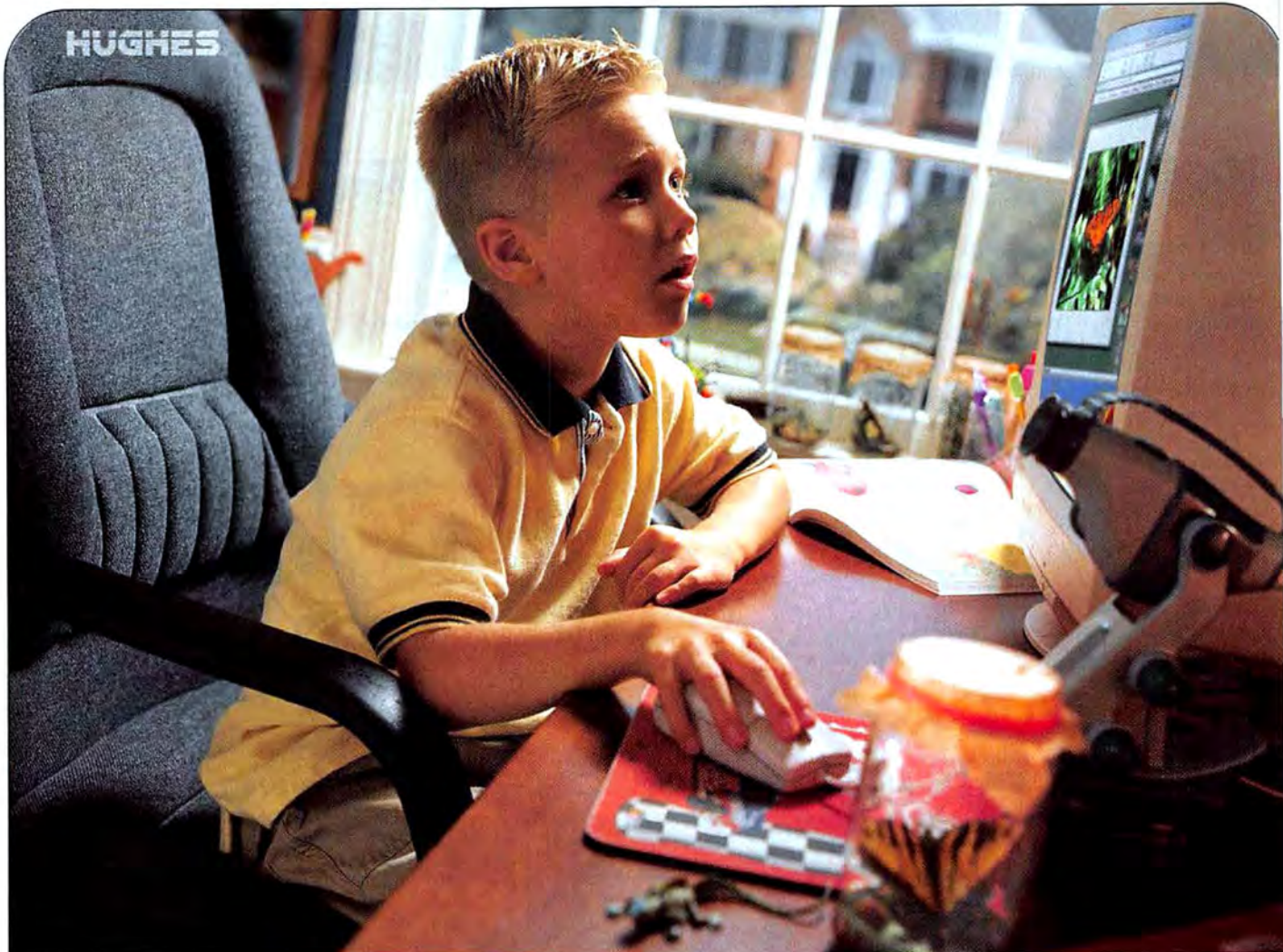


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BY MELISSA J. PERENSON

SMART STORAGE



FLASH, MAGNETIC, and optical devices from Trek, iomega, and LaCie illustrate the range of storage capacities and sizes.

From high-speed hard drives to CD-RW to pocketable disks, today's storage options give you a place for everything.

IF YOUR PC's hard drive is approaching its limit and a CD-RW drive doesn't meet all your storage needs, you are not alone. Nowadays, Windows XP eats up 1.5GB all by itself, and many garden-variety applications hog even more space. Add to that users' growing interest in creating, saving, and sharing lots of space-hogging digital files (photos, songs, presentations), and it's no wonder a crowd of storage products has arrived to meet demand. Familiar standbys such as internal hard drives, ►

CD-RW drives, and Iomega Zip drives have been joined by a range of surprisingly versatile lesser-known products that could help with your disk-space crunch, whether you need a format that's affordable, fast, vast, portable, or flexible.

Though sorting through the disparate options can seem daunting, it really boils down to three main categories: magnetic hard drives, optical drives, and miniature storage. Each type has its drawbacks as well as its advantages.

To help you weigh the trade-offs, we examined nine alternative storage products (in comparison with three conventional products). We looked at several external hard drives and a typical internal drive; we evaluated a number of optical drives (three that represent recordable DVD standards and one traditional CD-RW drive); and we surveyed a smattering of miniature products, throwing in an external Iomega Zip Drive for comparison.

HARD DRIVES

Vast, Fast & Affordable

For desktop users, one of the most cost-effective ways to add storage is to simply buy another internal hard drive—provided your PC has an extra drive bay. Though the performance of a drive varies according to its rotational speed (usually 5400 or 7200 rotations per minute), interface (IDE, IEEE 1394, or USB), and use, in most cases hard drives will be the fastest storage option you can buy. Internal drives like Western Digital's \$270, 100GB Caviar WD1000BB are the fastest and largest option of all the storage types we review here. The quick transfer speeds make internal hard drives ideal for housing applications and data. But since internal hard drives are fixed devices that are always connected, they are more vulnerable to data loss or disk failure from viruses, power surges, and bumps.

With an external hard drive, however, you can sidestep many of these dangers. Maxtor, for example, offers two external Personal Storage hard drives: The 3000DV holds 60GB and has an IEEE 1394 (FireWire) interface, while the 3000LE holds 40GB and connects via USB 2.0. To conduct an informal speed test of both drives, we cracked open the tower of our evaluation PC and installed the \$129 DuoConnect USB 2.0/1394 combo card. (For about \$50, you can buy a single-interface USB 2.0 or IEEE 1394 card.) Once our Windows 98 SE system recognized the drives, we were ready to size up their performance capabilities.

In our hands-on tests, we found that there was no real performance variance between Maxtor's IEEE 1394 and USB 2.0 external drives. The difference between using the 3000LE's USB 2.0 interface and its USB 1.1 interface, however, was more pronounced: With USB 1.1, it took about 10 minutes longer to complete our test than it did with USB 2.0. Should either of Maxtor's portable drives meet your buying criteria, be prepared to pay a premium—about twice as much per gigabyte as the internal Western Digital drive.

CHOOSING AN INTERFACE

WONDERING WHICH drive interface is better for you? If you use your system to store and edit digital video or if you have a digital video camera, choose the IEEE 1394 interface and the biggest-capacity hard drive you can afford. If you're just looking for faster performance, choose a USB 2.0 expansion card and a compatible hard drive, because this update of the common USB 1.1 standard can support USB 1.1 devices you already own.

Iomega's \$400 Peerless 20GB FireWire Drive represents a unique but pricey alternative to other hard drives. It consists of a 20GB, pocket-size cartridge that snaps into an upright IEEE 1394 adapter and base (the 20GB USB 1.1 model costs \$400; USB 2.0 versions are expected in early 2002). The IEEE 1394 model's two ports allow it to pass through data from your PC to another device (such as a camera or scanner) connected to the Peerless base. One advantage of the Peerless system is that its cartridges are interchangeable among USB and IEEE 1394 bases. To protect your data from the bumps and jostles of travel, Iomega (like most external hard drive makers) integrates shock-protection hardware into the cartridges. The company offers two rather expensive cartridge capacities: a 10GB cartridge is \$160; the 20GB unit is \$200. If you can afford to buy extra cartridges (which only Iomega sells), your storage expandability is limitless. But remember that your portability will be limited to using the cartridges where you have a base unit.



HARD DRIVES (top to bottom): Iomega Peerless Drive, Maxtor 3000DV, and Maxtor 3000LE.

OPTICAL DRIVES

Roomy & Portable

Optical media, such as CD-RW and rewritable DVD discs, are easy to share and use for archiving data. Smaller in capacity than hard drives, optical drives and media offer flexibility. CD-RW drives such as TDK's \$150 24/10/40 VeloCD Re-

Writer (see *Top 10 CD-RW Drives* on page 135) are popular for writing a sizable chunk of data to an inexpensive disc (in quantity, as low as 50 cents per 700MB CD-R disc and \$2 per 650MB CD-RW disc), which most any CD-ROM drive can

read. CD-R and CD-RW discs aren't ideal for storing video, though (only 1 hour of MPEG-1 or VHS-quality video fits on a CD). When rewritable DVD was first proposed, it seemed likely to replace CD-RW as the rewritable format of choice. But DVD technology has become mired in a three-way standards war: DVD-RAM, DVD-R/RW, and DVD+RW (see November 2001's "The DVD Dilemma" at find.pcworld.com/16861). Here's a ►

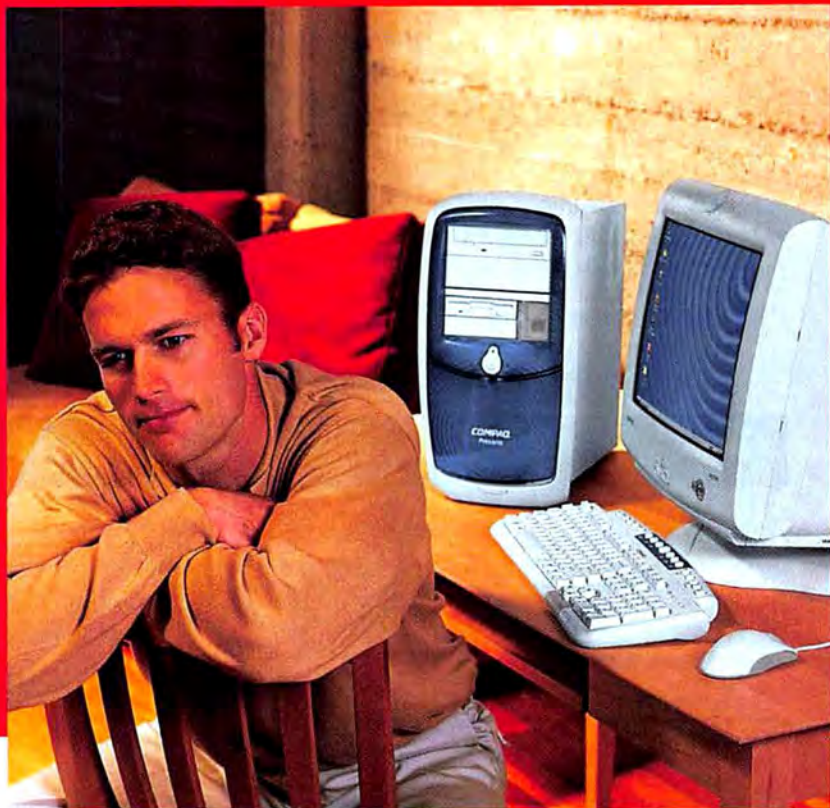
FEATURES COMPARISON

NEXT-GENERATION STORAGE OPTIONS

HARD DRIVE	Price as tested (10/15/01)	Tested capacity ¹	Cost per GB	Comparative transfer speed ²	Comments
Iomega Peerless FireWire Drive find.pcworld.com/16922	\$400 ³	20GB cartridge	\$20 ⁴	15 MBps	Iomega's compact hard drive cartridges travel easily, since the drive's electronics are housed in the base unit. Iomega sells its pricey cartridges in capacities of 10GB (\$160) and 20GB (\$200). ★★★★★☆
Maxtor Personal Storage 3000DV find.pcworld.com/16924	\$300	60GB	\$5	28 MBps	This external drive spins at 7200 rpm and is well suited for digital video and other applications that demand high performance, but it requires an IEEE 1394 interface. ★★★★★☆
Maxtor Personal Storage 3000LE find.pcworld.com/16923	\$200	40GB	\$5	14 MBps	The 5400-rpm 3000LE spins slightly slower than the 3000DV, but is both USB 1.1 and USB 2.0 compatible. Installing a USB 2.0 card allows you to get performance comparable to IEEE 1394 speeds. ★★★★★☆
Western Digital Caviar WD1000BB find.pcworld.com/16921	\$270	100GB	\$2.70	53 MBps	This fast 7200-rpm internal hard drive uses an Ultra DMA/100 interface and is a great choice for running applications and for primary storage, but it is prone to data loss and disk failure. ★★★★★☆
OPTICAL STORAGE					
Hewlett-Packard DVD100i find.pcworld.com/16926	\$600	4.7GB DVD+RW	\$3.40 ⁵	3.3 MBps for DVD+RW write at 2X ⁶	This internal drive can back up data or burn home movies twice as fast as drives that use other rewritable DVD formats. Its DVD+RW discs, however, are incompatible with some older DVD players. †
LaCie FireWire DVD-R/RW+CD-RW Combo Drive find.pcworld.com/16927	\$850	4.7GB DVD-RW	\$4.26 ⁵	2.6 MBps for DVD-RW write at 2X ⁶	LaCie's external drive is easy to install if your PC has an IEEE 1394 card. The write-once, 4.7GB DVD-R media will work with most DVD players; its DVD-RW media is rewritable but not as widely compatible. ★★★★★☆
		4.7GB DVD-R	\$2.55 ⁵	1.4 MBps for DVD-R write at 1X ⁶	
Panasonic LF-D321 find.pcworld.com/16941	\$600	4.7GB DVD-RAM	\$5.32 ⁵	2.8 MBps for DVD-RAM write at 2X ⁶	Panasonic's internal drive writes to 2.6GB and 4.7GB DVD-RAM and 4.7GB DVD-R media. It has a strong video software bundle, but some of the included utilities are difficult to master. †
		4.7GB DVD-R	\$2.55 ⁵	1.4 MBps for DVD-R write at 1X ⁶	
TDK 24/10/40 VeloCD ReWriter find.pcworld.com/16925	\$150	700MB CD-R	\$0.80 ⁵	3.3 MBps for CD-R write at 24X ⁶	CD-RW internal drives and their 700MB media are inexpensive. However, the media's storage capacity is rather small for digital video and for full hard drive backups. ★★★★★☆
		650MB CD-RW	\$3.29 ⁵	1.5 MBps for CD-RW write at 10X ⁶	
MINIATURE STORAGE					
IBM 1GB Microdrive Travel Kit find.pcworld.com/16943	\$380	1GB	\$380	4.2 MBps	With its CompactFlash II interface, IBM's miniature removable hard drive works with a variety of devices. Its moving internal parts make it less rugged than flash media, however. ★★★★★☆
Microtech Zio 128MB CompactFlash Bundle find.pcworld.com/16944	\$160 ⁷	128MB CompactFlash card	\$1250 ⁴	800 KBps	The Zio external drive fits in your palm and plugs directly into front-mounted USB ports or into rear ports via a cable. Accepts CompactFlash I or II media cards in capacities ranging from 8MB to 1GB. ★★★★★☆
Trek USB ThumbDrive find.pcworld.com/16961	\$150	128MB	\$1172	700 KBps	This rugged, petite, ultraportable device is great for transferring batches of files between systems with USB. Installation requires drivers. Other media capacities are available too. ★★★★★☆
Iomega Zip 250MB USB Drive find.pcworld.com/16942	\$150	250MB Zip disk	\$67 ⁸	900 KBps	This external drive writes to 250MB (\$15) and 100MB (\$10) disks. Write performance with the older 100MB media is poor, and the 250MB disks can't be used in 100MB Zip drives. ★★☆☆☆☆

1000KB = 1MB, 1000MB = 1GB. Products with yellow background were chosen as baseline products for their wide acceptance and well-known technologies. ¹ Other media capacities are available for most devices. ² Estimate based on vendor specifications. Values reflect a product's sustained data transfer rate, average transfer rate, or maximum transfer rate. ³ Includes 20GB cartridge. ⁴ Includes price of the drive and one piece of media. Additional media purchased will lower overall cost of ownership over time. ⁵ Drive cost not included. Media price derived from a broad examination of Web retailers. ⁶ 1X = 1.4 MBps with DVD media. ⁷ Preproduction product; not rated. ⁸ 1X = 150 KBps with CD media. ⁹ Includes reader and CompactFlash media.

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Data transfer rates may vary as follows: for recording to CD-R media, the data transfer rate may vary from 150 to 1200 Kbps; for writing to CD-RW media, the data transfer rate may vary from 150 to 600 Kbps; for reading to CD media, the data transfer rate may vary from 1500 to 3600 Kbps. Microsoft® Windows® XP Home Edition installed. Compaq, the Compaq Logo, Inspiration technology, Presario, and FutureBay are trademarks of Compaq Information Technologies Group, L.P. in the U.S. and other countries. Intel, the Intel Inside Logo, Pentium, Celeron, and Intel SpeedStep are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the U.S. and other countries. Microsoft, MSN, and Windows are registered trademarks of Microsoft Corporation. Products and company names mentioned herein may be trademarks and/or registered trademarks of other companies. ©2001 Compaq Information Technologies Group, L.P. 0761/01/02

look at drives integrating these standards.

The oldest rewritable-DVD standard is DVD-RAM. With media capable of enduring up to 100,000 rewrites, a DVD-RAM/R drive like Panasonic's \$600 LF-D321 is great for backing up and archiving data. Media for this drive come in a range of sizes—2.6GB (about \$20 for a single-sided disc), 4.7GB (\$25 for a single-sided disc), and 9.4GB (\$40 for a dual-sided disc)—and are available both as bare discs and in plastic cartridges that protect data from dust and thumbprints. Since few standard DVD-ROM drives and DVD movie players can read DVD-RAM discs, this format is a poor choice if you intend to view movies on your TV. However, the Panasonic LF-D321 also supports the write-once DVD-R format, which is compatible with ordinary DVD players and drives. Panasonic's preproduction internal LF-D321 drive features superb video editing software (including Sonic's DVDit LE), as well as a set of functional but cryptic utilities intended to help users with installation and maintenance.

LaCie's external FireWire DVD-R/RW+



OPTICAL DRIVES (top to bottom): HP's DVD100i (a DVD+RW drive), Panasonic's LF-D321 (a DVD-RAM/R drive), and LaCie's FireWire DVD-R/RW+CD-RW.

CD-RW Combo Drive, dubbed SuperDrive, offers write-once DVD-R and rewritable DVD-RW abilities. Installation was easy: After plugging the drive into our IEEE 1394 port and loading the bundled software, we were ready to burn and edit data and video discs. This drive writes to relatively cheap 4.7GB discs (as low as \$8 for a DVD-R and \$15 for a DVD-RW). Each disc holds about 2 hours of MPEG-2

video. The drive's ability to create DVD-Rs, which most DVD drives and players can read, is a main attraction. (DVD-RW media, like DVD+RW media, isn't compatible with older drives and players.) At \$850, though, this external model's portability will cost you. (Pioneer's internal DVR-A03 uses the same drive mechanism but costs only about \$550.) With the launch of Hewlett-Packard's \$600 DVD100i, the newest DVD format, DVD+RW, arrived. HP's claimed data transfer rate of 3.3 MBps means that the DVD100i burns discs twice as fast as some DVD-RW drives do. In addition, it uses competitively priced media (as low as \$15). But DVD+RW drives don't support DVD-R discs, which makes this drive less versatile than others. HP's write-once DVD+R format, intended for use with older drives and players, should debut in 2002. Taking all this into account, if it's speed you need, and you purchased your DVD drive or player after 2000, the DVD100i is a good option.

Still to come in 2002: LG Electronics is slated to launch a drive based on both the DVD-RAM and DVD-RW standards. ►

TIME CAPSULE

WHERE ARE THEY NOW?

OVER THE YEARS, lots of removable storage products have come and gone. Here's a look at the fate of a few recent players, all of them proprietary formats.

► **Imega Zip:** Since 1994, a total of 40 million Zip drives—most of them the 100MB version—have shipped, Imega estimates. While Zip drives are price-competitive with CD-RW drives, Zip's lower-capacity media costs seven times as much as CD-RWs (250MB Zip disks cost about \$15; 100MB Zip disks cost about \$10).

► **Imega Jaz:** Launched in 1995, the Jaz drive uses a speedy SCSI connection, making it appropriate for video editing or file backup. Jaz, however, never was cheap, and still isn't: External drives cost a hefty \$275 (internal models sell for \$267), and media is priced at \$90 for 2GB. Imega now sells both IEEE 1394 and USB adapters, but don't expect the Jaz line to evolve further.

► **SuperDisk (LS-120):** Arriving in 1997, this 3.5-inch drive was intended to replace old-

fashioned 1.44MB floppies but never gained wide acceptance in the PC market. LS-120 drives read standard 1.44MB disks as well as proprietary 120MB disks—which makes them a more natural fit for space-cramped notebooks—but their market share remains minuscule. Nonetheless, in 2001 SuperDisk drives that support 250MB media were introduced. A 120MB disk costs \$7, and a 250MB disk costs \$17.

► **Castlewood Orb:** In 1998, Castlewood's Orb and its 2.2GB

disks came on strong as competition to Jaz in both capacity and speed. However, in response to complaints of Orb drive failures and data corruption, Castlewood halted production in 1999 to implement a fix. Today, the company's retooled technology appears in the \$150 2.2GB internal Orb drive (disks cost \$30) and in its new \$300 5.7GB drive (disks cost \$60). Castlewood recently announced external IEEE 1394 and USB 2.0 models of its 5.7GB drive, as well.

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a AMD Athlon XP Processor 1600+ with QuantiSpeed™ architecture outperforms competitive 1.6GHz PC processors. QuantiSpeed™ architecture operates at 1.40GHz
AMD Athlon XP Processor 1700+ with QuantiSpeed™ architecture outperforms competitive 1.7GHz PC processors. QuantiSpeed™ architecture operates at 1.47GHz
AMD Athlon XP Processor 1800+ with QuantiSpeed™ architecture outperforms competitive 1.8GHz PC processors. QuantiSpeed™ architecture operates at 1.53GHz
AMD Athlon XP Processor 1900+ with QuantiSpeed™ architecture outperforms competitive 1.9GHz PC processors. QuantiSpeed™ architecture operates at 1.60GHz

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MINIATURE STORAGE

Small & Flexible

The trait that the products in this group share is not their format or mechanism, but their size. Though their data transfer speeds and storage capacity don't match those of other devices, these products do offer outstanding portability and have few cables or drivers to fuss with. Choices include Zip disks (see "Where Are They Now?" on page 112), micro hard drives, flash media cards, and all-in-one flash storage units.

However, no single product will work with all your portable devices or meet every storage need. We examined several products that have evolved to meet specialized requirements.

For example, the \$380, 1-inch-square IBM 1GB Microdrive Travel Kit plugs easily into a notebook (via its included PC Card adapter) or into a digital camera, an MP3 player, or a PDA that has a CompactFlash II slot (such as the Compaq IPaq Pocket PC). Even when we installed the driver on a 166-MHz Pentium laptop running Windows 95, the system recognized the Microdrive and assigned it a letter. The Microdrive's biggest disadvantage is that it can't top the speeds and capacities of the latest notebook hard drives, or of 5GB PC Card hard drives such as Toshiba's \$400 MK5002MPL. But the convenience of this palm-size unit—which can add storage to your notebook and other devices without requiring wires or bulky external adapters—makes the Microdrive a great choice for business travelers.

Flash storage is a fine alternative to hard

drives like the Microdrive. The media lacks moving parts, so it's less prone to damage. Flash storage is available in the form of inexpensive cards (and devices to read them) or as non-upgradable, fixed-capacity flash media drives like Trek's finger-size 128MB ThumbDrive.

The ultraportable unit plugs directly into your system's USB port (no adapter or cables are needed) and is perfect for toting a handful of files between the office and home. Our Windows Me test system instantly recognized the drive and assigned it a drive letter, but

you'll need drivers for it to work on a Windows 98 SE, Windows 2000, or Mac OS system. The ThumbDrive allows you to easily transfer files in Windows Explorer, and you can even save files directly to the drive. Owing to its USB 1.1 interface, it transfers files slower than an internal hard drive does, but the \$150 ThumbDrive's largest drawback is the premium you pay for its convenience. Still, this device is appealing if you regularly transport files between several systems. Keep your eye on it, though—it's so small, you might lose it in your bag or among the piles of papers on your desk.

A good compromise between fixed-size flash drives like the ThumbDrive and bulky, wired flash-media readers is Microtech's \$160 Zio 128MB CompactFlash Bundle, which includes a 128MB CompactFlash card, the Zio card reader, and an extension cable. (Zio readers are made for the SmartMedia and MultiMediaCard

formats too, but we favor CompactFlash for its higher capacities, harder design, and wider range of compatible peripherals.) With a PC Card adapter, CompactFlash cards can fit into a PC Card slot, allowing you to transfer images between a digital camera and a laptop without using the Zio. Since most desktop PCs don't have PC Card slots, the ultraportable, bell-shaped Zio reader offers another solution. It has a USB 1.1 connector on one side and a CompactFlash card slot on the other. The USB connector works best with a notebook or with a desktop's front-mounted USB port; the included extension cable helps you plug the Zio into awkwardly placed USB ports, such as those on the back of PCs. Best of all, the Zio can read any CompactFlash or CompactFlash II-compatible card, so if you fill one up you can simply buy another. SanDisk sells CompactFlash cards in sizes ranging from 64MB (\$50) to 1GB (\$800; due early in 2002).

FUTURE Visions

In the coming months you can expect to see bigger storage capacities in smaller packages. In the second half of 2002, look for the next generation of hard drives: Serial ATA. Endorsed by Intel and AMD, this technology promises eventually to enable data transfer speeds as fast as 600 MBps.

Due in the first half of 2002, Calimetrix' MultiLevel Recording technology promises to triple a CD-R disc's capacity to 1.95GB, and to triple drives' CD-R recording speed as well. Drives equipped with MultiLevel will be compatible with existing CD media.

Last, expect a new DVD-based optical format, DataPlay, to launch in early 2002. This format packs 500MB of data onto a \$5 to \$10, 3-centimeter cartridge and will allow you to write and play back discs in devices like digital audio players. ■

Melissa J. Perenson is a PC World associate editor who regularly covers storage topics.



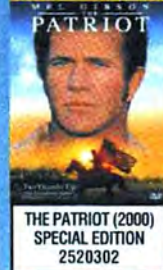
MINIATURE STORAGE (top to bottom): Trek USB ThumbDrive, Microtech Zio 128MB CompactFlash card and reader, and IBM 1GB Microdrive.

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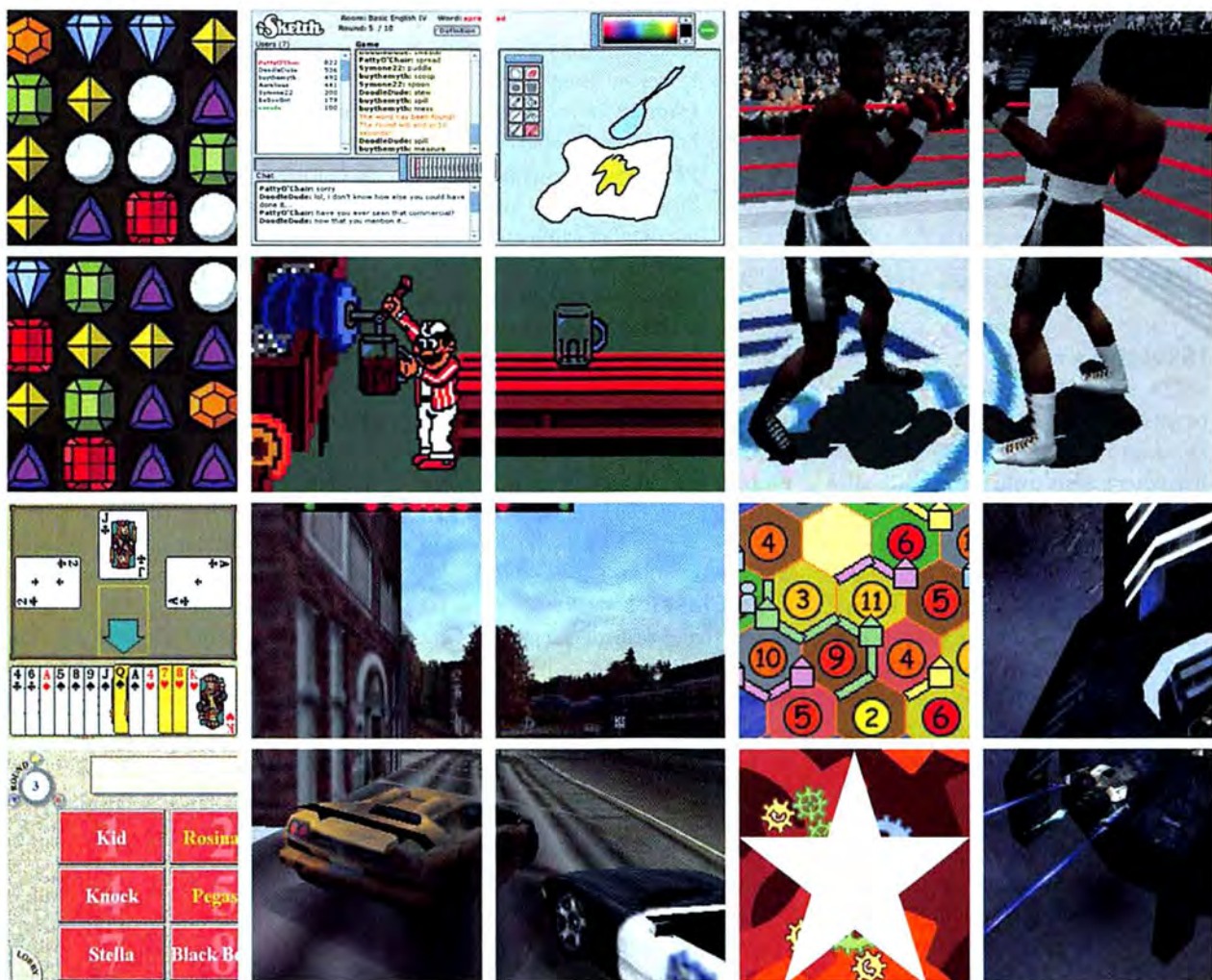
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PICTURES WORTH A COUPLE OF WORDS

ISketch ★★★★★

FREE Remember Pictionary, the popular board and TV game in which one player sketches clues to a mystery word or phrase that other players try to identify? It's alive and well on the Net at ISketch (www.isketch.net) as a fun, free, easy, and—for now—no-registration game. Point your Shockwave-equipped browser to the site and choose a playroom (or create a private one) with a language (Danish, French, German, and so on) or a clue category (food, movies, computer games) you like. The game assigns one player the drawing duty as others type in their guesses for the mystery word or phrase. The sketcher's drawing tools include a pen, an airbrush, and an eraser. Once you get going, it's easy to get hooked. Caution: Sketching with a mouse isn't everybody's cup of tea—this game may convince you to buy a pen tablet and stylus. —Yardena Arar

GET READY TO RUMBLE

Knockout Kings Web Boxing ★★★★★

FREE Boxing is a great way to let off some steam. And what better way to step into the ring than with eight of the most



famous boxers of all time? Knockout Kings Web Boxing from EA.com (www.ea.com) brings fantasy bouts like Holyfield versus Ali straight to your browser. It offers an impressive level of depth and decent-looking 3D graphics. After a quick download, you play solo

against your chosen opponent, competing against other players for high scores. Both the keyboard and the game pad controls are easy to learn but challenging to master. To access the free game, log on to EA.com and get ready to punch, block, and dodge your competition. —Eric Dahl

WHERE WERE YOU IN '82?

80's Classics ★★★★★

FREE Hyper-realistic 3D graphics and theater-quality sound—who needs 'em? Give me the ridiculously simple, endlessly addictive arcade blockbusters lovingly re-created at Shockwave.com's 80's Classics (find.pcworld.com/16340). My personal favorite: Root Beer Tapper, in which you play a soda jerk who must slide beverages down the bar to a crowd of cranky cowboys, sports fans, and even aliens. Centipede, Defender (I and II), Robotron, Spy Hunter, and five other vintage time-wasters are also available. Browser-based play is free; truly obsessed retro gamers can pay 80 quarters (er, \$20) for downloadable versions of all 11. —Harry McCracken

BURNING RUBBER AND BANDWIDTH

Need for Speed Web Racing ★★★★★

FREE Racing fans need look no further for fast, rubber-peeling action. Just brake for Need for Speed Web Racing from EA.com. Racers hop into their choice of cars, such as a Chevrolet Corvette, for a variety of single-player contests over distinct-looking landscapes and racetracks. One roadblock: You have to download

every track and every car, some of which are 4MB in size. The download can take some time, especially on a dial-up connection. But once you're past that bottleneck, you can expect to cruise at the limit the rest of the way. —Danny W. Lam

ASSOCIATE THIS

Strike a Match ★★★★★

FREE Part wordplay, part trivia quiz, part game show, Boxerjam's Strike a Match (www.boxerjam.com) is a free, pleasing, and surprisingly habit-forming multiplayer game. The "match" in the game's title refers to word connections: In each round, you are presented with an array of words that fall under various, unidentified topics (anatomy or car parts, for example). Then you're given several seconds to identify the words that belong together. The more time you take, the lower your score becomes. With amusing graphics and a level of difficulty that won't insult a moderately intelligent play-



er, Strike a Match is a real winner. I only hope that Boxerjam gets enough advertising to stay in business. —Y.A.

EASY PLAY IS IN THE DECK

Yahoo Card Games ★★★★★

FREE Take a break from your computer chores and head for the virtual tables of Yahoo Card Games (games.yahoo.com). Whether you use an existing Yahoo ID or sign up for a new one, you'll be playing cards within seconds. Players at all skill levels can sit in at dozens of card games, including Blackjack, Euchre, Bridge, Pinochle, Go Fish, and my favorite, Hearts. It took awhile to find a game at



my pace and skill level, but once I found it, the play resembled a real game. It even had a little table talk thrown in. All the games include instructions on how to play. Shy types can compete against the machine, or choose to watch others battle it out. Yahoo Card Games are simple, fun, and free. All you need now is a little bit of luck. —Dennis O'Reilly

BE DAZZLED

Bejeweled ★★★★★

FREE Diamonds are a girl's best friend. My sparkler is Bejeweled, also known as Diamond Mine, a highly addictive and amazingly simple puzzle game from PopCap (www.popcap.com), in which you tap adjacent pairs of colorful gems, swap them, and match horizontal and vertical lines of three or more. The more jewels you match, the more bonus points you score. You can play straight from your browser or download an enhanced version—complete with glistening gemstones and flashy sound effects—onto your machine. The downloadable version includes a timed level for players seeking more of a challenge. —Felicia Williams

INSECT INVASION

Dark Orbit ★★★★★

If Alfred Hitchcock had set his classic film *The Birds* in a futuristic deep-space mining outpost, he'd probably have produced WildTangent's Dark Orbit (www.wildtangent.com), a fast-paced 3D shooter game in which you command a mining ship that's been retrofitted with weapons.

Your mission: Desperately fight to escape a planet crawling with encroaching hordes of angry alien insects. Blessedly absent from most of the game is the truly awful soundtrack, which rears its ugly head only at the end of each level. The game requires WildTangent's game driver, which is a free download. You do have

to shell out \$20 to play the full game. But given Dark Orbit's eye-popping 3D graphics and exciting game play, the one-time fee is reasonable. —Andrew Brandt

GET YOUR MOTOR RUNNING

Gears ★★★★★

FREE Set the gears in motion with Onward Designs' Gears (find.pcworld.com/17601), a fun and relatively challenging puzzle game enhanced with appropriately mechanical background music. The goal is to drag and drop a set of large and small green gears onto the playing board and link them with blue cogs to make yellow gears spin in the direction of their arrows. As the game progresses, the number of cogs increases, making the puzzles more difficult to put together. What's more, each puzzle is timed—the longer you take, the lower your score. The game will get your brain in gear while it entertains. Gears is free and requires Macromedia's Shockwave plug-in. —F.W.

BUILD AN EMPIRE

Settlers of Catan ★★★★★

FREE Bartering, not military might, is the key to conquest in Settlers of Catan (settlers.cs.northwestern.edu). Here's what's at stake: You try to outmaneuver your opponents by building settlements, roads, and cities from natural resources. Begun as a research project in artificial intelligence, this free and ad-free Web site draws enough dedicated players to sustain a ladder league. Multiplayer gaming is the norm, though you can go solo

against robots that become more challenging as you progress. Game play is smooth, and contests last from 30 to 60 minutes. Because the site is still under development, you'll occasionally lose your connection. But Settlers of Catan fans will appreciate the chance to play pick-up games at their leisure. —Jeffrey Kuta ■

GAMING ADVICE



TIPS FOR SMOOTH GAME PLAY

- 1. Download the necessary players and plug-ins.** To run Dark Orbit, 80's Classics, and Settlers of Catan, for example, you need WildTangent, Shockwave, and Java players, respectively. Your browser alerts you if you need to acquire such programs and then takes you to the appropriate download page.
- 2. Make sure that you have the minimum system requirements.** It's best to use a machine equipped with at least a 233-MHz processor, 32MB of RAM, integrated 3D graphics, a modem, a sound card, and speakers.
- 3. Consider buying a graphics board.** For optimum 3D-gaming performance, invest in a good graphics board. See a list of this month's Top 10 on page 133.
- 4. Make sure the programs on your PC are compatible.** In particular, look at the game, the browser, and the operating system. To check specifics about potential problems and driver updates, read the gaming site's FAQ page or visit Blue's News (www.bluesnews.com) or GameSpy (www.gamespy.com).
- 5. Opt for a separate input device.** Try using a game pad, a steering wheel, or a pen tablet if your keyboard or mouse doesn't provide enough control. Check out Logitech's WingMan Strike Force 3D (www.logitech.com), Microsoft's SideWinder Force Feedback Pro, and other joystick options from Belkin (www.belkin.com) and Thrustmaster (us.thrustmaster.com); or consider a tablet from Wacom (www.wacom.com).

—Grace Aquino

Four Ways IT Pros Save Money

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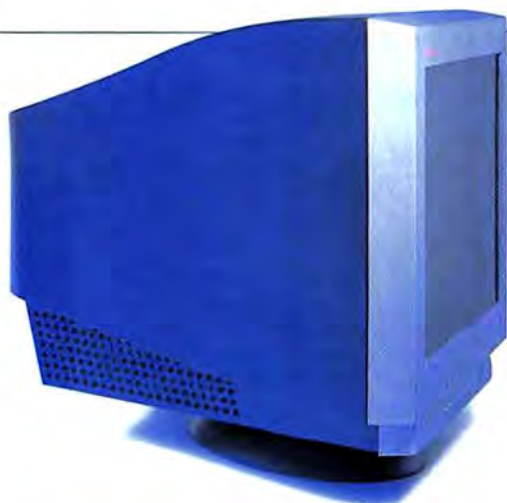
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TOP 100

EDITED BY RICHARD BAGULEY

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Top 10 Monitors

Compaq eschews the usual beige casing in favor of stylish silver and black on its \$329 17-inch P720 monitor.



Top 10 Digital Cameras

The little and the big: The card-deck-size Kyocera Finecam S3 (left) and the 5.2-megapixel Minolta Dimage 7 debut on our \$500-and-over chart.

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PC WorldBench 4: Measuring PC Speed

This month's Top 100 introduces an updated benchmark suite to test systems for our charts of office, home, and notebook PCs. PC WorldBench 4 runs tasks in 11 common programs to determine how fast a given system would be in everyday use. Performance scores from previous charts aren't directly comparable to the new scores, so we retested all recently reviewed systems that are expected to be on the market when you read this. See find.pcworld.com/15243 for more details on PC WorldBench 4.

Also, our *Top 10 Printers* chart is superseded this issue by "All-Purpose Printers," our roundup of color ink jet printers, on page 80.

Freelance writers Jon L. Jacobi, Richard Jantz, Joel Strauch, and Carla Thornton, and PC World editors Richard Baguley, Seán Captain, Lisa Cekan, Rebecca Freed, Alexandra Krasne, Heather Morra, Kalpana Narayanamurthi, and Alan Stafford contributed to this month's Top 100 section. Ulrike Diehlmann, Robert James, Elliott Kirschling, Jeff Kuta, Tony K. Leung, and Thomas Luong of the PC World Test Center performed testing on the products reviewed here, with support from Julio Giannobile and Julian Weatherby.

Top 15 Notebook PCs

The HP Pavilion N5430 is the first notebook in the Top 15 to use AMD's budget Duron-850 processor.

**Top 15 Home PCs**

The \$2250 Sony VAIO PCV-RX580 presents an intriguing package, but problems with the graphics card driver limited the resolutions the monitor could handle.

Top 10 Scanners

The \$399 Epson Perfection 2450 Photo hits the corporate scanners chart with an impressive optical resolution of 2400 by 4800.

**YOUR GUIDE TO THE TOP 100**

EACH MONTH WE TEST a large number of PCs, printers, monitors, and other products. Only the best products land on the charts, which are refreshed monthly. System configurations are shown as tested.

The overall rating for each product is calculated on a 100-point scale and reflects results from our hands-on

evaluations and performance tests. A 90-point score is exceptional, while one in the 70s is above average.

The PC WorldBench 4 score is a measure of how fast a PC can run a mix of common business applications as compared with our baseline machine, a Gateway Select 1200 with an Athlon-1200 processor, 128MB of PC133

SDRAM, and a 20GB hard drive. For example, a PC that scores 120 is 20 percent faster than the baseline system. The policies score is based on vendor support policies (not shown on charts).

Please see find.pcworld.com/15720 for more details on how we compile charts for the Top 100.

TOP 15 OFFICE PCs

	POWER SYSTEM	Issue tested	Overall rating	Street price (9/14/01)	PC WorldBench 4 performance score ¹	Faster	Comments
1	Best Buy Polywell Poly 815TS-1260 find.pcworld.com/13161	Retested	83	Average \$2150	Windows 2000	Very good 122	Intel's Pentium III for servers powers this unit to the second-highest score on the chart. (★★★★ Nov 01)
2	Best Buy Sys Performance 1400TD find.pcworld.com/11341	Retested	82	Average \$1774	Windows 2000	Outstanding 124	Fastest system on the chart comes with a rich, attractive display but scant software. (★★★★ Oct 01)
3	Gateway 700CB Deluxe find.pcworld.com/15880	NEW	82	Average \$2287	Windows 2000	Very good 119	Plenty of speed, tool-less entry to the case, and a good software bundle make for an excellent package. (★★★★ Nov 01)
4	MicronPC Millennia Max XP2 find.pcworld.com/10361	Retested	81	Inexpensive \$1663	Windows 2000	Good 109	Attractive display, ample documentation, and speedy Athlon-1200 performance helped by a \$314 price cut.
5	HP Vectra VL420 find.pcworld.com/15240	Retested	79	Very expensive \$3028	Windows 2000	Good 109	Corporate PC uses Intel's 845 chip set; has management features and an impressive flat-panel LCD monitor. (★★★★ Dec 01)
6	Polywell Poly 880K7-1400 find.pcworld.com/16760	Retested	78	Expensive \$2599	Windows 2000	Good 113	Includes an IEEE 1394 card, a GeForce3 graphics board, and a speedy Athlon processor. (★★★★ Oct 01)
7	Caliber Explorer 720 find.pcworld.com/10127	Retested	77	Average \$1899	Windows 2000	Very good 117	Plenty of power and a strong set of features, but only a one-year labor warranty and very limited tech support. (★★★ Dec 01)
VALUE SYSTEM		Percent of overall rating ▶		10 percent	25 percent		
1	Best Buy Micro Express MicroFlex 1200C find.pcworld.com/15221	Retested	84	Inexpensive \$999	Windows 2000	Very good 117	Excellent performance and ample expandability at an affordable price, but needs a better monitor. (★★★★ Dec 01)
2	Best Buy ABS Conquest VP find.pcworld.com/16700	NEW	80	Average \$1199	Windows XP Professional	Very good 115	Strong performance and an IEEE 1394 interface, but the monitor could be better. (★★★★ Nov 01)
3	Tangent Valera PC find.pcworld.com/13182	Retested	79	Inexpensive \$1149	Windows 2000	Good 111	Fast; dual monitor capability; integrated IDE RAID controller for adding another drive. Price falls \$250. (★★★★ Nov 01)
4	Sys TaskMaster 1000D find.pcworld.com/15800	NEW	75	Average \$1222	Windows 2000	Average 100	Reasonable speed for the price, and a good monitor, but expansion options are somewhat limited. (★★★★ Nov 01)
5	Compaq Evo D500 find.pcworld.com/15840	NEW	75	Average \$1254	Windows 2000	Average 100	Average speed and limited expandability, but an attractive case with tool-less access to components. (★★★★ Nov 01)
6	Gateway E-3600 find.pcworld.com/15820	NEW	74	Expensive \$1559	Windows 2000	Average 99	Remote manageability, tool-less access to components, and plenty of expansion options. (★★★★ Nov 01)
7	Dell Dimension 2100 find.pcworld.com/13183	Retested	74	Inexpensive \$999	Windows 2000	Poor 85	A stylish, affordable system with a good software bundle, but relatively slow performance. (★★★★ Nov 01)
8	Polywell Poly 830K7-1000 find.pcworld.com/10370	Retested	73	Inexpensive \$1150	Windows Me	Poor 90	Includes partition backup software along with a hard drive that is easy to remove through the front of the tower.
		Percentage of overall rating ▶		20 percent	20 percent		

All systems tested or retested under our new PC WorldBench 4 test suite. See find.pcworld.com/10860 for details on PC World's Star Ratings.

¹ Performance word scores reflect comparisons of PCs in the same category (power or value) running the same operating system. See "Your Guide to the Top 100" on page 123 for more details.

STARTING THIS MONTH, we are combining the power and value PC charts to give you all the information on business desktops that you need in one place: A single chart now tracks seven power and eight value PCs.

Last month's Best Buy, the Dell Dimension 8200, is no longer on the chart: Dell claims to be having supply problems and has discontinued the 2-GHz version of this system. That leaves the top spot open for the Polywell Poly 815TS-1260, which uses a 1260-MHz Intel Pentium III-S CPU.

Debuting on the chart this month is the Gateway 700CB Deluxe. Based on a 2-GHz Pentium 4 processor, this system achieved a score of 119 in our new PC WorldBench 4 tests. It's packed with features—such as a fast ATI Radeon graphics card—for a reasonable price of \$2287.

The value chart has several new entries. The ABS Conquest VP comes in at number two with a strong combination of fea-

Visit find.pcworld.com/16981 for reviews of all products ranked in this chart or tested this month.

BASE CONFIGURATION								Extra features	Design/ documentation	Vendor's reliability/ service
CPU	RAM (MB/type)	Hard drive (GB)	Monitor size (diagonal inches)	Graphics board	Case type ²	Open bays/slots				
Pentium III	256/ SDRAM	80 ³	19	Leadtek WinFast GeForce3	Midsize tower	5/3	Very good: 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, V.90 modem, network adapter, Lotus SmartSuite Millennium Edition	Very good/ Adequate	*/Fair ⁴	
Athlon- 1400	256/ SDRAM	61.5	19	ATI Radeon	Midsize tower	4/4	Good: 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, network adapter	Good/ Adequate	*/⁴	
Pentium 4- 2000	256/ RDRAM	40	19	ATI Radeon VE DDR	Midsize tower	4/3	Good: 20X-48X CD-ROM drive, network adapter, Microsoft Office XP Small Business Edition	Very good/ Adequate	Good/ Fair	
Athlon- 1200	128/ SDRAM	40	19	Creative Labs GeForce2 Ultra	Midsize tower	3/3	Very good: 12X/10X/32X CD-RW drive, V.90 modem, Microsoft Office 2000 Small Business Edition	Good/ Good	Good/ Fair ⁴	
Pentium 4- 2000	256/ SDRAM	80	17 (LCD)	HP GeForce2 MX-400	Desktop	2/3	Outstanding: 16X/10X/32X CD-RW drive, network adapter, Wake- on-LAN, chassis-intrusion detection	Outstanding/ Poor	Good/ Fair	
Athlon- 1400	256/ SDRAM	80	19	Leadtek WinFast GeForce3	Midsize tower	5/1	Very good: 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, V.90 modem, network adapter, Lotus SmartSuite 9.5	Adequate/ Adequate	*/⁴	
Pentium 4- 2000	256/ RDRAM	61	17	WinFast GeForce3	Midsize tower	3/4	Good: 12X DVD-ROM drive, 16X/10X/40X CD-RW drive, network adapter	Good/ Adequate	*/⁴	
	10 percent						10 percent	15 percent	30 percent	
Athlon- 1200	256/ SDRAM	40	17	Asus AGP-V7700	Midsize tower	3/3	Good: 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network adapter	Good/ Good	*/⁴	
Athlon- 1400	256/ SDRAM	40	17	Leadtek GeForce2 Pro	Midsize tower	3/2	Very good: 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, V.90 modem, network adapter	Good/ Adequate	*/⁴	
Athlon-1333	256/ SDRAM	40	19	Matrox Millennium G450	Midsize tower	5/3	Good: 12X DVD-ROM drive, network adapter, Corel WordPerfect Office 2000	Good/ Adequate	*/Fair ⁴	
Duron-1000	128/ SDRAM	41	19	Matrox Millennium G450	Minitor	2/2	Good: 12X/10X/32X CD-RW drive, network adapter	Adequate/ Adequate	*/⁴	
Pentium 4- 1700	256/ SDRAM	20	15	Compaq Vanta	Desktop	0/2	Average: 22X-48X CD-ROM drive, network adapter	Very good/ Adequate	Good/ Poor	
Pentium 4- 1700	128/ SDRAM	20	19	Visiontek GeForce3	Midsize tower	4/3	Good: 20X-48X CD-ROM drive, network adapter, Norton AntiVirus, LANDesk client manager	Good/ Adequate	Good/ Fair	
Celeron- 900	128/ SDRAM	20	17	Integrated Intel 810 chip set	Minitor	1/2	Average: 24X-48X CD-ROM drive, network adapter, Microsoft Office XP Small Business Edition	Good/ Good	Outstanding/ Fair	
Athlon- 1000	256/ SDRAM	40	17	MicroStar MS- 8818	Midsize tower	3/4	Outstanding: 16X DVD-ROM drive, 12X/10X/32X CD-RW drive, V.90 modem, network adapter, Norton AntiVirus, removable hard drive	Good/ Adequate	*/⁴	
	10 percent						10 percent	10 percent	30 percent	

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 Total space on two hard drives.

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.

tures and performance for \$1199. The Sys TaskMaster 1000D (which uses AMD's new 1-GHz Duron processor) captures fourth place, while the Compaq Evo 500 and the Gateway E-3600 enter the chart at number five and number six, respectively. Both offer a wide range of corporate features such as remote manageability and a case design that allows you to remove and insert drives without using tools.

Several new systems fell short this month. The Sys Performance 2000 received a score of 117 in our PC World-Bench 4 tests, but its \$2419 price helped keep it off the power chart. And though the Xi 1800+ MTower (with AMD's new Athlon XP 1800+ processor) earned a respectable PC WorldBench 4 score of 120, its very high price of \$2999 caused it to miss the power chart as well.



THE ABS CONQUEST VP provides a strong combination of power and features for \$1199.

TOP 15 NOTEBOOK PCs

	POWER NOTEBOOK	Issue tested	Overall rating	Street price (10/5/01)	PC WorldBench 4 performance score ¹	Faster	Comments
1	Best BUY Dell Inspiron 8100 find.pcworld.com/14880	Retested	91	Inexpensive \$2141	Windows 2000	Very good 100	Built for multimedia, with GeForce2 Go graphics plus IEEE 1394 and S-Video ports. Price sheds \$272 this month. (★★★★☆ Dec 01)
2	Dell Inspiron 4100 find.pcworld.com/16400	NEW	90	Average \$2685	Windows 2000	Outstanding 107	Accommodates lots of add-ins; sports dual pointing devices. Optional color palm rests and screen back available for \$20. (★★★★☆)
3	Gateway Solo 9550xl find.pcworld.com/16401	NEW	89	Average \$2827	Windows 2000	Outstanding 107	Includes giant screen and high-end multimedia connections, but unit is big and heavy. (★★★★☆)
4	IBM ThinkPad T23 find.pcworld.com/14881	Retested	88	Expensive \$3092	Windows 2000	Very good 105	Equipped with a whopping 48GB hard drive and a big screen with a light at the top. Drops \$275 in price. (★★★★☆ Dec 01)
5	Toshiba Satellite 3005-S403 find.pcworld.com/15342	Retested	88	Inexpensive \$2199	Windows Me	Very good 86	Midsize, black-and-silver unit with one modular bay on the front is a well-rounded laptop for consumers. (★★★★☆ Dec 01)
6	HP Omnibook 6100 find.pcworld.com/16402	NEW	85	Very expensive \$3699	Windows 2000	Very good 106	Corporate thoroughbred has it all, including a fast processor; a wireless-ready design; and a handsome, thin case with a modular bay. (★★★★☆)
7	WinBook Z1 find.pcworld.com/10442	Retested	83	Average \$2849	Windows 2000	Very good 103	Packs a large screen and lots of storage. Overhanging screen panel is somewhat clunky; support hours are limited.
VALUE NOTEBOOK		Percent of overall rating ▶		15 percent	20 percent		
1	Best BUY IBM ThinkPad R30 find.pcworld.com/16403	NEW	80	Average \$2099	Windows 2000	Good 88	Lightweight two-spindle unit has most standard connections, a light at the top of the screen, and built-in 802.11b wireless support. (★★★★☆)
2	Best BUY Chem USA ChemBook 3830 find.pcworld.com/12840	Retested	79	Inexpensive \$1499	Windows Me	Very good 79	All-in-one model also makes a nice stand-alone CD player. Battery, hard drive, and memory could be easier to access. (★★★☆☆ Nov 01)
3	Fujitsu LifeBook C Series find.pcworld.com/16404	NEW	78	Average \$1799	Windows 2000	Good 88	Outguns other laptops by offering four USB ports; DVD/CD-RW combination drive is a pleasant find in a low-cost notebook. (★★★★☆)
4	WinBook Z1 PIII-800 find.pcworld.com/16405	NEW	77	Expensive \$2249	Windows 2000	Very good 95	Speedy, with comfortable keyboard. Lacks built-in network connection, and screen panel overlaps front of case when closed. (★★★★☆)
5	WinBook Z1 Celeron-750 find.pcworld.com/16406	NEW	76	Inexpensive \$1496	Windows 2000	Average 83	Easy-to-upgrade laptop, but screen panel creates an overbite when notebook is closed. (★★★☆☆)
6	HP Pavilion N5430 find.pcworld.com/16408	NEW	75	Inexpensive \$1399	Windows Me	Average 68	Offers great audio controls, including see-in-the-dark buttons and track LED for playing CDs. (★★★☆☆)
7	Toshiba Portégé 4000 find.pcworld.com/16407	NEW	75	Very expensive \$2579	Windows 2000	Average 78	Has built-in Bluetooth and 802.11b wireless support, plus Secure Digital media slot. Delivers strong sound. (★★★★☆)
8	Gateway Solo 3450 find.pcworld.com/15380	Retested	75	Expensive \$2499	Windows 98 SE	Very good 76	Slender 3-pound portable morphs into full-size notebook with snap-on docking base. Narrow keyboard feels shallow. (★★★★☆ Dec 01)
		Percent of overall rating ▶		20 percent	15 percent		

See find.pcworld.com/10860 for details on PC World's Star Ratings.

¹Performance word scores reflect comparisons of PCs in the same category (power or value) running the same operating system. See "Your Guide to the Top 100" on page 123 for more details.

READY TO SPRING FOR A NOTEBOOK that offers a little something extra—such as added performance, a bigger screen, a spacious hard drive, or built-in wireless support? If so, you'll like our decision to expand the Top 15's power category from five to seven notebooks. The other big news: This month we tested (or retested) notebooks under our new benchmark, PC WorldBench 4. For more information about how we've revised the testing suite, look online at find.pcworld.com/15243.

All nine new laptops we tested this month made our list. Dell's Inspiron 4100, a minor upgrade of the business-oriented Inspiron 4000, earns second place on the power chart, helped by Intel's fastest mobile processor, the Pentium III-M-1200/800. Gateway's high-performance Solo 9550xl, an upgrade of the 9500xl that offers improved audio controls and more-comfortable palm rests, sits in third place.

Visit find.pcworld.com/16600 for reviews of all products ranked in this chart or tested this month.

BASE CONFIGURATION						Extra features ²	Overall design	Battery life (hours:min) ³	Average weight (pounds) ⁴	Vendor's reliability/service
CPU	Screen (inches)	RAM (MB)	Hard drive (GB)	Pointing device	Multi-purpose bays					
Pentium III-M-1000/733	15	256	20	Touchpad, eraserhead	1	Very good: 8X DVD-ROM drive, built-in modem and network adapter, Microsoft Office XP Small Business Edition 2002	Outstanding	Good/ 3:01	Heavy/ 9.0	Good/ Fair
Pentium III-M-1200/800	14.1	256	20	Touchpad, eraserhead	2	Good: 6X DVD-ROM and 4X/4X/24X CD-RW combo drive, built-in modem and network adapter, Microsoft Office XP SBE 2002	Very good	Average/ 2:58	Heavy/ 8.1	Good/ Fair
Pentium III-M-1133/733	15.7	256	30	Touchpad	2	Very good: 6X DVD-ROM and 4X/4X/24X CD-RW combo drive, built-in modem and network adapter, Office XP SBE 2002	Very good	Good/ 3:42	Heavy/ 9.3	Fair/ Fair
Pentium III-M-1133/733	14.1	256	48	Eraserhead	1	Good: 8X DVD-ROM drive, built-in modem and network adapter, Lotus SmartSuite	Outstanding	Average/ 2:41	Light/ 6.5	Good/ Fair
Pentium III-M-1000/700	14.1	256	30	Eraserhead	1	Good: 6X DVD-ROM and 4X/4X/24X CD-RW combination drive, built-in modem and network adapter, Lotus SmartSuite	Very good	Good/ 3:02	Average/ 7.3	Good/ Fair
Pentium III-M-1133/733	15	256	30	Touchpad, eraserhead	1	Good: 8X DVD-ROM drive, built-in modem and network adapter	Outstanding	Very good/ 3:58	Average/ 7.8	Good/ Fair
Pentium III-1000/700	15	256	30	Touchpad	2	Good: 8X DVD-ROM and 4X/4X/24X CD-RW combination drive, built-in modem	Very good	Good/ 3:06	Heavy/ 8.5	1/1
5 percent						10 percent	10 percent	5 percent	10 percent	25 percent
Pentium III-1000/700	14.1	256	30	Eraserhead	1	Good: 8X/4X/24X CD-RW drive, built-in modem and network adapter, Lotus SmartSuite	Outstanding	Average/ 2:22	Light/ 6.7	Good/ Fair
Pentium III-1000	14.1	256	20	Touchpad	0	Average: 8X/4X/32X CD-RW drive, built-in modem and network adapter	Average	Average/ 2:54	Average/ 7.7	1/1
Pentium III-1000/700	14.1	128	30	Touchpad	0	Good: 8X DVD-ROM and 8X/4X/24X CD-RW combination drive, built-in modem and network adapter	Average	Good/ 3:18	Average/ 7.7	Good/1
Pentium III-800/650	15.1	256	20	Touchpad	1	Good: 6X DVD-ROM and 4X/4X/32X CD-RW drive, built-in modem	Very good	Good/ 3:03	Heavy/ 8.4	1/1
Celeron-750	15.1	128	10	Touchpad	1	Average: 12X-24X CD-ROM drive, built-in modem	Very good	Average/ 2:57	Heavy/ 8.3	1/1
Duron-850	14.1	128	20	Touchpad	0	Average: 8X DVD-ROM drive, built-in modem and network adapter	Average	Poor/ 1:55	Average/ 8.0	Good/ Fair
Pentium III-750/550	12.1	256	30	Eraserhead	1	Good: 8X DVD-ROM and 4X/4X/24X CD-RW combination drive, built-in modem and network adapter	Very good	Very good/ 4:03	Very light/ 5.3	Good/ Fair
Pentium III-750	12.1	320	20	Touchpad	2	Good: 8X DVD-ROM and 8X/4X/24X CD-RW combination drive, built-in modem and network adapter, Microsoft Works 2002	Average	Poor/ 1:33	Light/ 6.5	Fair/ Fair
5 percent						10 percent	10 percent	5 percent	10 percent	25 percent

² Word score reflects both listed and unlisted features.

³ Unless otherwise noted, all notebooks come with a lithium ion battery.

⁴ Includes computer, AC adapter, power cord, floppy drive, and optical drive.

⁵ Insufficient data to give a rating.

HP's Omnibook 6100—with a sensibly designed, dark gray magnesium case, strong performance, and long battery life—takes sixth place on the power chart.

Our value list turns over almost completely, headed by IBM's new, affordably priced ThinkPad R30, which includes built-in 802.11b wireless support. Fujitsu's four-USB-port laptop—the LifeBook C Series—earns third place, followed by a

couple of WinBook models with 15-inch screens. HP's Pavilion N5430, in sixth place, is the first AMD Duron-equipped laptop to reach the chart. Finally, at number seven, Toshiba's sleek thin-and-light model, the Portégé 4000, impressed us with its 4.5-pound weight, its 4-hour battery life, and its built-in antennas supporting both 802.11b and Bluetooth wireless technologies. —Carla Thornton ▶



GATEWAY'S SOLO 9550xl sports a 15.7-inch screen—the largest currently available.

TOP 15 HOME PCs

	POWER SYSTEM	Issue tested	Overall rating	Street price (10/12/01)	PC WorldBench 4 performance score ¹	Faster	Comments
1	Best Buy ABS Performance 1 find.pcworld.com/16500	NEW	95	Inexpensive \$1899	Windows XP Home Outstanding 119		Provides plenty of speed for a low price. The monitor was unimpressive, however, and the sound system had a slight hiss. (★★★★☆)
2	Falcon Northwest Mach V find.pcworld.com/15107	Dec 01	89	Very expensive \$3995	Windows XP Professional Outstanding 121		Speed champ boasts a powerful, refined sound system. You'll pay dearly for this PC, however, and the monitor is only so-so. (★★★★☆ Dec 01)
3	Polywell Poly K7-1400DDR find.pcworld.com/15115	Dec 01	85	Inexpensive \$1999	Windows XP Home Very good 115		Speedy PC drops \$200. Monitor output varied from handsome on graphics to blurry on smaller text. (★★★★☆ Dec 01)
4	Sony VAIO PCV-RX580 find.pcworld.com/16503	NEW	77	Inexpensive \$2250	Windows XP Home Average 96		Great-looking system comes loaded for music and video buffs. Unfortunately, it lagged in our speed tests. (★★★★☆)
5	Alienware Area-51 find.pcworld.com/15102	Dec 01	74	Expensive \$3299	Windows XP Home Good 107		Loaded gaming system drops \$100, but monitor quality disappoints. (★★★★☆ Dec 01)
6	Gateway 700C find.pcworld.com/16442	Dec 01	67	Average \$2579	Windows XP Home Average 102		Brilliant LCD monitor tops off a good-looking system. Speed and sound quality are respectable, but not stunning. (★★★★☆ Dec 01)
7	HP Pavilion 7905 find.pcworld.com/15111	Dec 01	65	Average \$2638	Windows XP Home Average 99		Won kudos for game play and its digital media features, but disappointed on speed, monitor quality, and sound quality. (★★★★☆ Dec 01)
VALUE SYSTEM		Percent of overall rating ▶		10 percent	25 percent		
1	Best Buy NuTrend Athlon Mega 3 find.pcworld.com/15112	Dec 01	94	Average \$1339	Windows XP Home Outstanding 111		Our speedy value champ includes a great-looking LCD monitor, a printer, and extensive documentation. (★★★★☆ Dec 01)
2	Dell Dimension 4300 find.pcworld.com/15105	Dec 01	93	Inexpensive \$1209	Windows XP Home Good 94		Good all-around system but only middling performance, audio, and video. Documentation is first-rate. (★★★★☆ Dec 01)
3	HP Pavilion 7965 find.pcworld.com/16502	NEW	75	Expensive \$1648	Windows XP Home Good 90		This well-stocked, smartly built system came up short on sound and monitor quality, especially when playing DVDs. (★★★★☆)
4	Polywell Poly 1000DU find.pcworld.com/15114	Dec 01	73	Average \$1350	Windows XP Home Good 93		System squeezes impressive performance from a low-cost processor. But you can get a higher-end CPU for the price. (★★★★☆ Dec 01)
5	Dell Dimension 2100 find.pcworld.com/15104	Dec 01	73	Very inexpensive \$799	Windows XP Home Average 79		While not a speed demon, this well-built, low-cost PC is fine for basic computing. Includes thorough documentation. (★★★★☆ Dec 01)
6	Gateway 500X find.pcworld.com/15109	Dec 01	73	Expensive \$1548	Windows XP Home Average 87		Solidly constructed; lagged on performance tests, but well equipped for music lovers. (★★★★☆ Dec 01)
7	Falcon Northwest Talon 3.1 find.pcworld.com/15108	Dec 01	71	Very expensive \$1845	Windows XP Home Outstanding 116		Beats most power systems, but you pay a lot for its performance. Monitor displayed handsome images and text. (★★★★☆ Dec 01)
8	Systemax Venture M U17 find.pcworld.com/15117	Dec 01	68	Average \$1299	Windows XP Home Good 92		Solid, beginner-oriented PC can double as an entertainment center, with a TV-tuner, bundled games, and DVD player. (★★★★☆ Dec 01)
		Percent of overall rating ▶		20 percent	20 percent		

Go to find.pcworld.com/10860 for details on PC World's Star Ratings.

¹ Performance word scores reflect comparisons of PCs in the same category (power or value) running the same operating system. For more details, see "Your Guide to the Top 100" on page 123.

MUCH HAS CHANGED SINCE November's Top 15 chart. We gathered all-new contenders for December's "Home PCs: All This and XP Too" (find.pcworld.com/16620), and we've revised the way we test and rate systems. All of the PCs in this Top 15 run Windows XP, and we expect home vendors to phase out PCs with older versions of Windows in coming months.

We've also adjusted the mix of PCs, creating a near-even split of seven power systems and eight value machines. Our Best Buy value PC

from last month, the NuTrend Athlon Mega 3, retains the top spot. However, a late shakeup just before we went to press realigned our power chart. The Dell Dimension 8200 received a Best Buy in December, but Dell told us it would no longer sell the 2-GHz Pentium 4 model we tested because the company could not get parts for it. As a result, the power Best Buy goes to ABS's new, lightning-fast

Visit find.pcworld.com/16520 for reviews of all products ranked in this chart or tested this month.

BASE CONFIGURATION							Extra features	Graphics/ sound quality	Setup and ease of use	Vendor's reliability/ service
CPU	RAM (MB/type)	Hard drive (GB)	Monitor (inches)	Graphics	Case type ²					
Athlon XP 1800+	256/DDR SDRAM	60	19	64MB Leadtek Win- fast GeForce3 TDH	Midsize tower	Very good: 16X DVD-ROM drive, 24X/10X/40X CD-RW drive, V.90 modem, net- work adapter, Corel WordPerfect Office 2002, Ulead VideoStudio Basic 4.0	Good/Good	Good	3/3	
Athlon XP 1800+	512/DDR SDRAM	80 ⁴	22	64MB VisionTek GeForce3 Ti 500	Midsize tower	Average: 16X DVD-ROM drive, 24X/10X/40X CD-RW drive, network adapter	Good/ Outstanding	Very good	3/3	
Athlon- 1400	256/DDR SDRAM	80 ⁴	19	64MB Leadtek Win- fast GeForce3	Midsize tower	Good: 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, V.90 modem, network adapter, Lexmark X83 printer, Logitech USB Webcam	Good/ Average	Good	3/3	
Pentium 4-1800	512/ SDRAM	80	19	32MB Asus AGP-V3800M	Minitower	Outstanding: DVD-RW and 8X/4X/2X/ CD-RW combo drive, 20X-40X CD-ROM drive, V.90 modem, WordPerfect 9, Photoshop Elements and Premiere 6.0 LE	Good/ Average	Average	Good/ ³	
Pentium 4-2000	256/ RDRAM	60	19	64MB PNY Verto GeForce3	Tower	Outstanding: 16X DVD-ROM drive, 24X/10X/40X CD-RW drive, V.90 modem, network adapter, Microsoft SideWinder joystick and Game Pad Pro	Good/Good	Average	3/3	
Pentium 4-2000	256/ RDRAM	80	15 (LCD)	64MB VisionTek NV20	Midsize tower	Average: 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, network adapter, Microsoft Works Suite 2001, Norton AntiVirus 2002	Very good/ Good	Average	Fair/Fair	
Pentium 4-2000	512/ SDRAM	80	19	64MB HP GeForce3 Ti 200	Midsize tower	Average: 16X DVD-ROM drive, 16X/8X/32X CD-RW drive, V.90 modem, network adapter, Microsoft Works, Pinnacle Studio DV 7	Good/ Average	Good	Fair/ Poor	
10 percent							10 percent	15 percent	5 percent	25 percent
Athlon- 1333	256/DDR SDRAM	40	15 (LCD)	64MB Leadtek Win- fast GeForce2	Midsize tower	Very good: 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, V.90 modem, net- work adapter, Epson Stylus Color 777 printer, WordPerfect Office 2000	Good/Good	Average	3/3	
Pentium 4-1500	256/ SDRAM	40	17	32MB Dell GeForce2 MX	Midsize tower	Good: 16X/10X/40X CD-RW drive, network adapter, Microsoft Works Suite 2001	Very good/ Average	Good	Outstanding/ Good	
Pentium 4-1700	512/ SDRAM	80	17	32MB Asus AGP-V3800M	Midsize tower	Outstanding: 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, V.92 modem, net- work adapter, Microsoft Works 2001, Pinnacle Studio DV, McAfee Security	Average/ Poor	Good	Fair/Poor	
Duron- 1000	128/DDR SDRAM	40	19	32MB Matrox Millennium G450	Midsize tower	Very good: 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, V.90 modem, net- work adapter, Lexmark 253 printer, Logitech Webcam	Good/ Very good	Average	3/3	
Celeron- 1100	128/ SDRAM	20	17	Integrated Intel 810	Minitower	Average: 24X-48X CD-ROM drive, V.92 modem, network adapter, Microsoft Works Suite 2001	Average/ Average	Good	Outstanding/ Good	
Pentium 4-1700	256/ SDRAM	40	17	64MB Gateway GeForce2 MX400	Minitower	Very good: 16X DVD-ROM drive, 16X/8X/32X CD-RW drive, V.90 modem, net- work adapter, Creative Nomad II MP3 player, Microsoft Works Suite 2001	Good/Good	Very good	Fair/Fair	
Athlon- 1333	256/DDR SDRAM	20	17	64MB VisionTek GeForce2 Ultra	Midsize tower	Limited: 16X DVD-ROM drive, V.90 modem, network adapter	Good/ Average	Average	3/3	
Pentium 4-1700	128/ RDRAM	40	17	32MB ATI All-in- Wonder Pro	Midsize tower	Good: 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, SoftK56 modem, network adapter, Microsoft Works Suite, Flight Simulator 2000, Motocross Madness	Average/ Good	Good	3/3	
10 percent							10 percent	10 percent	5 percent	25 percent

¹ Vertical cases are towers (over 20 inches), midsized towers (15.5 to 20 inches), or minitowers (under 15.5 inches). Horizontal cases are desktops (5 inches or taller) or compacts (under 5 inches).

² Insufficient data to give a rating.

⁴ Two 40GB hard drives with RAID.

Performance 1. Also debuting are Sony's stylish VAIO PCV-RX580 on the power side and HP's feature-rich Pavilion 7965, a value unit. Another newcomer, Gateway's shoebox-size 300X, missed the chart due to its ho-hum performance. Compaq's Presario 5000Z drops out because Compaq is revising its entire Presario line.

We're now speed-testing systems on our new benchmark, PC WorldBench 4,

and we've updated our subjective testing criteria for items like monitor and speaker quality. For monitors, we use a subset of our current *Top 10 Monitors* tests, plus a high-action scene from the movie *Gladiator*. Finally, we've revamped our video game testing, replacing the frames-per-second scores with our testers' assessments of image quality and the smoothness of game play. —Sean Captain ▶



NUTREND'S ATHLON MEGA 3 packs an LCD monitor, powerful speakers, and a printer.

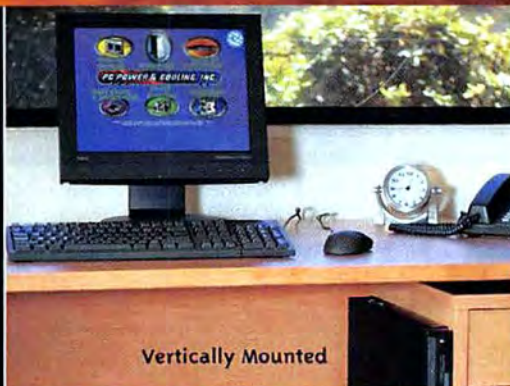
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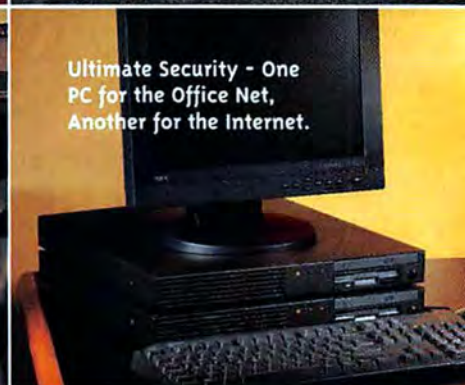
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TOP 10 MONITORS

Visit find.pcworld.com/16320 for reviews of all products ranked in this chart or tested this month.

A NEW 17-INCH BEST BUY THIS MONTH, Compaq's P720 produces great-looking text and graphics and eschews basic beige packaging in favor of an attractive black-and-silver case. Landing at number six, the new \$159 KDS XF-7i covers just the fundamentals in image quality, navigation controls, and

documentation, but it's also the least expensive monitor here. Hyundai's ImageQuest Q770 debuts at number eight on our chart. With a compact form and intuitive navigation controls, the Q770 is easy to use, but its text looks better than its graphics. Next month we'll review 19-inch CRT monitors. ▶

	17-INCH MONITOR	Street price (10/17/01)	Overall rating	Quality of text/graphics	Comments
1	Best BUY Samsung SyncMaster 700NF find.pcworld.com/10571	\$239	93	Very good/Excellent	FEATURES: 15.9-inch viewable area, .25mm stripe-pitch Diamondtron NF tube, up to 119-Hz refresh rate, up to 1920 by 1440 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Renders extremely sharp text and beautiful color graphics. A nifty retracting panel on the front bezel holds easy-to-use on-screen controls. Drops \$30 this month. (★★★★★ Sept 01)
2	Best BUY Compaq P720 find.pcworld.com/16267 NEW	\$329	90	Excellent/Excellent	FEATURES: 16.2-inch viewable area, .25mm stripe-pitch Diamondtron NF tube, up to 118-Hz refresh rate, up to 1600 by 1200 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: This sleek black-and-silver monitor has eight navigation and shortcut buttons. Image quality looked great all around, with sharp text and realistic colors. (★★★★★)
3	Iiyama Vision Master Pro 413 find.pcworld.com/13260	\$299	88	Very good/Excellent	FEATURES: 15.9-inch viewable area, .25mm stripe-pitch Diamondtron NF tube, up to 118-Hz refresh rate, up to 1600 by 1200 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 12-hour weekday toll-free support. SUMMARY: Produces bright, vibrant graphics. Controls are woefully confusing, and the on-screen menus time out before you can decipher them. Includes dual inputs. (★★★★★ Nov 01)
4	ViewSonic G75f find.pcworld.com/13380	\$269	88	Very good/Very good	FEATURES: 16-inch viewable area, .25mm stripe-pitch Perfect Flat tube, up to 105-Hz refresh rate, up to 1280 by 1024 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Text is clearly readable and colors appear well saturated. On-screen controls are well organized, but button combinations take a while to figure out. (★★★★★ Nov 01)
5	Sony CPD-G220S find.pcworld.com/10572	\$350	86	Very good/Excellent	FEATURES: 15.9-inch viewable area, .24-.25mm variable-pitch FD Trinitron tube, up to 85-Hz refresh rate, up to 1600 by 1200 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Top-notch image quality at a relatively high price. While the controls are a bit confusing, the manual explains them and includes a thorough troubleshooting section. (★★★★★ Sept 01)
6	KDS XF-7i find.pcworld.com/16266 NEW	\$159	85	Good/Good	FEATURES: 16-inch viewable area, .25mm diagonal dot-pitch shadow mask tube, up to 85-Hz refresh rate, up to 1024 by 768 resolution at 70 Hz, three-year warranty, 11-hour weekday toll-free support. SUMMARY: Boasts the lowest price on the chart. Text and graphics look generally sharp and detailed, though not outstanding. On-screen menus and documentation cover the basics. (★★★☆☆)
7	Eizo Nanao FlexScan T565 find.pcworld.com/10576	\$415	84	Very good/Very good	FEATURES: 15.8-inch viewable area, .25mm stripe-pitch Trinitron tube, up to 118-Hz refresh rate, up to 1600 by 1200 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 8-hour weekday toll-free support. SUMMARY: Colors in photos and Web pages look lovely, and text is sharp. But far less expensive models perform even better, and tech support hours are minimal. Includes a USB hub. (★★★★★ Sept 01)
8	Hyundai ImageQuest Q770 find.pcworld.com/16269 NEW	\$199	81	Very good/Satisfactory	FEATURES: 16-inch viewable area, .25mm diagonal dot-pitch Dyna Flat tube, up to 75-Hz refresh rate, up to 1024 by 768 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 8-hour weekday toll-free support. SUMMARY: This inexpensive monitor has a small footprint and renders text well, but graphics look foggy. It includes a setup poster and a CD-ROM with animated guides, but no manual. (★★★☆☆)
9	CTX EX700F find.pcworld.com/13281	\$185	81	Good/Satisfactory	FEATURES: 16.3-inch viewable area, .25mm diagonal dot-pitch flat shadow mask tube, up to 89-Hz refresh rate, up to 1024 by 768 resolution at 70 Hz, three-year warranty, 12-hour weekday toll-free support. SUMMARY: With respectable text quality and a low price, this model makes a good choice for price-conscious buyers who don't work with graphics. (★★★☆☆ Nov 01)
10	Hewlett-Packard P720 find.pcworld.com/13321	\$259	80	Good/Satisfactory	FEATURES: 15.9-inch viewable area, .25mm diagonal dot-pitch flat shadow mask tube, up to 85-Hz refresh rate, up to 1280 by 1024 resolution at 70 Hz, TC0'99 compliant, three-year warranty, 11-hour weekday toll-free support. SUMMARY: A reasonably priced monitor for people who work primarily with text, but graphics fans should look elsewhere. Controls are basic but easy to navigate. (★★★☆☆ Nov 01)

HOW WE TEST: Twelve judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, spreadsheets, Web pages, and scanned photos. The overall rating is based on text and graphics quality (25 percent each), price (25 percent), features and ease of use (20 percent), and service and support (5 percent). The best possible overall rating is 100. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. See find.pcworld.com/10860 for details on PC World's Star Ratings.

¹ Maximum refresh rate at 1024 by 768 resolution (the tested resolution for this size monitor). ² Uses an aperture grille in which parallel wires near the sides of the screen are strung farther apart than those at the middle.

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TOP 10 GRAPHICS BOARDS

TEST
Center

Visit find.pcworld.com/16280 for reviews of all products ranked in this chart or tested this month.

WHERE HAVE ALL THE GeForce3 cards gone? NVIDIA is phasing out its high-end graphics chip set and replacing it with the more powerful GeForce3 Ti. Similarly, the GeForce2 Ti chip set will replace the GeForce2 GTS, GeForce2 Ultra, and GeForce2 Pro. Look for reviews of cards using these new

chip sets next month. As a result of the transition, our chart is littered with inexpensive cards from a variety of vendors. GeForce2 MX-400-based cards from Asus and ELSA debut at number seven and number eight, respectively. Matrox's dual-head Millennium G550 hops on at number nine. ►

	AGP BOARD	Street price (10/17/01)	Overall rating	Image quality	Overall speed	Features rating	Comments
1	Best BUY CardExpert GeForce2 MX TwinView/Vivo Golden Sample find.pcworld.com/11423	\$129	95	Very good	Good	Very good	FEATURES: NVIDIA GeForce2 MX-400 chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video-in and -out, composite-in and -out; software DVD player, video-editing software. SUMMARY: Solid performance and image quality, plus it can display to two monitors or to a monitor and a TV simultaneously. (★★★★☆ Oct 01)
2	Best BUY ATI All-in-Wonder Radeon find.pcworld.com/10140	\$199	93	Good	Good	Outstanding	FEATURES: ATI Radeon chip, 32MB of DDR SDRAM, 350-MHz RAMDAC; DVI-out, TV tuner, hardware DVD support; graphics-editing software. SUMMARY: This card makes a strong showing, thanks to its video features, the bundled software, and a \$50 price drop this month. It's a great card for video-editing mavens.
3	MSI MX400 Pro-VT32S find.pcworld.com/14540	\$89	92	Very good	Good	Good	FEATURES: NVIDIA GeForce2 MX-400 chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video-in and -out, composite-out; color-calibration utility, software DVD player, overclocking utilities. SUMMARY: Excellent value for casual gamers, but no bundled games. Produced a few glitches in some test games. (★★★☆☆ Dec 01)
4	AOpen MX400-A find.pcworld.com/11321	\$129	91	Good	Good	Very good	FEATURES: NVIDIA GeForce2 MX-400 chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video-in and -out, composite-in and -out, TV tuner; color-calibration utility, software DVD player, video-editing software. SUMMARY: Has strong image quality and features, and a TV tuner to boot. (★★★★☆ Oct 01)
5	Asus AGP-V7100 Pro Pure 32MB find.pcworld.com/13101	\$89	90	Very good	Good	Good	FEATURES: NVIDIA GeForce2 MX-400 chip, 32MB of SDRAM, 350-MHz RAMDAC; color-calibration utility, software DVD player, three PC games. SUMMARY: A generous game bundle, fine performance, and a low price make this model a great choice for casual gamers on a budget. (★★★★☆ Nov 01)
6	ATI Radeon 64MB DDR find.pcworld.com/10284	\$199	87	Good	Very good	Very good	FEATURES: ATI Radeon chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; hardware DVD support, S-Video-out, composite-in and -out; graphics-editing software. SUMMARY: This card offers solid performance at high resolutions, a generous helping of ports, and a substantial amount of RAM.
7	Asus AGP-V7100 Pro TV 64MB find.pcworld.com/16220	NEW \$105	87	Good	Good	Good	FEATURES: NVIDIA GeForce2 MX-400 chip, 64MB of SDRAM, 350-MHz RAMDAC; S-Video-out, composite-out; color-calibration and overclocking utilities, software DVD player, two PC games. SUMMARY: 64MB of RAM lets it run games at high resolutions, though slowly. Includes Star Trek New Worlds and Messiah. (★★★★☆)
8	ELSA Gladiac 511 find.pcworld.com/16221	NEW \$129	86	Very good	Good	Good	FEATURES: NVIDIA GeForce2 MX-400 chip, 64MB of SDRAM, 350-MHz RAMDAC; S-Video-out, composite-out; color-calibration utility, software DVD player, two PC games. SUMMARY: Performs similarly to the comparably equipped Asus AGP-V7100 Pro TV 64MB, but costs a bit more. (★★★★☆)
9	Matrox Millennium G550 find.pcworld.com/16240	NEW \$125	85	Good	Average	Very good	FEATURES: Matrox G550 chip, 32MB of DDR SDRAM, 360-MHz RAMDAC; dual-DVI support, hardware DVD support, S-Video-out, composite-out; color-calibration utility. SUMMARY: The included Headcasting software lets you put a digitized version of your face into games. We had to disable fog to play Test Drive 6. (★★★★☆)
10	MSI MX400 Pro-TC64S find.pcworld.com/11302	\$100	83	Good	Good	Average	FEATURES: NVIDIA GeForce2 MX-400 chip, 64MB of SDRAM, 350-MHz RAMDAC; S-Video-out; color-calibration utility, overclocking utility, software DVD player, one PC game. SUMMARY: Well priced, but the output was rather dark and lacked contrast in several of the games used in our tests. (★★★★☆ Oct 01)

HOW WE TEST: We test graphics boards under Windows Millennium Edition. Our performance scores are based on tests that we evaluate on frame rate (50 percent) and image quality (50 percent). We use GT Interactive's Unreal Tournament, Id Software's Quake III Arena, Interplay's MDR2 Demo, Infogrames' Test Drive 6, and the Caligari TrueSpace 4.2 Benchmark for both performance and image-quality testing. We test graphics boards in a Dell Dimension 4100 Series with a PIII-933 CPU and 128MB of PC133 SDRAM. To test each board, we use drivers supplied by the vendor. Overall rating is based on performance (42.5 percent), features (27.5 percent), price (20 percent), and support policies (10 percent). All boards are 4X AGP compatible unless otherwise noted. See find.pcworld.com/10860 for details on PC World's Star Ratings.



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Actual items may differ from pictured. **Quantispeed architecture operates at 1400MHz. ***Quantispeed architecture operates at 1467MHz. ****Quantispeed architecture operates at 1533MHz.

TOP 10 CD-RW DRIVES

Visit find.pcworld.com/16901 for reviews of all products ranked in this chart or tested this month.

THOUGH 20X AND 24X DRIVES now claim more than half the spots in the Top 10, 16X drives remain a compelling option for bargain hunters. Four 16X models earn places on the chart this month, including a newcomer, Samsung's SW-216. Another newcomer—the 20X/10X/40X PCRW2010 from

Philips—debuts at number two, thanks to its strong performance and reasonable price (which is matched by three of the four 24X drives on our chart). Lite-On's 24x10x40x LTR-24102B has price and speed on its side, but its bare-bones documentation pushes it toward the bottom of the list. ▶

	CD-RW DRIVE	Street price (10/10/01)	Overall rating	Performance/support policies	CD-R write speed for 650MB/CD-RW write speed for 100MB (min:sec)	Comments
1	Best Buy TDK 24/10/40 VeloCD ReWriter find.pcworld.com/11142	\$150	86	Outstanding/ Very good	4:12/1:20	FEATURES: 24X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.12, one-year warranty, 10.5-hour daily toll-free support. SUMMARY: One of the fastest drives we've tested, this inexpensive model holds fast to the number one spot thanks to seven-day-a-week tech support. (★★★★☆ Oct 01)
2	Best Buy Philips PCRW2010 find.pcworld.com/16060 NEW	\$150	82	Outstanding/ Very good	4:31/1:19	FEATURES: 20X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.22, one-year warranty, 11-hour weekday and 8-hour weekend toll-free support. SUMMARY: A fast CD-R burner for its speed class, this sharp-looking drive is bolstered by daily tech support and helpful documentation. (★★★★☆)
3	Samsung SW-216 find.pcworld.com/16080 NEW	\$100	82	Very good/ Good	5:29/1:19	FEATURES: 16X/10X/32X, IDE, internal, 2MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.11, one-year warranty, 10-hour weekday toll-free support. SUMMARY: This unit joins our chart because of its low price and solid all-around performance—it's one of the best models we've seen among 16X drives. (★★★★☆)
4	CenDyne Lightning 24x10x40 find.pcworld.com/14020	\$150	81	Outstanding/ Fair	4:11/1:19	FEATURES: 24X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.26, one-year warranty, 9-hour weekday and 4-hour Saturday support (calls are not toll-free). SUMMARY: Excellent performance and a competitive price (\$30 off this month) make this 24X drive a great choice. (★★★★☆ Dec 01)
5	Yamaha LightSpeed CRW2200EZ find.pcworld.com/11146	\$190	81	Very good/ Very good	4:49/1:16	FEATURES: 20X/10X/40X, IDE, internal, 8MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.11, one-year warranty, 12-hour weekday toll-free support. SUMMARY: This speedy drive logged the fastest time on our CD-RW tests; it also has a terrific software bundle. Price drops \$30 since last month. (★★★★☆ Oct 01)
6	LG Electronics GCE-8160B find.pcworld.com/14000	\$130	79	Very good/ Very good	5:32/1:31	FEATURES: 16X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Adaptec Easy CD Creator 4.03 and DirectCD 3.03, one-year warranty, 12-hour weekday toll-free support. SUMMARY: LG's inexpensive drive is a strong all-around performer and a fast CD-ROM reader for its speed class. (★★★★☆ Dec 01)
7	Sony CRX1611/82U find.pcworld.com/11136	\$130	79	Very good/ Very good	5:36/1:21	FEATURES: 16X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, BHA's B's Recorder Gold 1.99 and Clip, one-year warranty, 12-hour weekday and Saturday toll-free support. SUMMARY: Ranks as a good overall performer—in spite of sluggish times for installing Office and writing an image to CD-R. (★★★★☆ Oct 01)
8	QPS Que Internal 24x10x40x CD-RW find.pcworld.com/14040	\$165	79	Outstanding/ Good	4:12/1:20	FEATURES: 24X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.23, one-year warranty, 11.5-hour weekday support (calls are not toll-free). SUMMARY: First-rate CD-R and CD-RW write performance plus a reasonable price keep this no-frills drive in the Top 10. (★★★★☆ Dec 01)
9	Lite-On 24x10x40x LTR-24102B find.pcworld.com/16040 NEW	\$150	78	Outstanding/ Fair	4:31/1:19	FEATURES: 24X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Ahead Nero Burning ROM 5.5 and InCD 2.26, one-year warranty, 9-hour weekday support (calls are not toll-free). SUMMARY: This unit's performance ranks it with the best 24X-class drives we've seen, but lackluster documentation and support hold it back. (★★★★☆)
10	Iomega 16x10x40 Internal CD-RW find.pcworld.com/11128	\$175	76	Good/ Very good	5:37/1:45	FEATURES: 16X/10X/40X, IDE, internal, 2MB buffer, buffer underrun protection, Adaptec Easy CD Creator 4.03 and DirectCD 3.03, one-year warranty, 12-hour weekday and 7-hour Saturday toll-free support. SUMMARY: This drive features easy installation. It remains expensive compared with other 16X models, however. (★★★★☆ Oct 01)

HOW WE TEST: To gauge CD-ROM read performance, we time how long the drive takes to install Microsoft Office 2000 SBE (disc one). To determine CD-R write performance, we burn data to CD-R discs from an image file and on the fly. We evaluate digital audio extraction speed by extracting 320MB of musical tracks from an audio CD to our hard drive. We measure CD-RW performance by copying 100MB of files to a CD-RW disc, then rewriting the same data to the same disc. Overall ratings are based on performance (35 percent), price (25 percent), features (20 percent), tech support policies (10 percent), and ease of installation (10 percent). See find.pcworld.com/10860 for details on PC World's Star Ratings. * Vendor's speed ratings, listed in order: CD-R write/CD-RW write/CD-ROM read.

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QuantiSpeed™ architecture** outperforms competitive 1.90GHz processors

AMD Athlon™ XP Processor 1800+ with **\$1959** # 1818
QuantiSpeed™ architecture** outperforms competitive 1.80GHz processors

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QuantiSpeed™ architecture** outperforms competitive 1.70GHz processors

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TOP 10 DIGITAL CAMERAS

Visit find.pcworld.com/16881 for reviews of all products ranked in this chart or tested this month.

CAMERAS WITH RESOLUTIONS of 4 megapixels or higher now dominate our chart of digital cameras priced at \$500 or more. Casio's new QV-4000 tops the list, with great images, a competitive price, and tons of features. The first 5-megapixel camera we tested, the Minolta Dimage 7, landed near the bot-

tom of the chart, owing mostly to its high cost and so-so picture quality—proof that a high pixel count doesn't necessarily result in stunning photos. Want to travel light? Kyocera's new Finecam S3 is one of the smallest cameras we've reviewed, and it offers a surprising number of features for its size. ▶

	CAMERA: \$500 AND OVER	Street price (10/16/01)	Overall rating	Image quality	Ease of use	Battery life/ shots	Comments
1	Best BUY Casio QV-4000 find.pcworld.com/16261 NEW	\$689	85	Very good	Good	Excellent/ 389	FEATURES: 4.1-megapixel resolution, 16MB CompactFlash media, 34mm-102mm focal length; USB and video output; 16.6 ounces. SUMMARY: Solid all-purpose camera. Better look and design than earlier Casio models. Posted the second-best image-quality score of all cameras on the chart. ★★★★★
2	Best BUY Canon PowerShot G2 find.pcworld.com/14800	\$899	84	Outstanding	Adequate	Very good/ 348	FEATURES: 4-megapixel resolution, 32MB CompactFlash media, 34mm-102mm focal length; USB and video output; 18.9 ounces. SUMMARY: Full-featured camera takes the best photos of the bunch and has a long battery life. Includes a roomy storage card and a swing-out viewfinder. (★★★★★ Dec 01)
3	Epson PhotoPC 3100Z find.pcworld.com/14804	\$599	83	Good	Very good	Good/ 271	FEATURES: 3.34-megapixel resolution, 16MB CompactFlash media, 34mm-102mm focal length; USB and video output; 16.9 ounces. SUMMARY: Great price for this easy-to-use model. Takes movies with sound. Practical choice for a family with both novice and experienced photographers. (★★★★★ Dec 01)
4	Sony Cyber-shot DSC-S85 find.pcworld.com/14803	\$799	82	Good	Good	Excellent/ 427	FEATURES: 4.1-megapixel resolution, 16MB Memory Stick media, 34mm-102mm focal length; USB and video output; 16.4 ounces. SUMMARY: Well-designed and easy to use, with extremely long battery life. Photos looked a bit oversaturated, however, and the shutter button is touchy. (★★★★★ Dec 01)
5	Nikon Coolpix 995 find.pcworld.com/14801	\$899	81	Very good	Good	Very good/ 309	FEATURES: 3.34-megapixel resolution, 16MB CompactFlash media, 38mm-152mm focal length; USB and video output; 16.2 ounces. SUMMARY: Offers a huge, sometimes intimidating list of features, including a swivel lens and custom buttons. Photos look good, showing fine detail. (★★★★★ Dec 01)
6	Toshiba PDR-M81 find.pcworld.com/14802	\$699	81	Very good	Good	Very good/ 325	FEATURES: 4.2-megapixel resolution, 8MB SmartMedia card, 35mm-100mm focal length; USB and video output; 12.3 ounces. SUMMARY: Impressive picture quality and easy-to-navigate menus and controls mark this model. It has fewer advanced features than competing cameras. (★★★★★ Dec 01)
7	Olympus Camedia C-4040 Zoom find.pcworld.com/16264 NEW	\$899	80	Good	Good	Adequate/ 222	FEATURES: 4.1-megapixel resolution, 16MB SmartMedia card, 35mm-105mm focal length; USB and video output; 14.1 ounces. SUMMARY: General-purpose camera keeps to the basics. Offers a fast f1.8 lens and manual exposure modes, and it records QuickTime movies with sound. ★★★★★
8	Fujifilm FinePix 6900 Zoom find.pcworld.com/16270	\$799	76	Very good	Adequate	Adequate/ 194	FEATURES: 3.34-megapixel resolution, 16MB SmartMedia card, 35mm-210mm focal length; USB and video output; 16.1 ounces. SUMMARY: Futuristic-looking camera has a 6X optical zoom and a double-exposure feature. Produced impressive images, but it's pricey for a 3.3-megapixel unit. (★★★★★ Dec 01)
9	Minolta Dimage 7 find.pcworld.com/16262 NEW	\$1299	74	Good	Good	Adequate/ 169	FEATURES: 5.2-megapixel resolution, 16MB CompactFlash media, 28mm-200mm focal length; USB and video output; 18.4 ounces. SUMMARY: The first 5-megapixel camera on the chart includes a 7X optical zoom, an SLR-like shape, and rapid-action controls. Electronic viewfinder could be sharper. ★★★★★
10	Kyocera Finecam S3 find.pcworld.com/16263 NEW	\$599	72	Adequate	Good	Limited/ 98	FEATURES: 3.3-megapixel resolution, 16MB MultiMediaCard media, 38mm-76mm focal length; USB and video output; 6.8 ounces. SUMMARY: Tiny camera is not much larger than a pack of cards. Includes a 2X optical zoom and an aperture-priority exposure option, and it takes QuickTime movies. ★★★★★

HOW WE TEST: Each camera's overall rating is based on price (15 percent), picture quality (30 percent), ease of use (15 percent), features (20 percent), battery life (10 percent), and support (10 percent). For all ratings, higher is better. To gauge picture quality, we take a series of shots, with and without flash, at 640 by 480 resolution and at the camera's highest resolution. We take pictures of a complex still life and of a mannequin to see how well each camera captures image details and subtle colorings such as skin tones. A panel of judges reviews the on-screen and printed photos and assigns image-quality scores; we then average those scores. Camera weights include batteries. Data based on tests designed and conducted by the PC World Test Center. All rights reserved. See find.pcworld.com/10860 for details on PC World's Star Ratings. * 35mm film equivalent.

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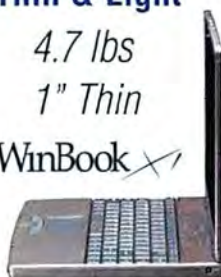
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TOP 10 SCANNERS

Visit find.pcworld.com/16780 for reviews of all products ranked in this chart or tested this month.

A \$30 PRICE CUT lands the Microtek ScanMaker 4700 in the number one SOHO spot this month, while Visioneer's One-Touch 8920 replaces that company's admirable OneTouch 8820. Ranking as the most affordable, highest-resolution

(2400 by 4800 dpi) model on the corporate side of the chart is the new Epson Perfection 2450 Photo.

HP's Scanjet 5490c is a versatile tool, but limited interface options caused it to miss the corporate chart. ▶

SOHO SCANNER	Street price (11/15/01)	Overall rating	Scan quality	Scan speed (sec per page)		Comments
				Black-and-white	Color ¹	
1 Best Buy Microtek ScanMaker 4700 find.pcworld.com/10427	\$150	90	Good	29 @ 300 dpi	263 @ 1200 dpi	FEATURES: USB, 1200 by 2400 dpi, 11.4-by-20-by-4.6-inch case, 8 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. SUMMARY: Has 42-bit color, high resolution, quick-start buttons, and lots of software; works with transparencies right out of the box.
2 Canon CanoScan N1240U find.pcworld.com/13141	\$199	89	Good	40 @ 300 dpi	303 @ 1200 dpi	FEATURES: USB, 1200 by 2400 dpi, 10.1-by-15.1-by-1.3-inch case, 3.3 pounds, 8.5-by-11.7-inch scanning area; includes optional transparency adapter or ADF. SUMMARY: Compact unit offers glorious color and ample software, but it isn't as speedy as other USB scanners. (★★★★ Nov 01)
3 Epson Perfection 1650 Photo find.pcworld.com/15842	\$249	88	Good	18 @ 300 dpi	417 @ 1600 dpi	FEATURES: USB, 1600 by 3200 dpi, 10.9-by-17.7-by-4.6-inch case, 6.8 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. SUMMARY: High-resolution scanner creates crisp, colorful images, but it doesn't come cheap. (★★★★ Dec 01)
4 Visioneer OneTouch 8920 find.pcworld.com/16180 NEW	\$150	88	Good	23 @ 300 dpi	429 @ 1200 dpi	FEATURES: USB, 1200 by 4800 dpi, 16.7-by-11.7-by-4.5-inch case, 7.2 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. SUMMARY: This scanner features 48-bit color and high resolution but is the slowest SOHO model here for color scans. (★★★★)
5 Canon CanoScan N670U find.pcworld.com/15841	\$99	88	Good	39 @ 300 dpi	93 @ 600 dpi	FEATURES: USB, 600 by 1200 dpi, 10.1-by-15.1-by-1.4-inch case, 3.3 pounds, 8.5-by-11.7-inch scanning area; no optional transparency adapter or ADF. SUMMARY: Slim unit has ample software, but bargain price is offset by mediocre performance and low resolution. (★★★ Dec 01)
6 Microtek ScanMaker 5700 find.pcworld.com/15844	\$380	88	Good	29 @ 300 dpi	88 @ 1200 dpi	FEATURES: USB and IEEE 1394, 1200 by 2400 dpi, 11.4-by-19.7-by-4.5-inch case, 10.4 pounds, 8.5-by-11.7-inch scanning area; built-in transparency adapter; ADF optional. SUMMARY: The only FireWire model on the SOHO chart offers speed and strong image quality, but at a hefty price.
7 HP Scanjet 4470c find.pcworld.com/12160	\$199	87	Excellent	58 @ 300 dpi	255 @ 1200 dpi	FEATURES: Parallel and USB, 1200 by 1200 dpi, 12-by-19.9-by-2.9-inch case, 6.3 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. SUMMARY: Splendid scan quality, but warranty and free support limited to 90 days. (★★★★ Oct 01)
CORPORATE SCANNER						
1 Best Buy HP Scanjet 7450c find.pcworld.com/10423	\$760 ^a	94	Good	17 @ 300 dpi	687 @ 2400 dpi	FEATURES: USB and SCSI, 2400 by 2400 dpi, 12.3-by-22.6-by-7.3-inch case, 13.8 pounds, 8.5-by-14-inch scanning area; includes transparency adapter and ADF. SUMMARY: High-resolution 5700 unit handles legal-size documents and transparencies. SCSI card and cable cost \$60 extra.
2 Microtek ScanMaker 8700 Pro Design find.pcworld.com/15843	\$1100	94	Excellent	29 @ 300 dpi	83 @ 1200 dpi	FEATURES: USB and IEEE 1394, 1200 by 2400 dpi, 22.3-by-15.3-by-6.3-inch case, 25.5 pounds, 8.5-by-14-inch scanning area; built-in transparency adapter; ADF optional. SUMMARY: Powerful imaging software, great scan quality, and blazing performance. (★★★★ Dec 01)
3 Epson Perfection 2450 Photo find.pcworld.com/16181 NEW	\$399	94	Excellent	18 @ 300 dpi	983 @ 2400 dpi	FEATURES: USB and IEEE 1394, 2400 by 4800 dpi, 11.9-by-18.7-by-4.8-inch case, 12.8 pounds, 8.5-by-11.7-inch scanning area; includes transparency adapter; no optional ADF. SUMMARY: Dual-format unit with impressive scan quality, ultrahigh resolution, and a great price. (★★★★)

HOW WE TEST: All scanners are tested at default settings under Windows 98 on a Gateway GP7-550 (Pentium III-550) PC with 128MB of RAM, using each scanner's bundled software. Overall rating is based on image quality (25 percent), speed (SOHO 22 percent; corporate 25 percent), ease of use (SOHO 17 percent; corporate 10 percent), features (SOHO 16 percent; corporate 20 percent), support (10 percent), and price (10 percent). Speeds are timed from start of scanning until cursor control is regained. Data based on tests designed by the PC World Test Center. Visit find.pcworld.com/10860 for details on PC World's Star Ratings. ^a At unit's maximum optical resolution. ^b In order: width, depth, height. ^c Tested with IEEE 1394 interface. ^d Tested with USB interface. ^e Priced with SCSI adapter. ^f Tested with SCSI interface.



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MORE REVIEWS

MISSED AN ISSUE OF *PC World* or passed your copy along to a friend? Here's a recap of other *Top 100* topics from previous issues and from PCWorld.com. To read reviews of the products ranked on these Top 10 charts, go online and type in the

PC World Find-It URL at the top of each chart (for example, find.pcworld.com/14840 for products on the *Top 10 Monitors* chart). Next month's *Top 100* will cover CD-RW drives, 19-inch CRT monitors, and digital cameras priced at under \$500. ■



FOR \$89, the MSI MX400 Pro-VT32S has plenty of graphics bang for the buck on the *Top 10 Gaming Boards* chart.



THE VIEWSONIC G90f hits number seven on December's *Top 10 Monitors* chart, with a reasonable \$299 price but only average performance.

GAMING BOARDS

find.pcworld.com/16463

GRAPHICS BOARDS FOR GAMERS From PCWorld.com November 2001	
1	Best BUY ELSA Gladiac 920 find.pcworld.com/10280
2	Best BUY MSI G3 Pro-VT640 find.pcworld.com/13120
3	CardExpert GeForce3 Power Pack find.pcworld.com/11301
4	Asus AGP-V8200 Deluxe find.pcworld.com/13100
5	CardExpert GeForce2 MX TwinView/Vivo Golden Sample find.pcworld.com/11423
6	Asus AGP-V7100 Pro Pure find.pcworld.com/13101
7	Visiontek GeForce3 find.pcworld.com/16540
8	MSI MX400 Pro-VT32S find.pcworld.com/14540
9	AOpen MX400-A find.pcworld.com/11321
10	ATI All-in-Wonder Radeon find.pcworld.com/10140

MONITORS

find.pcworld.com/14840

19-INCH CRT MONITORS From the December 2001 issue	
1	Best BUY Samsung SyncMaster 950p find.pcworld.com/10570
2	Best BUY KDS VS 195i find.pcworld.com/10574
3	Optquest 095 find.pcworld.com/10800
4	ViewSonic GS790 find.pcworld.com/10573
5	CTX EX950F find.pcworld.com/14520
6	Iiyama I91A find.pcworld.com/10806
7	ViewSonic G90f find.pcworld.com/14622
8	Hitachi CM721F find.pcworld.com/14841
9	Samsung SyncMaster 900NF find.pcworld.com/14521
10	Sony CPD-G420S find.pcworld.com/10577

PRINTERS

find.pcworld.com/11800

MONOCHROME LASER PRINTERS From the October 2001 issue	
1	Best BUY Minolta-QMS PagePro 1100L find.pcworld.com/11665
2	Brother HL-1440 find.pcworld.com/11581
3	IBM Infoprint 12 find.pcworld.com/11669
4	Samsung ML-1210 find.pcworld.com/11582
5	Lexmark Optra E312 find.pcworld.com/11670
1	Best BUY Xerox DocuPrint N2125 find.pcworld.com/11600
2	IBM Infoprint 21 find.pcworld.com/11660
3	HP LaserJet 4100n find.pcworld.com/11661
4	GCC Elite 21N find.pcworld.com/11580
5	Brother HL-1670N find.pcworld.com/11662

PRINTERS

find.pcworld.com/14960

COLOR LASER PRINTERS From the December 2001 issue	
1	Best BUY Oki Data Oki C7200n find.pcworld.com/14942
2	Best BUY Lexmark C720N find.pcworld.com/14941
3	Minolta-QMS Magicolor 2200 GN find.pcworld.com/14940
4	Lexmark Optra C710N find.pcworld.com/14944
5	Tektronix Phaser 750N by Xerox find.pcworld.com/14946
6	Minolta-QMS Magicolor 6100 DeskLaser find.pcworld.com/14943
7	Oki Data Oki C9200n find.pcworld.com/14947
8	Brother HL-2400CeN find.pcworld.com/14945
9	Xerox Phaser 860N find.pcworld.com/14948
10	Minolta-QMS Magicolor 6110 find.pcworld.com/14980

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KINGSTON TECHNOLOGY: TAKING THE STRESS OUT OF MEMORY UPGRADES

www.shop.kingston.com

You already know that memory upgrades are the fastest, most reliable way to boost your PC's performance—so what's holding you back?

Many users are afraid that by installing new memory, they might damage their PCs. But the procedure is actually quite painless, and the results—from improved multitasking to eye-popping multimedia—are often substantial.

Now the largest independent memory manufacturer, Kingston Technology Company Inc., is helping users to successfully upgrade their own systems, through demonstrations and system-specific memory guides.

Visitors to www.Shop.Kingston.com can access detailed hardware advice as well as an easy-to-follow animated tutorial. "We wanted to show users how easy it is to install memory," says Jason Jacobi, a Kingston spokesman. "And once they see it for themselves, they can feel comfortable buying the upgrade they need to run today's leading software and operating systems, including Microsoft Windows XP."



KINGSTON MAKES IT EASY FOR YOU

Customers at Shop.Kingston.com already use the site's Memory Configurator to choose memory by system model, memory specification, or Kingston part number. PDA users, and those with digital cameras and MP3 players, can search for their upgrades by device type.

Now Kingston's animated online tutorial, "Memory Installation in 3 Steps," shows users how just how easy it is to install memory. The animated demo reviews a typical system's layout and components and illustrates the correct way to place modules in a PC's memory bays.

Kingston also provides free, detailed Adobe Acrobat PDF-formatted installation guides for PCs from leading manufacturers, as well as guides for installing Flash memory modules and software drivers.



First-time memory buyers will especially benefit by clicking on Kingston's animated installation guide, from the Shop.Kingston.com homepage. "It takes the anxiety out of the installation process for users at any level," says Jacobi. "After watching it, you won't be afraid anymore to take the cover off of your PC."

QUALITY YOU CAN COUNT ON

By installing their own modules, users can experience firsthand the high quality of Kingston's modules. IT professionals rely on Kingston memory to update their systems. And many leading PC manufacturers in the United States build Kingston memory right into their new machines.

Kingston each year builds and tests more than two million customized modules for hardware manufacturers and systems developers. Now consumers, through Shop.Kingston.com, can receive the same memory, and the same warranties, as Kingston's business customers.

"Kingston has a good handle on quality," says Kingston consumer Tim Scovell. "I'm always adding modules to my systems, and the Kingston memory works every time."

Kingston's memory is system-specific, and the company guarantees the compatibility of modules selected through the Kingston Memory Configurator. "It leads you to the exact memory your system requires," Jacobi adds.

In the unlikely event that a customer has trouble with his upgrade, he or she can call Kingston at 800-435-0640 and consult with a memory expert, 24/7.

With its latest support for novice upgraders, and with its 24/7 customer service, Kingston is making its memory products and professional-level support available to every consumer. "At Shop.Kingston.com," Jacobi says, "Web surfing, gaming, and exciting multimedia are going to be possible on more systems than ever before."



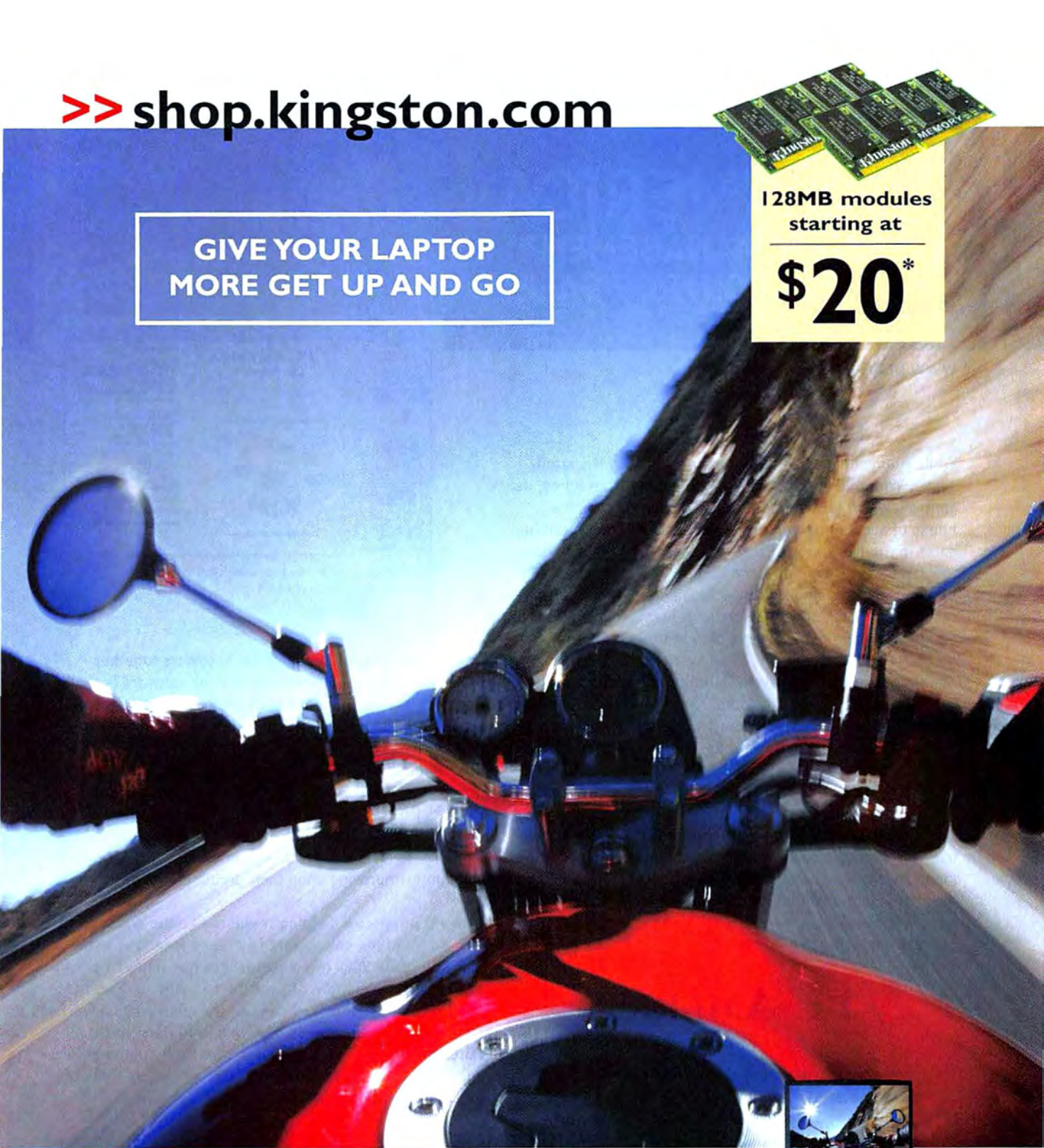
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PC AMERICA: INVENTORY MANAGEMENT AT POINT OF SALE

www.pcamerica.com

While many motorists in Dimondale, Mich. say the family-owned Windmill Truck Stop is a home away from home, its controller, Kevin Edelmann, says it's been more like a house of accounting horrors. Besides monitoring retail fuel sales in the truck stop's "truckers only" area, he also has to keep an eye on commuters' and travelers' purchases in the king-sized complex's convenience store, family restaurant, motel, and auto service center. "Keeping track of all of that inventory has been a nightmare," Edelmann says.

The Point of Sale (POS) system that the Windmill had been using since 1982 did a fine job of ringing up sales, but it couldn't tell store managers anything about what was on the shelf. "The system only broke sales down by department," Edelmann says. "So it couldn't tell the difference between a tube of toothpaste and a bottle of shampoo."

Edelmann found only a few POS solutions that were easy to use, Microsoft Windows-based, and able to support multiple input devices. And none of them could manage the 20,000-plus items in the Windmill's convenience store and restaurant. "We desperately needed a solution that could bring all of these components of our business together," he says.



PC AMERICA

Things finally turned around at the Windmill once Edelmann deployed PC America's Cash Register Express (CRE 2000), a Windows-based POS program that works with ordinary PCs and peripherals, as well as barcode scanners, receipt printers, and pole displays (which show charges at the checkout counter). Now all of the Windmill's cashiers can use touch screens and barcode scanners to enter orders and update inventory. And setting up CRE 2000 could not be easier, says Edelmann. "PC America did



The home page for PC America speeds you to the point-of-sale products you need.

an excellent job pulling all of the hardware together initially. But the great thing about their software is that I can grab any component I want off the shelf and throw it together in no time. This is one slick program."

The Windmill has processed more than half a million transactions with CRE 2000 and PC America's Restaurant Pro Express (RPE 2000) since October 1999. And Edelmann predicts that PC America will continue to develop the software he needs to keep things running smoothly. "PC America is constantly improving upon their products," he says.

Now PC America is helping retailers like the Windmill to move beyond the sale itself to increase revenues. A new feature in CRE 2000 gives businesses the ability to print coupons on the bottom of sales receipts on an Epson TM-T88II receipt printer. They can use the coupons to advertise specials on slow business days (e.g., "10 Percent Off All Purchases Every Tuesday"), or to give their customers discounts on overstock items (e.g., "Get a Free Six-Pack of Pepsi on Your Next Visit").

CRE 2000's couponing feature promises retailers an excellent route to a crucial dimension in retail sales. "Repeat business is the most important aspect of any business," says PC America's president, Howard Gosman. "With this addition to our POS package, we are giving our customers a quick and easy-to-use method for creating it."



Cash Register Express Software for Windows...\$495

Computerize any type of retail store using Cash Register Express for Windows. Computerization pays for itself, saving you thousands of dollars, giving you peace of mind, and making the best use of your time. Cash Register Express



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All PC America Software requires Microsoft Windows. The software was written in Visual Basic using Microsoft Access Files. The source code is available.

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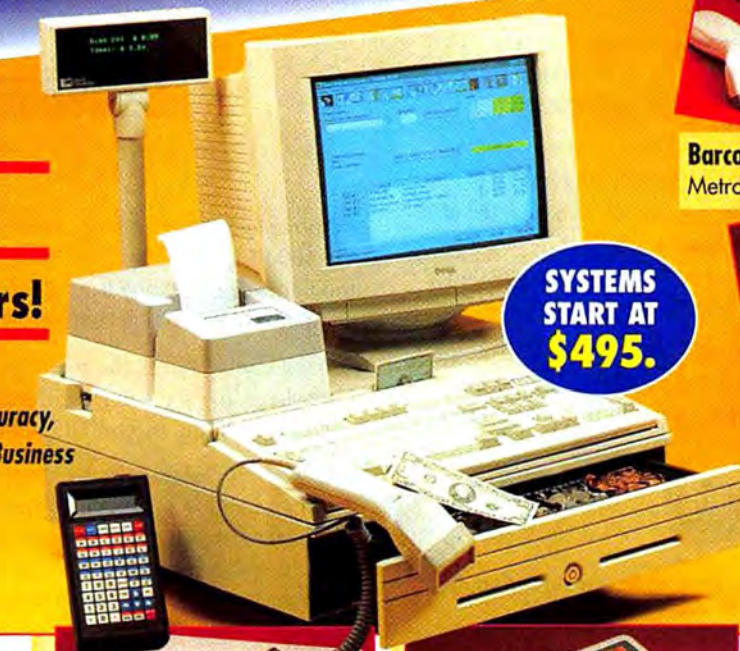


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Computer system failures can give anyone heart palpitations, but for Chuck Maray's customers, they can be a matter of life and death.

Maray is a customer service systems engineer at Camtronics Medical Systems Inc., a developer of imaging equipment and PC-based diagnostic workstations for cardiologists.

Part of Maray's job is to ensure the reliability of Camtronics' products, which are already in a quarter of the cardiology labs in the United States. But for a while, Camtronics thought it could save money by purchasing "no-name" memory on the Internet.

"I tried getting the best deal on RAM by buying no-name memory," Maray says. "And I had problems. There were times I couldn't even get a system to boot up after I installed the modules."



Now Maray buys Camtronics' memory upgrade modules factory-direct at www.Crucial.com.

Crucial.com is the award-winning retail Web site for leading memory manufacturer Micron Technology Inc., which tests all of its modules under extreme temperatures, voltages, and operating conditions. Crucial.com sells over 73,000 upgrades for more than 13,000 desktops, notebooks, servers, routers, printers, and electronic devices.

Maray earns a 10-percent discount with each purchase he makes at Crucial.com. But the real reason he stays with Crucial is that "they've never sold us a bad DIMM."

RELIABLE AND COMPATIBLE

Crucial.com backs all of its memory with a lifetime limited warranty and free technical support through its live-chat Expert Line, e-mail, and a toll-free telephone number. And the site's Safe Shopping Guarantee promises shoppers that their transactions are encrypted and personal information kept completely confidential.



Camtronics' IT department also uses Crucial.com to keep the 400 PCs at its Hartland, Wisc. headquarters up to date: the upgrades they buy from Crucial, Maray says, keeps the company's technology cost-of-ownership under control.

Crucial.com ensures the modules Maray and his coworkers buy are a perfect match for their desktop and portable systems through its Memory Selector tools.

The Memory Selector gives shoppers all the information they need in one place: customers simply enter their computers' make and model information, and the Memory Selector returns a list of Crucial memory upgrades that are guaranteed to work with that system.

Indeed, the site guarantees the compatibility of every module purchased through the Memory Selector.

The Web site also includes a CompactFlash Memory Selector to help users of digital cameras and other electronic devices locate the perfect upgrade. (All of the vendor's CompactFlash memory products are mechanically and electronically compliant with the CompactFlash Association's stringent specifications.)

Those who want to learn more about the advantages of using CompactFlash memory products can visit the Crucial.com library, which shows the benefits of CompactFlash cameras and explains the capacities of various CompactFlash memory cards.

"The Crucial Web site saves me time, by directing me to exactly the right upgrade, every time," Maray says. "I don't have to do any research outside of the site."



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EDITED BY DENNIS O'REILLY



WINDOWS TIPS

SCOTT DUNN

Sound Off: Take Charge of Windows Audio Controls

? I OFTEN USE my home computer when other members of my family are asleep. I usually mute the volume before I boot up or shut down, but if I forget, or if the computer crashes, the whole house hears it. Is there any way to hush Windows automatically?

Andrew Hobbs, Raleigh, North Carolina
WINDOWS DOESN'T offer silent boot-ups as a feature, but some workarounds and utilities can overcome this limitation. Here are some of my favorite tricks and

tools to keep your PC on the QT, and for managing your PC's sound in general.

The hardware way: The easiest way to silence your computer before it starts making noise is by turning down the volume on your speakers; or, if you can plug your sound system into a power strip with individual on-off switches, just cut the juice to the speakers before booting up.

Unfortunately, neither option is available for notebook computers or for many desktop systems. Some computers let

you disable sound by entering the setup screen during boot-up and before Windows loads. Of course, you usually have to reboot and reenter setup to undo this.

Mute on start-up: For many people, a freeware sound-muting utility is a better solution. After I complained in the August 2001 issue about Windows' lack of a mute key (find.pcworld.com/14620), Christian Klukas of Magdeburg, Germany, created the Mute and SetVol freeware programs to address this need. Both programs are available at find.pcworld.com/12280.

Place the programs in the folder of your choice. To mute Windows' start, right-click the Start button, choose *Open*, double-click *Programs*, and then double-click *Startup* to open the Startup folder. Use Explorer or click *Start•Search (Start•Find in Windows 9x)* to locate the *mute.exe* file. Right-drag this file to the Startup folder, and choose *Create Shortcut(s) Here*. Then **<Alt>**-double-click the shortcut (or right-click and choose *Properties*) to open its Properties sheet. With the Shortcut tab in front, click the Target box. Move the cursor to the end of the existing command line, and type a space followed by the desired command-line switches—in this case **on -delay**. When you're finished, the command line should look something like "**C:\Program Files\mute.exe on -delay**" (see **FIGURE 1**). Then click *OK*. This keeps Mute active so that whenever you log off or exit Windows, the sound is muted.

Though Mute takes merely 1.5KB of RAM, you may not want the program to sit in memory all the time. To prevent this, delete *'-delay'* from the Target box of the shortcut. This will mute your sound when Windows starts, after which Mute will exit and take no more memory. However, Windows will still play its start-up

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Half a dozen ways to control Windows audio commands; quick access to the Task Manager to stop problem apps.

152 INTERNET TIPS

How to make Google your default search tool in Internet Explorer; show AOL who's boss with PowerTools.

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Choosing and then setting up a PC network is easier than you think, with these tips to get you going.

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Combine your rescue disks on a single CD-ROM; move Outlook settings to a new PC; time-stamp your notes.



FIGURE 1: ENSURE A SILENT start-up by adding the on and -delay switches to the command line of the Mute freeware program.

sound before it launches applications in the Startup folder (including Mute), so you won't get a completely silent start-up. You can fix that by choosing *Start>Settings>Control Panel>Sounds* (in Windows 9x) or *>Sounds and Multimedia* (in Windows 2000 and Me). Select the *Sounds* tab (in Windows 2000 and Me), scroll down the Sound Events list, and select *Start Windows*. In the Name drop-down list, choose *(None)*. If you have several other applications that launch at start-up, you may need to repeat this step for the *Open Program* and *Close Program* sounds as well. When you're done, click *OK*.

If you want only an occasional quiet start-up, use Mute with the '-delay' switch but launch the shortcut manually rather than putting it in your Startup folder.

Mute on shutdown: You can also activate Mute from an application designed to launch programs when Windows exits. A couple of these programs are described in this month's Windows Toolbox.

The taskbar icon: Once you've muted your PC, you can un-mute it by clicking the speaker icon in the tray area (near the clock). When the Volume control appears, uncheck the *Mute* check box. To re-mute it, repeat these steps and check the *Mute* check box. If you don't see the speaker icon, open the Control Panel and double-click the *Multimedia* icon in Windows 9x or *Sounds and Multimedia* in Windows Me or 2000. Check *Show volume control on the taskbar*, and click *OK*. In Windows XP's Control Panel, click *Sounds, Speech, and Audio Devices*, then *Sounds and Audio Devices*. Check *Place volume icon in the taskbar*, and click *OK*.

Quick Launch: It may take several seconds for the Volume control to appear when you click the taskbar sound icon. To solve that, you can use the Mute utility to toggle your sound on and off, or use the SetVol utility to set a specific volume level with a single click of an icon in the Quick Launch toolbar of the Windows taskbar.

To create an instant mute button, click *Start>Search* (or *Start>Find* in Windows 9x) to locate *mute.exe*, and then right-drag the file to the Quick Launch bar and choose *Create Shortcut(s) Here*. The resulting Mute icon toggles sound on or off with one click. For a volume-changing icon, do the same for *setvol.exe*. Then right-click the SetVol icon in the Quick Launch bar and choose *Properties*. At the end of the Target command line under the Shortcut tab, type a space followed by *-10*. Next, create another SetVol shortcut with a command-line switch of *+10*. Click the first one each time you want to lower the volume by 10 percent and the second to increase the volume by 10 percent. You can use any number in incre-

ments of 10. If you omit the plus or minus, the volume is set at that precise percentage (in this case, 10 percent).

To give the new icons descriptive tool tips that pop up when the pointer hovers over each, right-click an icon and choose *Rename*. Type the description of your choice and click *OK* (Windows 98 SE and later). For earlier Windows versions, right-click an empty part of the Quick Launch toolbar and choose *Open*, then rename the icon with the tool tip text you prefer (see **FIGURE 2**).

Keyboard control: To toggle the sound on and off from your keyboard, create a shortcut for Mute and place it either on the desktop or in a folder in the Start Menu hierarchy. For this purpose, I recommend creating a folder called 'Keyboard Shortcuts' in the Start Menu\Programs folder. This makes it easy to find the shortcuts if you ever need to delete them or change their key assignments.

Right-click your shortcut and choose *Properties*. With the Shortcut tab in front, click the 'Shortcut key' box, and press the



FIGURE 2: MAKE QUICK LAUNCH buttons for instant muting, or for changing the volume to a specific level.

keys you want for toggling your system sound. If you select just a function key (one of the <F> keys at the top of your keyboard) or a key on the numeric keypad, you won't be able to use that key for anything else; instead, choose <Ctrl>, <Alt>, <Shift>, <Ctrl>-<Alt>, <Ctrl>-<Shift>, <Alt>-<Shift>, or <Ctrl>-<Alt>-<Shift> along with another key. And try to pick a combination that you don't use in another program (see **FIGURE 3**). Click *OK*. If you ▶

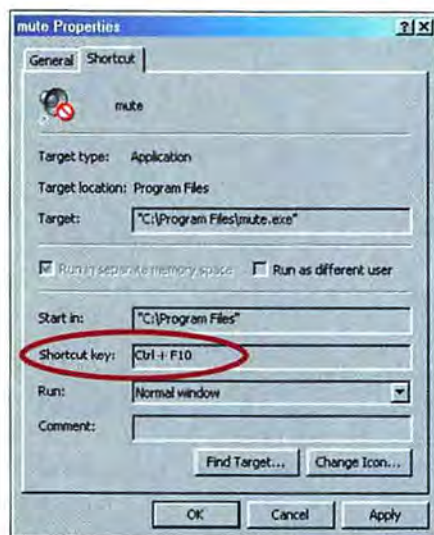


FIGURE 3: CREATE a keyboard shortcut for the Mute freeware Windows silencer.

later delete this shortcut, you'll need to restart Windows before the key combination you chose becomes free again.

Compact audio controls: If you double-click the speaker icon on the taskbar, you will see a volume-control dialog box that includes balance controls and separate volumes for .wav sounds, CD audio, and more. (The precise appearance will vary with your system's audio drivers.) To make this dialog box more compact, press **<Ctrl>-S** (see FIGURE 4). It will keep this new, more svelte appearance until you reopen it and press **<Ctrl>-S** again.

TASK MANAGER IN A FLASH

Windows 2000 WINDOWS' Task Manager lets you easily shut down hidden or troubled apps, check which programs are hogging RAM, and analyze CPU usage. You may be a Task Manager aficionado, but you may not know the fastest ways to reach the utility.

In Windows 2000, you can launch



FIGURE 4: TO REDUCE the size of the default volume-control dialog box, press **<Ctrl>-S**.

Task Manager by pressing **<Ctrl>-<Alt>-<Delete>** to display the Windows Security dialog box, and then clicking the Task Manager button.

In Windows XP, **<Ctrl>-<Alt>-<Delete>** brings up the Task Manager immediately without any intervening dialog box. Another fast way to get to Task Manager—without using the three-finger salute: Simply right-click an empty spot on the taskbar and choose *Task Manager*.

And here's a trick to make Task Manager even handier: Reader Timothy J. Luoma of Gainesville, Florida, points out that when Task Manager is running, it displays a tiny animated CPU-usage icon in the system tray (located in the lower-right corner of the screen). You can also hold your pointer over the icon for a moment to see the CPU-usage percentage displayed in a tool tip. If you like this feature, why not make Task Manager run all the time by placing a shortcut to it in your Startup folder?

Right-click the *Start* button and choose *Open*. Double-click *Programs*, then double-click *Startup*. Choose *Start>Search>For Files or Folder*, type **taskmgr.exe** in the top box, enter your start-up drive in the 'Look in' box (for most people it will be **C:**), and click *Search Now*. When you see the Task Manager program file listed in the Search Results window, right-drag it to your open Start-up folder. When you release the mouse button, choose *Create Shortcut(s) Here*. Now right-click the new shortcut and choose *Properties*. Select the *Shortcut* tab and choose *Minimized* from the Run drop-down list. Click *OK*. To keep Task Manager out of your way when you don't need it, double-click the shortcut to launch it, and in the menu bar at the top of the Task Manager window, choose *Options>Hide When Minimized*.

Task Manager will now start invisibly, but you'll be able to open its window anytime by double-clicking the CPU-usage icon in the system tray.

Find more tips at www.pcworld.com/heres_how. Windows Tips pays \$50 for published tips and questions. Scott Dunn is a contributing editor for PC World.

WINDOWS TOOLBOX

Start Tasks on Shutdown

YOU CAN USE Windows' Start Menu\Programs\Startup folder and Task Scheduler to launch applications or perform other tasks automatically at specified times—except when it's time to shut down your computer. If you'd like to clean up the day's temp files or reset your volume control to mute when you turn your computer off, these utilities will help.

For the freebie approach, try ActiveSaver, a scrawny 45KB screen-saver file (.scr) that can be used like a standard screen saver to launch a file, exit Windows, or do both after a preset interval. The screen-saver Settings button is used to configure ActiveSaver (right-click the desktop, choose *Properties*, and click the *Screen Saver* tab)—but ActiveSaver



doesn't even have to be the active screen saver to work. Just drag the file ActiveSaver.scr to the Start button or to the Quick Launch toolbar on the taskbar, and then choose it instead of the usual *Start>Shut Down* command when you're ready to call it a day.

ActiveSaver lets you launch only one program at shutdown, and on my Windows 2000 machine, it didn't work with the computer's power-down feature. If this bothers you, or if you just want a more full-featured utility, consider ShutdownPlus. This shareware allows you to launch multiple tasks at shutdown, and in Windows 98 and later versions it replaces Windows' own Shut Down dialog box with its own. This means you don't have to launch a separate application to exit. ShutdownPlus comes in personal (\$30) and professional (\$40) versions. Go to find.pcworld.com/12280 to get both ActiveSaver and ShutdownPlus.

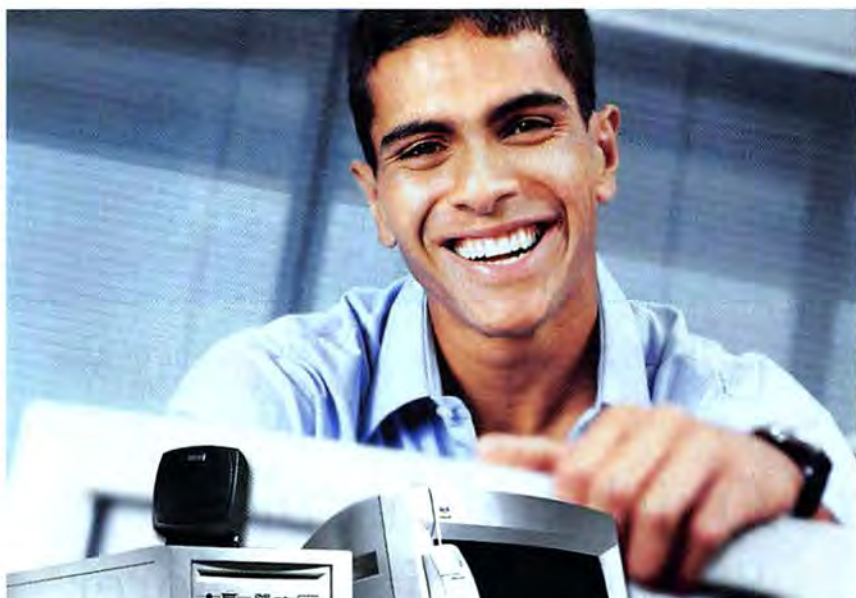
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INTERNET TIPS

SCOTT SPANBAUER

MAKE GOOGLE YOUR
DEFAULT IE SEARCHER

TAKE CONTROL OF AOL
WITH POWERTOOLS

Quick and Simple Searches With Explorer

IT'S EASY TO GET complacent about searching the Internet. After all, you can almost always find what you're looking for simply by heading over to Google (www.google.com) and typing in a few words. But Internet Explorer's built-in search tools can make the task even less work, as long as you take control.

tons to move selected sites up or down the list. The same window also lets you control which search engine IE uses to search for terms you type into the browser's Address bar. Click the *Autosearch settings* button, choose an engine from the drop-down menu, and click OK. Now when you type *mukluks* into IE's Address bar and press <Enter>, the browser will use the search engine you selected, not the default one.

What's that you say? Google's not listed as a search engine option in the aforementioned windows? Egad! To remedy that, type www.google.com/google.reg in the browser's Address bar, and either save the .reg file to your hard disk for future use or select *Open this file from its current location* and click OK to replace the standard IE Search pane with the Google search pane. The Google pane supplants IE's Search Assistant; after installation, all IE searches will happen through Google, except for searches on terms you enter in the Address bar, which will continue to use the search service you chose above. If you want to revert to IE's own Search panel, enter www.google.com/default.reg to run the Registry script that puts it back.

GET, SET IE'S QUICK SEARCH

THE QUICK SEARCH tool, a component of Microsoft's Web Accessories for Internet Explorer 5, provides another cool way to search the Net. The 134KB Web Ac-

cessories download (find.pcworld.com/16740) includes utilities, menu bars, and tweaks geared toward power users and developers. Quick Search allows you to specify on the spot which engine you want to use when you enter a search term into IE's Address bar.

To specify a search engine, just precede your search term with a mnemonic code. For example, to search AltaVista for photographs of songwriter PJ Harvey, enter **av PJ Harvey photos**.

Google isn't listed among the Quick Search codes either, but that's okay because Quick Search is easy to customize. To add a code for Google, simply click the *Quick Search* button that Web Accessories added to IE's Links toolbar. Click *New* to add a new search shortcut, enter an appropriate code (**goo** sounds good to me), choose *Custom URL* from the Search drop-down list, enter <http://www.google.com/search?q=%s> in the URL field, and then click OK. Now when you enter *goo guava* into IE's Address bar, you'll see Google's fruity results.

Send your questions and tips to nettips@spanbauer.com. We pay \$50 for published items. Scott Spanbauer is a contributing editor for PC World.



FIGURE 1: STREAMLINE INTERNET EXPLORER searches by specifying the default engines used in both Search and Address bar searches.

To display IE's Search pane, click the *Search* button in the browser's Standard Buttons toolbar (choose *View>Toolbars>Standard Buttons* if the button isn't visible). To see what's going on underneath Search's basic interface, click *Customize*. The resulting *Customize Search Settings* window shows the search sites IE employs when it searches for Web pages, addresses, and businesses (see FIGURE 1). Check boxes to choose from an assortment of preselected search sites, and prioritize the sites by clicking the arrow but-

POWERTOOLS FOR AOL

WHEN READERS ASKED for a way to get rid of the AOL Plus feature (see August's *Internet Tips* at find.pcworld.com/16742), a solution eluded me. Luckily, several readers found one: BPS Software's PowerTools for AOL. In addition to disabling the otherwise inescapable AOL Plus, the worthy \$30 Professional version gives AOL power users an MP3 player, an AOL Instant Messenger answering machine, wallpaper and color themes, chat logging (if you can't get in a chat room, PowerTools will keep ping-ponging automatically until a space opens up), and lots more. The \$20 PowerTools LE omits some of the Professional edition's chat tools. Download trial versions from find.pcworld.com/16741 or from the vendor (www.bpssoft.com), or use the keyword *powertools* on AOL.



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STEP BY STEP

STAN MIASTKOWSKI

Set Up a Network in a Snap

MANY HOMES and most small businesses have multiple PCs. More than ever, it makes sense to hook them together in a network to share files, printers, and Internet connections (especially broadband).

Setting up a network has become easier over the past couple of years, with automated software installation largely eliminating the need for geek-level skills. On the hardware side, add-in cards are still the norm for most networks; but USB options are available for people who don't want to perform PC surgery. On laptop PCs, hardware installation is as simple as

sliding in a PC Card. And even doing that may not be necessary. Many contemporary laptops are equipped with built-in network connections, and some of the newest have wireless network capabilities.

For low cost and high speed, traditional wired networks are still the best bet. But if you prefer not to snake wires across rooms and through walls, phone line networks let you use your existing wiring, albeit at slower speeds. The hot technology is wireless, where the 802.11b protocol (more commonly dubbed WiFi) has all but won the wireless networking standards battle.

THE TOP DOWN

Benefits: Share files, printers, and an Internet connection among multiple desktop and notebook PCs

Costs: Standard wired adapter, \$20 to \$40 per PC; phone-line adapter, \$25 to \$75 per PC; wireless adapter, \$100 to \$250 per PC; router/firewall for shared broadband Internet access, \$100 to \$300

Expertise level: Intermediate

Time required: 30 to 60 minutes per PC

Tools required: Phillips screwdriver, anti-static wrist strap (recommended)

Vendors: 3Com (www.3com.com), Agere Systems (www.orinocowireless.com), D-Link Systems (www.dlink.com), Intel (www.intel.com), Linksys (www.linksys.com), NetGear (www.netgear.com), SMC Networks (www.smc.com)

If no single type of network is best for you, you can buy devices (routers and bridges) for creating hybrid networks with both wired and wireless products. ■

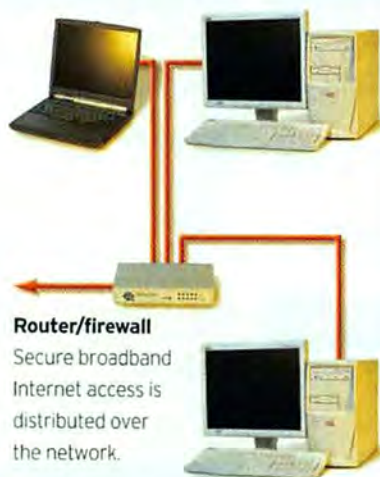
Stan Miastkowski is a contributing editor for PC World.

HOW TO CHOOSE THE BEST NETWORK FOR YOU

EACH TYPE OF NETWORK has its advantages and disadvantages, and each can connect to the Internet in a variety of ways. But new low-

cost products such as routers and bridges let you combine different types of networks. Here's a look at some sample network setups.

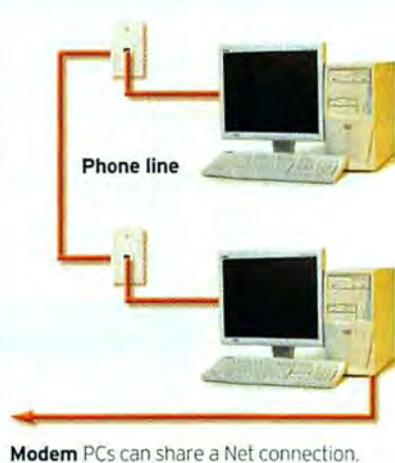
ETHERNET



Advantages: Very inexpensive, fast, and easy to extend to more PCs.

Disadvantages: Requires running wires. A network of more than two PCs requires a central hub, switch, or router.

PHONE-LINE



Advantages: Inexpensive, easy to install, uses existing telephone wiring. Fast enough for common network tasks and Internet sharing.

Disadvantages: Old phone wiring can degrade network performance.

WIRELESS



Advantages: No wires, PCs can be anywhere (including outside).

Disadvantages: Costs two or three times as much as alternatives. Speed falls as PCs get farther apart.

BEFORE YOU BEGIN

Installing a network significantly changes the configuration of each PC involved. Always do a complete backup first. Barring that, you should at least back up your critical data files and settings to removable media before you begin. Different makers' network hardware and software require you to take different steps in different sequence. The steps outlined here are typical, but you should read your manual or installation poster carefully.

INSTALL THE NETWORK ADAPTER



1 Add-in card. Turn off and unplug your PC, then remove the cover. To avoid static damage, wear an antistatic wrist strap while working inside your PC. Find a free PCI slot, carefully insert the network card into it, and fasten it down with a screw. When you restart your PC, Windows should automatically detect the card. Follow the manufacturer's directions for installing the driver.



USB adapter (phone-line and wireless networks). Plug the USB connector into a free USB port. Windows should automatically detect the unit. Follow the manufacturer's directions for installing the driver.



PC Card. With your notebook running Windows, insert the PC Card into an unused PC Card slot. Windows should automatically detect the unit. Follow the manufacturer's directions for installing the driver.

HOOK UP YOUR NETWORK AND GET IT RUNNING

2 Hook up your router. If you have a broadband Internet connection, you will need to hook up the router/firewall to the cable modem or DSL box, using the cable that came with the router.



4 Install the software. In addition to installing the drivers for the network adapters, you'll probably have to install product-specific software in order to set up the hardware and to customize the settings. In each instance, follow the manufacturer's directions.



3 Hook up the wires. If you're using a standard network, plug a Category 5 network cable from each PC network card (A) into your hub or switch (B). Do the same with your router/firewall if you have one. For a phone-line network, plug one end of a phone cable into the correct jack on the card (C) or USB adapter (usually there's an additional jack for hooking up a phone), and plug the other end into a phone jack. With a wireless network, as the name implies, you normally don't need to run any wires unless you're using a router or access point to integrate it with a wired network.



5 Get connected. Test your network to make sure everything is talking to everything else. If you can't access the Internet or communicate with other PCs on your network, first check your network product manual or the maker's Web site. Alternatively, go to *Start>Help*, select *Network Troubleshooter* (in Windows 98) or *Home Networking Troubleshooter* (in Windows Me), and follow the directions. No luck? It's time to call tech support.

Home Networking Troubleshooter

What problem are you having?

- ☐ I'm having problems sharing files or printers.
- ☐ I'm having problems connecting to the Internet.
- ☐ I'm having problems sharing an Internet connection.
- ☐ I don't know how to set up my network.
- ☐ I'm having problems with my modem or with dial-up networking.

HARDWARE TIPS

KIRK STEERS

Get the Most From Your Display and Graphics Card

WHEN IT COMES to your PC's monitor, looks aren't everything—they're the *only* thing. Staring at fuzzy images and a flickering screen can lead to eyestrain, headaches, and general crankiness. Follow these steps to see the best your graphics card and monitor can show you.

To view your graphics card settings, right-click your Windows desktop and select *Properties*, or click *Start>Settings>Control Panel* and double-click the *Display* icon (see **FIGURE 1**). In the Settings tab of the Display Properties box, 'Screen area' sets your monitor's resolution, and 'Colors' determines how many colors it shows (also known as *color depth*). 'Refresh rate' (reachable via the *Advanced* button and the *Adapter* tab) sets how often per second the monitor redraws the on-screen image.

Resolution: Most PCs made in the past four years have a graphics card and graphics RAM that can support resolutions of at least 1024 by 768 pixels per inch; many graphics cards support resolutions up to 1600 by 1200. Budget systems often inte-

grate their graphics processing onto the motherboard—a setup that provides less power than a dedicated graphics card. Some low-cost systems don't support resolutions higher than 800 by 600.

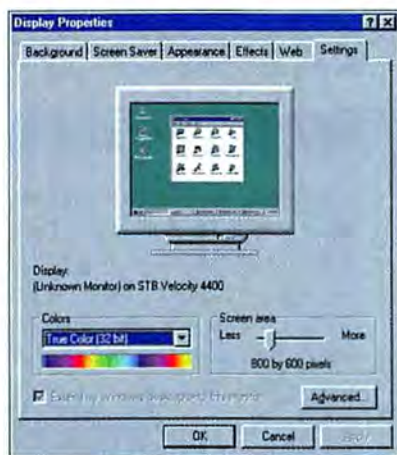


FIGURE 1: SET YOUR RESOLUTION and color depth from the Display Settings screen.

In the Settings tab, slide the 'Screen area' bar to the far right to see the highest resolution your system supports. If the maximum setting is too low to meet your needs, you may be able to eke out a higher resolution by lowering the color depth.

Color depth: Click the pull-down list under Colors to see your color-depth options at the monitor's current resolution setting. High Color (16-bit) provides 65,536 colors, and True Color (24-bit) offers over 16 million. Newer systems have a True Color (32-bit) option that also displays 16 million colors; the additional 8 bits define opacity, or the amount of transparency when layers of color are combined.

Color depth and resolution compete for the graphics adapter's screen memory, so

lowering one may allow you to increase the other. But there's no hard-and-fast rule—you just have to experiment.

Refresh rate: Some experts say your PC should redraw the screen no less than 72 times per second (or 72 Hz) to be comfortable, while others say the minimum rate is about 85 Hz. Try different refresh-rate settings and see what works for you.

To set the refresh rate, click the *Advanced* button under the Settings tab of Display Properties, and then select the *Adapter* tab. If both your graphics card and your monitor support multiple refresh rates, you can select one from the drop-down list under 'Refresh rate'.

If the choice is set to Optimal, Windows has selected a refresh rate for you. Unfortunately, there's no easy way to know what that optimal rate is, and it may not be the highest setting available. If the Optimal setting doesn't produce a flicker-free screen, try your other choices.

DESIGNATE YOUR DRIVER

WINDOWS LETS YOU choose only refresh rates that your graphics card and monitor support. If Windows can't detect your monitor—because Plug and Play isn't enabled or because the monitor doesn't support Plug and Play—it sets a safe but eye-exhausting refresh rate of 60 Hz.

The name of your monitor is shown on the Settings tab in Display Properties under 'Display'. If it says 'Unknown Monitor', Windows couldn't find a driver for your monitor and likely set the refresh rate at 60 Hz. To correct this setting, click the *Advanced* button at the bottom of the Settings tab, select the *Monitor* tab, and make sure the *Automatically detect Plug & Play monitors* box is checked.

Make sure you've downloaded and installed the latest driver for your graphics card. Graphics drivers are updated frequently, and installing the latest revision is often the cure for all kinds of graphics-performance and display problems. ■

See www.pcworld.com/heres_how for additional hardware tips. Kirk Steers is a PC World contributing editor. Hardware Tips welcomes your tips and questions and pays \$50 for published items.

GET UNBUSY

LEAVING YOUR PC'S modem connected when not in use blocks incoming phone calls, leaves your Internet account open to unauthorized use, and may rack up phone charges. To keep your phone line open and your network link closed when idle, have your modem shut down after a set time. Double-click the *Modems* icon in Control Panel, select *Properties*, and click the *Connection* tab. Check *Disconnect a call if idle for more than* and enter the length of time you want Windows to wait before closing your modem link.

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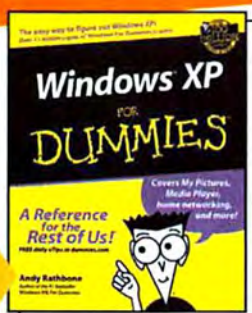
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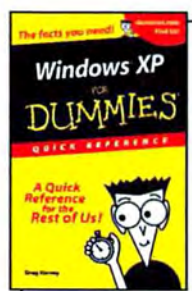
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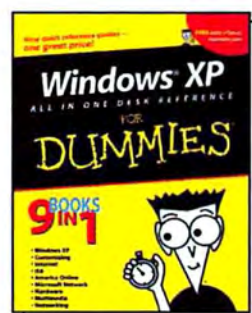
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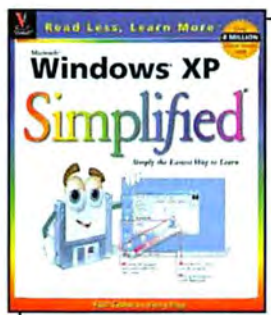
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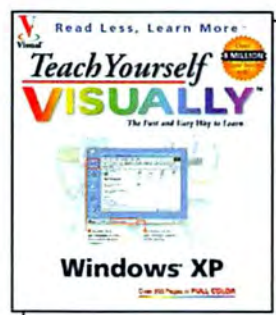
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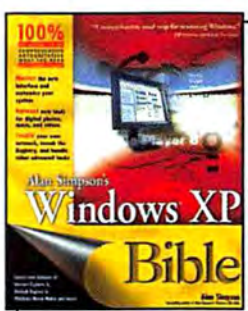
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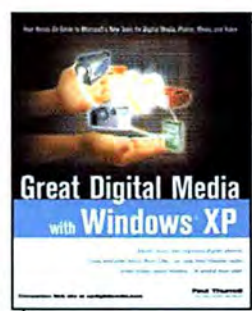
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Combine Your Rescue Disks on a Single CD

? MANY PROGRAMS today recommend that users create a separate rescue disk—a bootable floppy to use in case of emergencies. Is there any way to put all of these onto one bootable CD?

Bill Snell, via the Internet

WHAT A GREAT IDEA! Yes, it's possible—at least most of the time. The instructions below may not work with every kind of rescue disk, however. And if your PC can't boot from a CD, just skip this tip.

option. Then see if booting from CD is one of the available selections.

To combine your rescue disks, you need a CD-R or CD-RW drive, and software for writing to it. I'll assume you have Roxio/Adaptec's Easy CD Creator program; it comes bundled with many CD-RW drives.

First, create the various rescue disks, if you haven't already done so. Once you've created these floppies, transfer each disk's contents to a separate folder on your hard

drive. A number of programs, including Symantec's Norton AntiVirus, will let you create an emergency "disk" on your hard drive. If you find that option, use it.

You will definitely need a Windows start-up disk. Here's how to create one: Select *Start•Settings•Control Panel* and double-click

folder, type **autoexec** and press **<Enter>** to load that particular rescue program.

When you're satisfied that the disk works, create your CD. Back in Windows, put a blank CD-R or CD-RW disc into the drive. If this action doesn't launch Easy CD Creator, launch the program yourself; use the option to create a *Data CD*, not the option to use *DirectCD*.

When Easy CD Creator opens, select *File•New CD Project•Bootable CD* (see **FIGURE 1**). When prompted for a bootable floppy, insert the Windows start-up disk. Then drag the folders that contain your other rescue-disk files from the top pane of the CD Creator window (Explorer) to the bottom pane (CD Layout). Finally, click the *Create CD* icon.

When you boot from this CD, you'll find yourself at the DOS prompt in drive A:, a virtual floppy that functions the same as a regular Windows start-up disk. The other files from the CD-ROM are stored on the CD, which is probably one drive letter later than it would otherwise be (if your CD drive is usually D:, for instance, this time it will be E:). To get to it, type the drive letter followed by a colon and press **<Enter>**. Use the *Directory (dir)* command to see what folders are available; type **dir /p** to see just a screen at a time; and enter the **cd** command again to get to a particular folder. Once you reach a folder, type **autoexec** and press **<Enter>**.

MOVE OUTLOOK EXPRESS SETTINGS TO A NEW PC

? IS THERE A SIMPLE way for me to move my Outlook Express installation—messages, addresses, rules, signatures, and so on—to a new computer?

Bradford H. Turnow

Hampton Bays, New York

FOR A COMPANY that gets a cut from nearly every PC sold, Microsoft seems absurdly uninterested in easing the job of moving your old PC's settings to a new computer. Your Outlook Express setup has four different pieces that you may want to move. I suggest that you transfer them in the order listed below.

Accounts: On your old computer, open Outlook Express, select *Tools•Accounts*, and under the *Mail* tab pick the account



FIGURE 1: MAKE A BOOTABLE rescue CD using Easy CD Creator's data CD option and dragging the folders with your rescue disk files.

To find out if it can, enter your CMOS setup program and look around. The method for entering the setup program varies from one computer to another, so I can't provide exact instructions. In most computers, pressing **<Delete>** or **<F2>** soon after you turn on the computer—before it starts loading Windows—will bring up the setup menu. (When you first turn on your computer, there's usually a 5-second notice listing your machine's particular setup key.) Search the setup's various submenus until you find the boot-order

the *Add/Remove Programs* icon. Click the *Startup Disk* tab, select *Create Disk*, and then follow the prompts. This procedure is an exception—copy the files to a floppy disk, not to your hard drive.

Once the programs are on your hard drive, test them. Put the Windows start-up disk in the floppy drive and select *Start•Shut down•Restart*. At the DOS prompt, use the *Change Directory (cd)* command to go to the folder for a program (for instance, to go to the *c:\nav* folder, type **cd c:\nav** and press **<Enter>**). Once inside the

you want to transfer. Click the *Export* button, save the file to a floppy disk or other removable medium, and move it to the new computer. Select *Tools•Accounts* on the new computer, click the *Import* button, and double-click the file you exported.

Address Book: Like Accounts, Address Book contains an easy export/import feature, which you'll find on its File menu. But the feature doesn't work very well. If you use Address Book folders to organize your contacts, importing an address book will wipe out that organization.

Instead, copy the address book file from the old computer to the new one. Where Outlook Express keeps the address book and what it names the file vary from one PC to another. To find yours, select *Start•Search•For Files or Folders* (or *Find•Files or Folders*) and enter **.wab* in the 'Search for files or folders named' (or Named) text box. If the search unearths just one, that's the one you want. If it finds more than one, you'll have to figure out which option

is your address book. The correct file is likely named after you, with a designation such as 'Bradford.wab'. Double-click the file to read its contents, if you like.

After you have searched both of the PCs, copy the .wab file to either a removable or a network drive on the old computer, and then move it to the new PC. Give the file the same name as the new computer's existing .wab file, and place it in the same folder so that it replaces the .wab file used by your new computer's Outlook Express.

Rules, signatures, and other settings: This is by far the hardest part. On the old computer, select *Start•Run*, type *regedit*, and press *<Enter>*. Navigate the Registry Editor's left pane as if it were Windows Explorer until you find *HKEY_CURRENT_USER\Identities*. Click the plus sign next to Identities to see one or more "keys" (the Registry term for folders), each identified with a long, bracketed string of letters and numbers. If there's only one key,

you've found the one to use. If there are multiple keys, select each one and in the right pane examine the data it contains. The identity of the key that refers to you should be obvious.

In the correct identity's subkeys, go to and highlight *Software\Microsoft\Outlook Express*. Select *Registry•Export Registry File*. Save the file and move it to a temporary folder on the new computer.

Make sure Outlook Express is closed; then open three applications on your new computer's desktop: WordPad (*Start•Programs•Accessories•WordPad*), the Registry Editor (*Start•Run*, type *regedit*, and click *OK*), and Windows Explorer. Make sure Explorer is opened to the folder containing the .reg file that you just exported.

In the Registry Editor, navigate to *HKEY_CURRENT_USER\Identities* and click your identity's key in the left pane. In the right pane, double-click the *UserID* value to bring up the Edit String dialog box. With the 'Value data' field highlight-

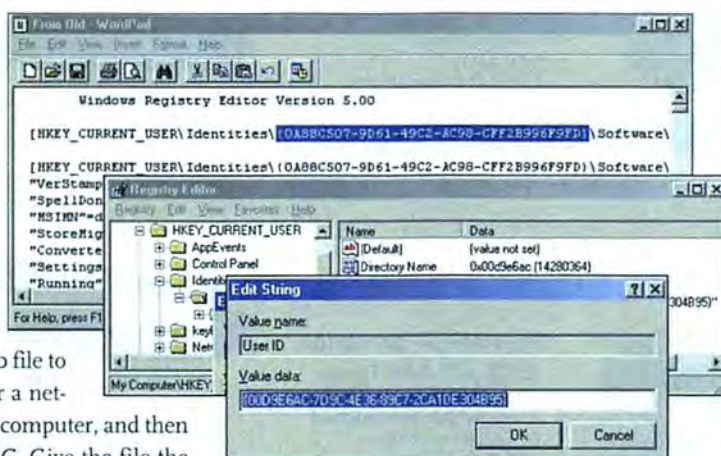


FIGURE 2: TO MOVE your OE settings to a new PC, change the ID number with WordPad and Regedit.

ed, press *<Ctrl>•C* to copy the identification string. Press *<Esc>* to close the dialog box (see **FIGURE 2**). Close the Registry Editor.

In Explorer, drag the .reg file to the menus, not on the blank editing space. This will load the file into WordPad. Near the top of the file, you'll see a line that starts *'HKEY_CURRENT_USER\Identities\'*, followed by the identity number from the old computer. Highlight that number, including the curly brackets that

TIME-STAMP YOUR NOTES

NOTEPAD IS FAIRLY basic, but it can do some nice tricks that few people know about. For instance, you can use the program to keep time- and date-stamped notes, such as records of phone calls, and it will do the stamping for you. Create a file in Notepad that starts with the text string *.LOG* (yes, it must start with a period and be entirely uppercase). This must be the only text on the first line of the file. Now every time you load that file, Notepad will insert the time and date at the bottom of the text.

surround it, but don't highlight the backslashes that surround the brackets.

Select *Edit•Replace*. The identity number that you've just highlighted should now appear in the Replace dialog box's 'Find what' field. Next, move to the 'Replace with' field and press *<Ctrl>•V* to paste in the new computer's identity.

Click *Replace All*, followed by *File•Save*, and then close WordPad. In Windows Explorer, double-click the file, and then click *Yes*.

Mailboxes: To move your Inbox, Sent Items, and any mailboxes you created yourself, simply move all of the files from their folder on the old PC to a folder on the new system. To find the location of that folder, open Outlook Express, select *Tools•Options*, click the *Maintenance* tab, and then click the *Store Folder* button. That method will work on both computers, but if you've brought over the rules, signatures, and

other settings as described above, the files will be located in the same place on the new computer as on the old one. Exit Outlook Express on each computer before you begin copying the files. ■

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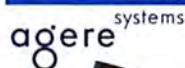
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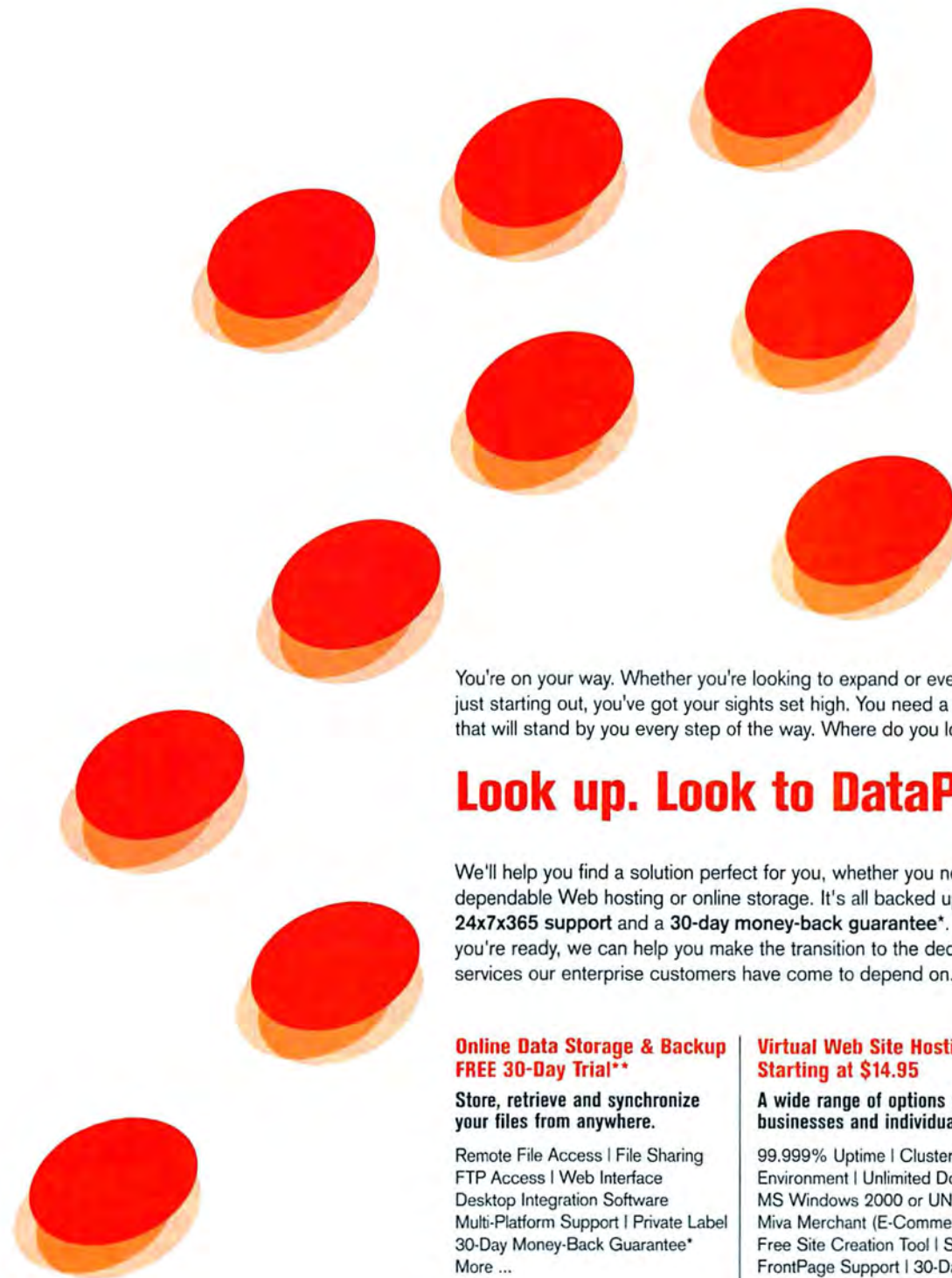
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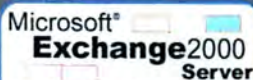
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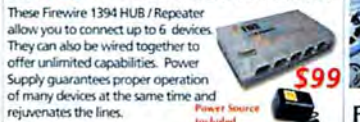


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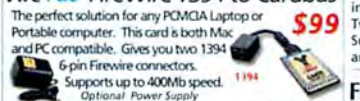


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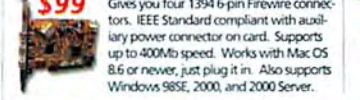
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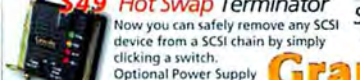
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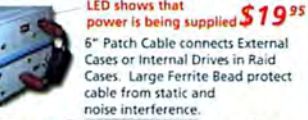
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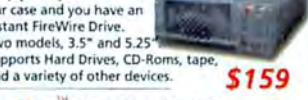
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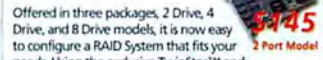


\$3695

IDEVue™ ATA 100 RAID PCI Host

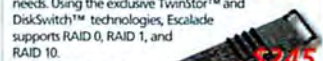
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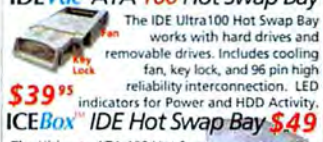
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2002: What Will Not Be

I'VE SAID IT BEFORE, AND I'LL SAY IT AGAIN: Pundits do a consistently lousy job of handicapping the future, even when that future is simply the year ahead. So every now and then I consult Elsie Bee, a perennially in-

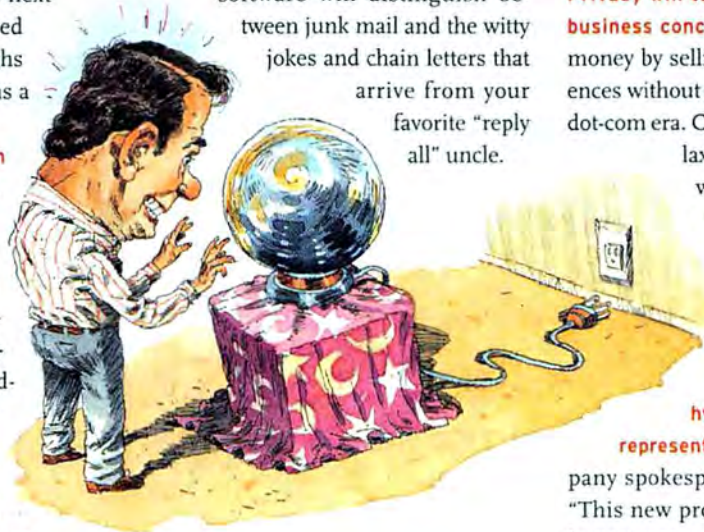
beta Liquid Crystal Ball under development in a secret lab near Redmond, Washington. Thus far, its artificial intelligence is unblemished: Whatever it predicts is guaranteed *not* to occur for at least a year. So, for the next 12 months, you can rest assured that the following breakthroughs are about as likely to happen as a Windows price drop.

New computers will usher in an era of incredible productivity. Thanks to the confluence of several new technologies, you will never see the hourglass again—or endure even moderately annoying crashes. Diagnostic programs will fix hardware problems before you're aware that you have them. Never again will you find yourself wasting two days on the phone trying to fix a program that saves you 10 minutes every century!

Downloading movies at home will become a national craze. Why head out to Blockbuster for a high-quality DVD when you can download the movie at one-tenth the resolution without moving from the comfort of your home office? Best of all, it will cost only one thin dime for you to see at home the same first-run feature that's playing right now in the mall!

Spam will disappear. Thanks to aggressive educational efforts disseminated over the Internet, no one will bother replying to e-mailed porn links or million-dollar-a-

month work-at-home offers, and spammers will give up in frustration. Just in case they return, surprisingly savvy filter software will distinguish between junk mail and the witty jokes and chain letters that arrive from your favorite "reply all" uncle.



Seven astonishing predictions that won't come true anytime soon.

Cell phones will sound better than wired ones. Connections will improve so much that you'll never again hear the dreaded phrase "Are you calling on a cell phone?" Better still, ubiquitous, dirt-cheap high-speed data services will let you watch high-res sporting events on your handset.

Customer service will reach new heights.

Despite the tough economy, businesses will recognize the competitive need for prompt, efficient support. That's why they'll staff up with enough well-trained Ph.D.s to answer the phone in seconds and solve every problem in less than a minute. Even broadband providers will join this service-first bandwagon!

Privacy will take priority over mundane business concerns. Companies making money by selling your name and preferences without your permission? That's so dot-com era. Crackdowns by the formerly

lax consumer credit industry will ensure that identity theft becomes a thing of the past; you may even have to use a thumb-print sensor to order shampoo over the Web.

Microsoft will stop overhyping its products and misrepresenting its behavior. Shy company spokespeople will say things like

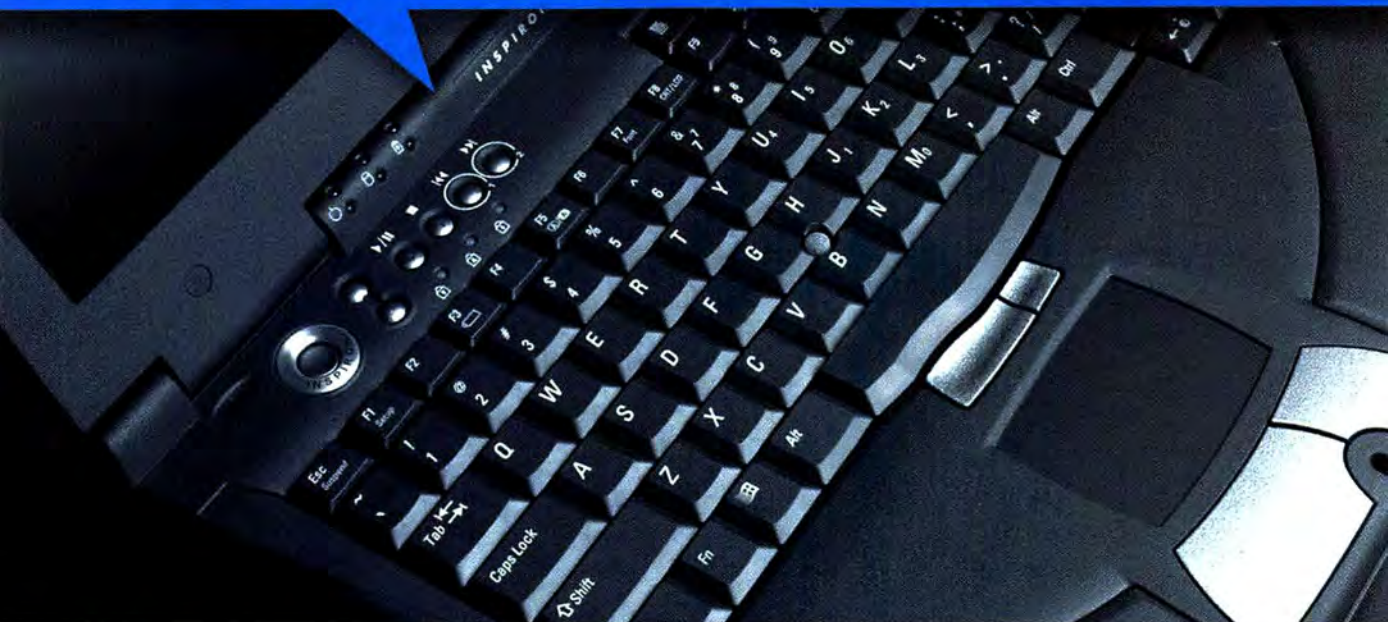
"This new product is at most a modest improvement over earlier versions." Steve Ballmer will meekly recant his outrageous claim (you can read it at find.pcworld.com/17061) that Microsoft has never told PC manufacturers what they can and can't ship with Windows. And in a keynote speech at one convention or other, Bill Gates will announce, "The only reason we're including this extraneous feature in our operating system is to crush our competition. You got a problem with that?" ■

Contributing Editor Stephen Manes, a cohost of the public television series Digital Duo, has written about PCs for nearly two decades.



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E-VALUE Code:
00563-591209

Recommended upgrade:

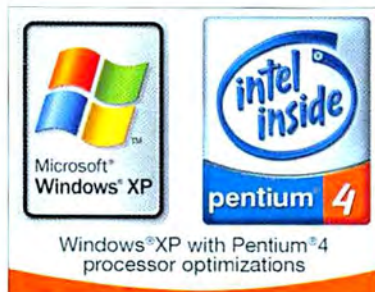
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