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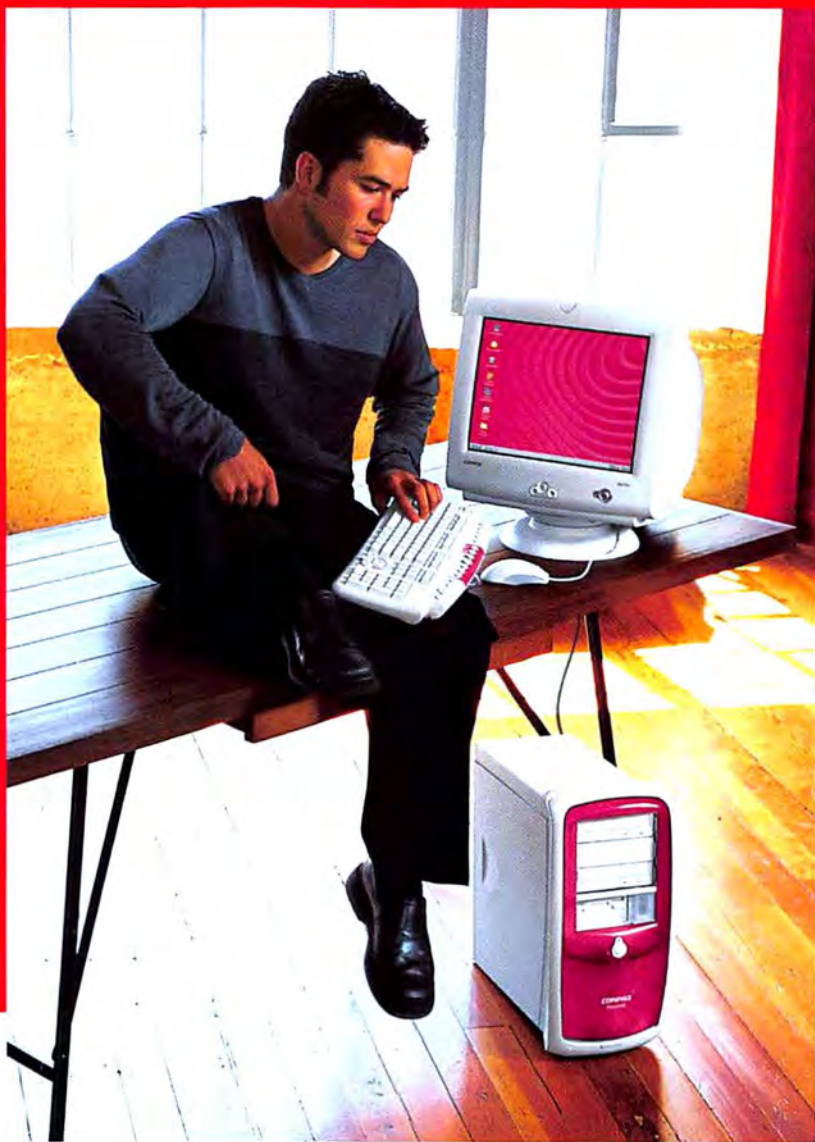
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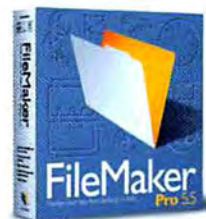
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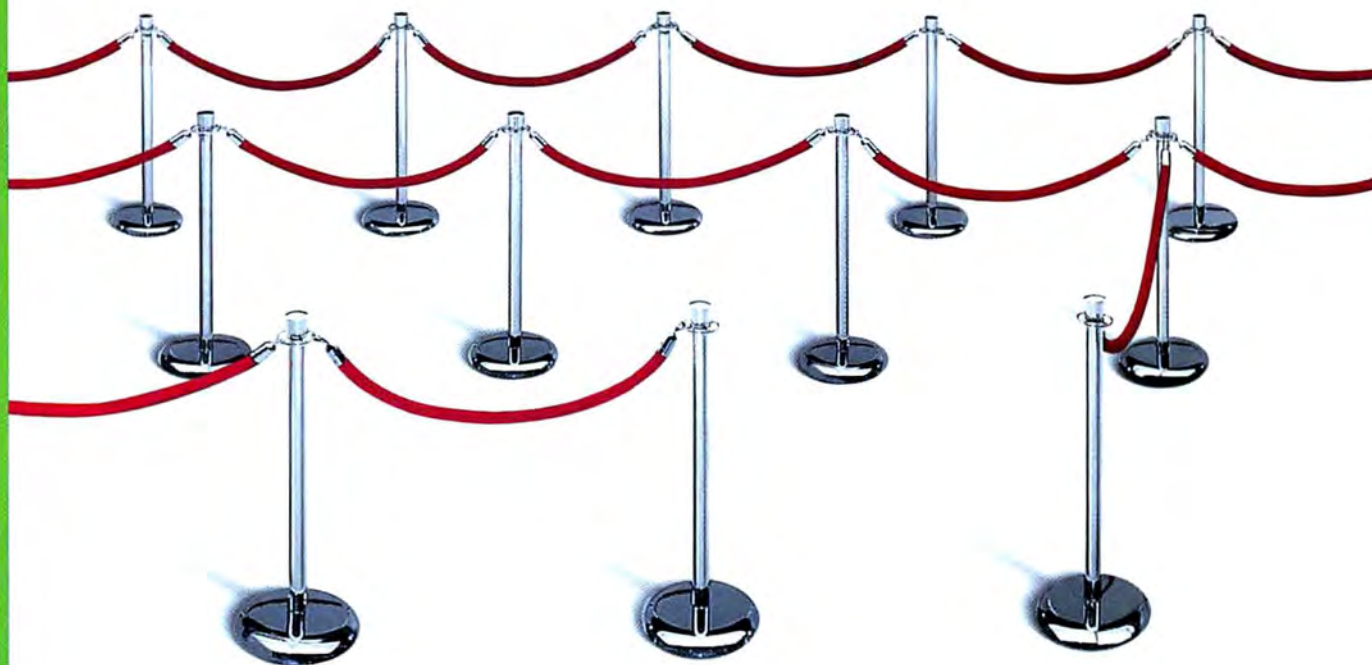
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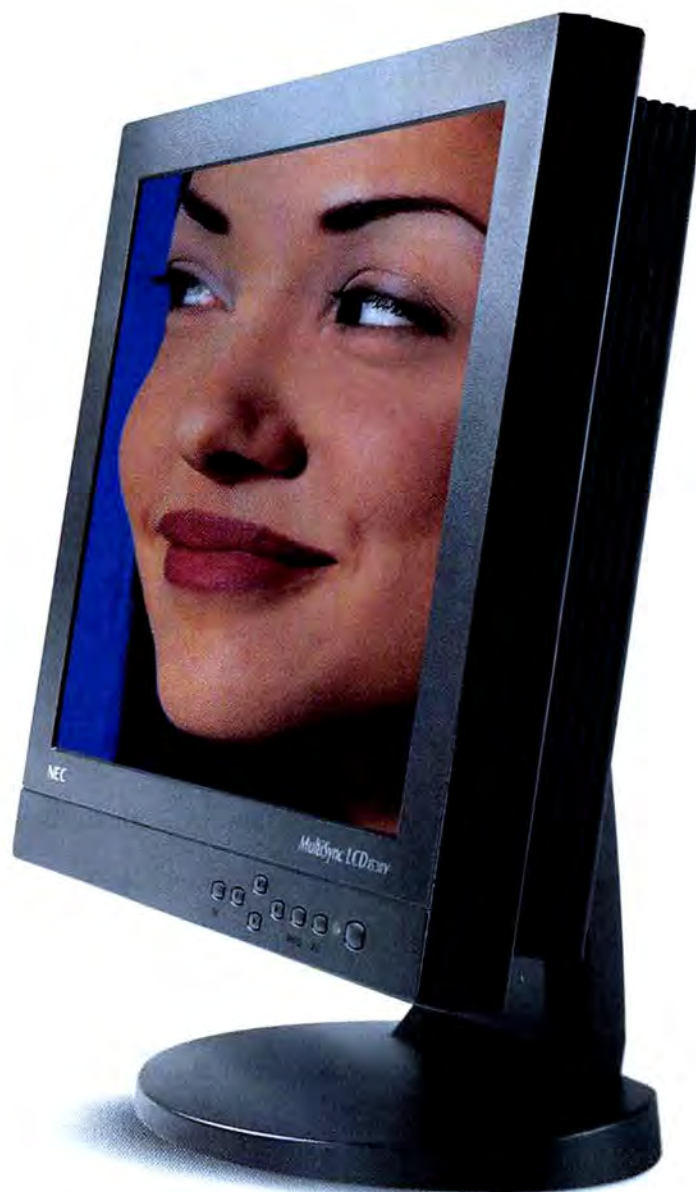
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PC ANNIVERSARY

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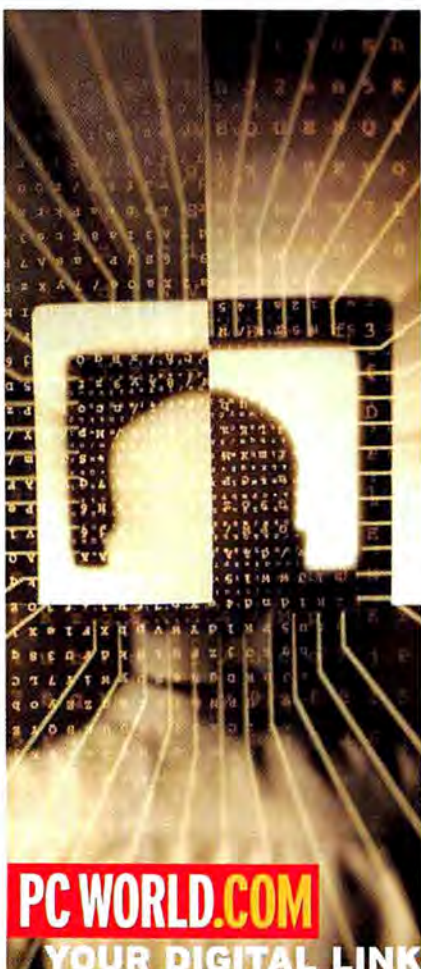
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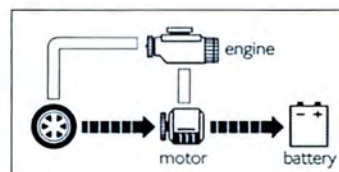
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COMPAQ
Inspiration Technology

Best PC Prices Ever: Should You Buy?

CONSIDER THIS: A 1-GHz Pentium III-equipped Dell with a 20GB hard drive and 64MB of RAM for just \$789. Too little memory? How about an IBM NetVista with an 800-MHz PIII chip, a 30-gig drive, and 128MB of RAM for just \$60 more? Still too expensive? Find a manufacturer's ad, like the one for the Dell Dimension cited above, and take it to Gateway. That vendor promises to beat any

price from Dell, Compaq, IBM, and three other competitors in a promotion fetchingly titled "PC Price War...? Cool."

PC price war is right. As *PC World* has been reporting, desktop and notebook prices are down an average of 30 to 40 percent this year. Prices for many peripherals and components (except CD-RWs) have fallen, too. And discounts on individual items can be startling, such as the Qbe Cirrus Personal Computing Tablet—introduced a year ago at \$4745—that I saw on sale at AOL recently for \$999.

AN UNPRECEDENTED FIRE SALE

THE REASON PRICES are so low is that nobody is buying. Businesses trimmed their technology spending to get through the economic slowdown. Consumers seem to be waiting for higher stock prices or the George Bush tax rebate—or perhaps just better products—before they return in force.

All of which raises the question, is this a good time to buy? If price were the sole issue, the answer would be a resounding yes. In the 20 years since IBM introduced the PC (see Lincoln Spector's retrospective, "The PC at 20," on page 133), there has never been a time when you could buy more power for less money.

But prices may swoon even lower. Our sister company IDC recently predicted that domestic sales of PCs will register their first-ever decline this year, dropping by 6 percent. The result,



PCs have **never cost less** in their 20-year history, but whether you should **make a purchase** depends **on your needs.**

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says Roger Kay, director of Client Computing, may be continued bargains throughout the year.

Some buyers may also be waiting for PCs preloaded with Windows XP, due out this fall. Sure, Microsoft's new operating system has drawbacks—chief among them an annoying copy protection scheme (see page 44 for Scott Spanbauer's report on user reaction to this feature). But Microsoft has a right to enforce its license agreements, and our tests suggest that, in other respects, Windows XP will be a winner.

Of course, you could buy your PC now and upgrade to XP later. But then you might miss important hardware enhancements. "Today's machines are bottlenecked beyond the CPU," says Rob Enderle of Giga Information Group in Cambridge, Massachusetts. "That's why you see so little improvement in performance when you go from a 1.2-GHz chip to a 1.7-GHz chip. But when you look at new technologies coming from companies like Intel, Nvidia, and AMD, the machines 12 months from now will largely render obsolete anything selling this year."

So what's a buyer to do? My advice: If you really must have Windows XP or the new hardware configurations, wait it out. If not, start shopping. Look for deals on midrange Pentium III- or Athlon-powered systems (our new Product Finder at www.pcworld.com/productfinder can help). Demand serious discounts if you're buying in quantity. And negotiate even if you're looking to acquire only a single system.

One more note: Next month, we'll be introducing a redesign of *PC World* that has been in the works since late last year. The new look is simple, clean, and modern, and we hope you'll like it. But be assured: The changes are mostly cosmetic. You'll find all the usual features, writers, and ratings under that shiny new skin. As usual, you can send me any thoughts or comments at eddir@pcworld.com.

COMING UP IN SEPTEMBER

Pump Up Your PC: Want more speed, storage, or multimedia pizzazz? Here's how to upgrade or build a system from scratch.

Monitor Madness: Our comparison testing reveals the best values among today's 17-inch, 19-inch, and 21-inch displays.

Search Party: Finding information online is a lot easier if you know which search engine to use—and how to use it.

Wanna Buy Cheap Stuff?: *PC World* editors go shopping and offer tips on how to avoid getting burned when you purchase online.

Antivirus Roundup: Melissa isn't your friend. Neither is that tennis player. Learn which products keep viruses away.

Kevin McKean is editorial director of *PC World*.

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YOUR TAKE ON: Traveling with a laptop ♦ Tech help sites ♦ A missing camera

CAN USER MANUALS BE SAVED?

I WOULD LIKE to thank Stephen Manes for noting [in *Full Disclosure*, June] that: "Professional indexing by a human being has become a quaint concept."

But professional human indexers, such as myself, are still around. It boggles my mind that hardware and software vendors do not rely on intelligent humans to assist with indexing. (I wonder how much money could be saved on tech support calls if the manuals themselves were indexed well?)

"Information architecture" and "Web site design" may sound like new fields. But here's a secret: It's all indexing—ask any librarian or other information professional. But try telling that to a Web site or database designer.

I have been writing indexes for over ten years, for a variety of media. And the American Society of Indexers (www.asindexing.org), an association of professional indexers, has been around since 1968. There's simply no excuse for any interested company not to provide quality information to its customer base.

L. Pilar Wyman, Annapolis, Maryland

I FULLY AGREE with Manes on the quality of many manuals, but as a technical writer since 1986, I must say I have only once met a tech writer who did not bust their butt to produce the best possible document in the time available.

The problem with manuals boils down to upper management simply not caring enough about the quality of documentation to extend the product release date—after all, poor documentation doesn't really affect sales.

The process starts with marketing being late with product requirements or changing them midstream. This is compounded by the developers who always—and I mean always—exceed their development time, leaving the tech writers in a crunch.

So, Stephen, you have 10 minutes to write your column; let's see what you can do. Oh yes, we'll be adding a couple more requirements in the last 2 minutes.

Paul Tepley, Boulder, Colorado

MANES LEFT OUT one problem that I've found laced throughout the Windows 2000 Professional "Getting Started" man-

Get the
Help
you
need

Tired of bad tech support?
Here's how to get better service,
even if your vendor
fails you.



uals. It takes the form "If x doesn't identify the problem, contact your network administrator." That's great advice for a workstation like mine linked to one other home computer. Or I get the error message "network path not found," but nowhere do the manuals or the help system discuss network paths.

I keep talking to myself, the only network administrator in my household, but I still don't know the answer.

Robert Cushing, Austin, Texas

MORE EXPERT HELP SITES

THE SIDEBAR "Get Expert Advice on the Web" in June's "Get the Help You Need" reviews several tech advice sites, most of which charge fees. A number of sites offer free answers to problems from a huge database.

Two sites that come to mind are www.pcnineoneone.com and www.computing.net. I've used both to search for answers and found them reliable and helpful. In my experience, the people who provide responses at these sites are very sincere and knowledgeable, and they waste no time in coming up with correct solutions to your PC's problems.

Pat Gibney, Mobile, Alabama

YOU LEFT OUT the one site that my colleagues and I swear by. Easy to use, full of free tips and advice, with superior tutorials and a paid e-mail advice section costing only \$10 per question (with detailed, friendly responses usually arriving in less than 2 hours), www.techmommy.com is our choice for online tech support.

Barbara Treat, via the Internet ▶

HOT BUTTON

Readers' Advice on Tech Support

YOUR ARTICLE ON tech support ["Get the Help You Need," June] omitted one obvious way to get help: When you receive exceptional service, write a letter to the supervisor to commend the person who helps you. This person then receives praise, and sometimes the letters are posted in the office. You will receive even better service, and if the person gets promoted, you have someone higher up who will definitely remember you! I have used this strategy more than once and found it well worth the effort to write the letter or e-mail. In today's world, few people take the time to express their thanks, so it is that much more appreciated.

Meg Layton, Reston, Virginia

IN YOUR TECH support sidebar, "When You Just Can't Take It Anymore," you left out one

important step for getting results when you complain: Contact your credit card company. The vendor will almost certainly listen after it has been refused payment.

Daniel Owen, Phoenix, Arizona

INSTEAD OF putting people on hold, tech support departments should have an answering machine-like service that allows customers to describe their problem when a representative is not available. A rep could later call the customer back. If the company doesn't want to pay charges for return phone calls, perhaps it could equip the answering machine with a feature to alert the caller about the current waiting time for reaching a representative.

Being put on hold is horrible.

Bayo Falase, Gallup, New Mexico

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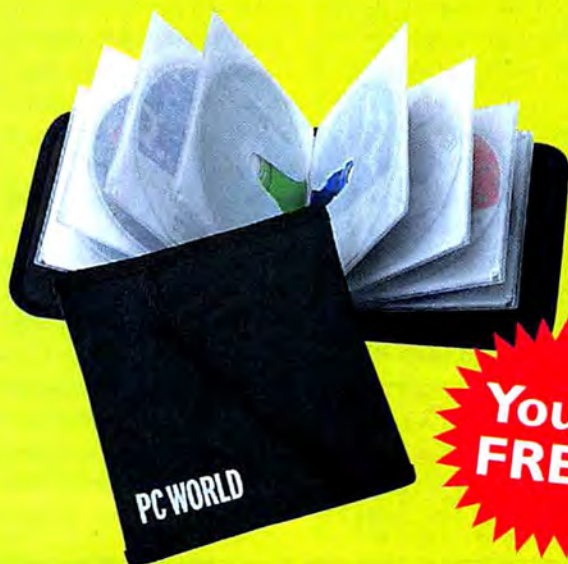
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LETTERS

MISSING CAMERA CAPER

I'M IN THE MARKET for a digital camera over \$500. In your May issue, your top pick was the Epson PhotoPC 3000Z, but it dropped off the *Top 10 Digital Cameras* list in the June issue. What happened?

Richard L. Grandjean, Dallas, Texas

Editor's response: Because Epson no longer manufactures the PhotoPC 3000Z, it's no longer eligible for our chart, though it is still a good camera. We regret we didn't include an explanation. —Alan Stafford

TIMELY TRAVEL TIP

HERE'S A TIP for flying with a laptop: Take along a couple of games or movies suitable for 6- to 12-year-olds, and earphones. On a flight from Salt Lake City to Anchorage, I saw a traveler finishing up some work on his portable. He was seated next to a bored, squirming youngster traveling with his mother. The man inserted a game or a movie, put it on the youngster's tray table, handed him the earphones, and enjoyed some undisturbed sleep.

I thought it was a great idea.

Larry Lunden, Aiken, South Carolina

AND A REEVALUATION

AFTER REREADING the article "Sites of Passage" by Michael Shapiro [June], I realized I was unfair in my very critical online evaluation in your June issue survey.

Although I still think your June issue was not up to your usual standards, this article was comprehensive, well written, and had a lot of good information for air travelers. It was well researched and covered all the bases. I'll look forward to more of Michael Shapiro's articles.

Jack Rhondeau Jr.

Citrus Heights, California

PC World welcomes your letters to the editor. E-mail letters@pcworld.com. We reserve the right to edit for length and clarity. ■

CORRECTIONS AND CLARIFICATIONS

JUNE'S "Tame Your In-Box" should have stated that Outlook Express's spelling checker will check the spelling of outgoing messages automatically only when the default setting is changed.

PC World regrets the error.

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Catalog, pg. 30



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For those of you who don't remember, a vinyl album was a big, dusty, scratchy, round thing that people used to play music. Until the day the CD arrived. So simple, yet revolutionary. So small, yet full of space. So thin, yet practically indestructible. The rest is history. Nowadays, the CD is the universal digital media standard everybody knows and trusts. With that in mind, Sony created the new CD Mavica® digital camera. The first and only digital camera line to capture and burn crisp digital images onto a universal 3" CD-R that's just under \$5. With advanced features like an InfoLithium® rechargeable battery, up to 3.3 Mega Pixel and 3x Optical Carl Zeiss® lens on select models, you can easily take, share, and store up to 1,300 images on a 156 MB CD-R, virtually forever. And don't get rid of your photo album. Everyone knows how valuable vinyl can be these days. For more information or your nearest retailer, visit us at www.sony.com/di

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Avoiding the Upgrade From Hell

How to have the latest software without experiencing installation disasters.



REMEMBER THE SCENE from the movie *Gladiator* where the prisoners-turned-gladiators crouch in mute terror in the center of the Coliseum, waiting for a gate to open that would bring them face-to-face with unknown bloody horrors and almost certain death? That's sort of how I felt the last time I contemplated upgrading my computer's operating system, from Windows 95 to Windows 2000.

Okay, so I'm exaggerating—software developers on horseback rarely attack hapless users, for one thing—but I did feel a sense of impending doom just before I hit the Install button. In that case,

my premonition was correct. Although I didn't get bludgeoned with a mace, my PC and I were locked in mortal combat for weeks before we reached an uneasy truce that let most of my applications run smoothly again.

Why am I having flashbacks to software installation nightmares? Because a new round of the upgrade shuffle is starting for many people, with the recent release of Microsoft's Office XP suite and the coming of Windows XP.

You know what the marketers at Microsoft (and every other software company) promise when a new version of their product comes out: Richer features! Easier to use! Greater efficiency! Seamless, simple installation! It would be easy to ignore the pitches if it weren't for the fact that they're often true. Software can do much more than it did just a few years ago, and these more versatile programs are often less complicated to use. Lots of installations go off without a hitch and result in happier PC users.

And even if you wanted to ignore all software updates, that strategy wouldn't work. To use your PC to its full capacity, especially on the Web, you need current software. Besides that, the rest of the world will upgrade even if you don't, eventually leaving you a hermit on your digital island, unable to communicate with people outside your den.

On the other hand, we've all heard the horror stories. Consider version 5 of the popular Easy CD Creator software from Adaptec spin-off Roxio. Some unsuspecting customers who recently installed the update on Windows 2000 systems found themselves either stuck in limbo during boot-up or staring helplessly into the blue screen of death (see "CD Creator 5 Tangles With Win 2000," www.pcworld.com/news/july2001/cdcreator). At press time, the company had released a patch to prevent the blue screen crashes but was still grappling with the superslow boot-ups.

According to Doug Wiesner, vice president of Michigan-based Professional Technical Development, a consulting firm that often helps clients resolve software installation debacles, the most common upgrade problems occur when individuals or companies upgrade their operating system and find that their older software no longer runs. "Often these are mission-critical applications that just aren't compatible with newer operating systems," he says, "and although [our company] can sometimes retrofit the software, usually the long-term solution ►

requires an exhaustive upgrade to the [client company's] entire system."

Software installations often fail because of hardware problems. If your system has only the minimum memory or processing power to handle a big, sophisticated new suite or other software, you may well find that the application runs—but more slowly than an RV trying to climb a mountain pass.

As Wiesner points out, this can be a big hurdle: "These days, users really have to consider their needs and to weigh the added functionality of the software against the expense and hassle of upgrading hardware, possibly installing patches and fixes, updating drivers, and dealing with whatever other unexpected problems happen."

So if there are perils to both upgrading and not upgrading, what's a cautious computer user to do? That depends. With some apps, like antivirus upgrades and virus definitions, it's generally a good idea to stay as current as possible, since the benefit almost always outweighs any potential upgrade trouble. But if you're contemplating an operating system or application suite upgrade, you might want to hold off until you've had a chance to do some homework.

Here's how you can arm yourself against potential disaster:

- **Make a list:** Newer isn't always better, and not all upgrades offer the functionality you need. Make a wish list describing the features you'd most like in a program. Then compare it with the features provided in the new version. If the two lists don't have much in common, don't bother.
- **Make another list:** Create a complete inventory of your hardware and software—including drivers and version numbers—before any upgrade. Click on 'Download' at www.belarc.com and you'll get Belarc Advisor, a handy utility that will create an inventory of the hardware and software on your system. Use this list to confirm that you meet the hardware requirements for an upgrade and to deter-

mine whether you'll need driver updates.

- **Consider others:** If you're thinking about upgrading an application like an office suite, think about the other users you regularly exchange files with, and make sure the upgrade will be compatible with the applications and platforms they use. For example, if an application uses a new file format, check whether it allows you to save your work in an appropriate older format as well.

- **Look for trouble:** Visit the vendor's Web site and check for software patches, troubleshooting tips, and other fixes.

- **Learn from others:** Visit online forums such as the newsgroups at support.microsoft.com and research other users'

experiences. Look for trends, especially those that affect applications you use.

- **Resist pressure:** If an application that's working fine constantly badgers you to download an upgrade (Real Player, are you listening?), consider trying another program that may accomplish the same task with less harassment.

- **Clear your schedule:** If you decide to upgrade, consider your workload before you start. Set aside an appropriate chunk

of time during a period when you don't have a lot of impending deadlines, just in case of a calamity.

- **Save your files:** Back up your system—especially important files that you can't afford to lose—before you upgrade (for more information on how to do this, see www.pcworld.com/heres_how/oct2000/backup). Also, if you're upgrading your operating system, back up your entire hard drive in case disaster strikes and you need to restore it.

- **Be patient:** Even if everything goes smoothly, allow some time to get back up to speed after you upgrade. You may need to reinstall customized settings, tweak macros, and learn new commands.

- **Consider waiting:** Many of the worst bugs in any new program are fixed within six months. If you can wait, consider letting others be the guinea pigs.

- **Buy preinstalled:** It's often easier to get a new operating system by waiting until you're ready to buy a new computer. Your PC vendor will have done the testing needed to make sure the OS will work with your new hardware.

There's no substitute for doing your research. So before you upgrade, hope for the best—but prepare for the worst.

Anne Kandra is a contributing editor and Grace Aquino an associate editor for PC World.

ON YOUR SIDE



I CALLED MICRONPC technical support to ask about the BIOS setup of my computer. A rep said she couldn't help me since my three-year-old machine was out of warranty.

I was surprised. Working in the software industry, I talk to many PC manufacturers—including Compaq, Dell, and Gateway—whose reps are willing to give advice or direction even on products with expired warranties. I understand that I have to pay for parts and labor, and in some cases I may have to pay for phone support on systems that are beyond the term of the service contract. But the rep didn't even offer me the option of paying for support. What gives? MicronPC's unwillingness to help is disturbing to the point that it's mean-spirited.

Tim Curran, Omaha

On Your Side responds: According to MicronPC spokesperson Michele Casey, the rep should have offered Curran the alternative of calling the company's 900-number for \$3-per-minute support. After the warranty expires, the company will still provide assistance with hardware and software problems, but you have to pay. Many PC vendors, including MicronPC, cover most of a system's components for three years and installed software for 15 days from the day you bought the machine. (Gores Technology Group has acquired MicronPC, but is retaining its policies on service.) —Grace Aquino

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Not Your Ordinary Browsers

FRANKENBROWSER (frank-ən-braŭz-er), *noun*: Any of numerous applications that transmogrify Internet Explorer's look, feel, and features in ways that range from highly practical to downright bizarre. *See also* CrystalPort, CubicEye, NeoPlanet.

Listen up, Webster's: The name and definition are mine, but Frankenbrowsers are real—and they're multiplying. These aren't full-blown alternative browsers. They rely on Internet Explorer to do the heavy lifting of rendering pages, so they sidestep glitches that have sunk past upstart browsers. But unlike mere plug-ins, Frankenbrowsers retool IE in profound ways.

NeoPlanet (www.neoplanet.com), the genre's old-timer, packs an agreeable hodgepodge of browsing enhancements, including a Download Manager that lets you schedule file transfers to happen in bulk when your PC is otherwise unoccupied. But its signature feature is the way it lets you perform radical surgery on its personality via skins—custom icon designs and color schemes that you download and install with a couple of clicks.

True, some of the 600 available skins are just e-billboards for corporate enterprises ranging from Jack Daniel's to the Baltimore Ravens. But most of them are the handiwork of NeoPlanet fans. These user-crafted makeovers use slick palettes and detailing, such as brushed-metal effects, for a refreshing departure from the gray, lifeless norm of Windows interfaces. And even though my rational side keeps telling me that cosmetic changes shouldn't make browsing better, they do.

Still, NeoPlanet's reign as my favorite Frankenbrowser ended when I found CrystalPort (www.crystalport.com). First of all, CrystalPort fixes a lingering IE limitation: its inability to handle more than



one Web page unless you launch multiple copies of the browser. CrystalPort's tabbed design lets you load as many pages as you like, hop between them in a heartbeat, and save them as a group.

Then there's AppCapture, which lets CrystalPort treat other apps like plug-ins. That means, for instance, that you can tuck your e-mail or instant-messenger client of choice into the browser for quick access. For me, that feature alone is worth CrystalPort's cost of \$20. At press time, though, the product's creators had plans

for a new, improved version and a price hike to a yet-to-be-determined figure.

Every good Frankenbrowser is innovative; 2ce's CubicEye (www.2ce.com) is utterly unique. Billed as a 3D browser, it gives you a window that looks like the inside of a cube, with Web pages tacked on its walls. You can rotate the cube so any page is on the primary, back wall. Here's where things really get weird: You can divide the cube's walls into other Web-plastered cubes, subdivide those cubes ad infinitum, and then zoom around them in smooth, 3D motion.

3D OR NOT 3D?

THE POINT OF CubicEye, 2ce says, is to simplify Web navigation. But this package is more a work of freakish genius than a workaday tool—amusingly hallucinogenic, but also disorienting. And the 3D effects gobble resources: You need a Pentium III PC with 128MB of RAM, brawny graphics, and late-model versions of IE and DirectX.

So would I advise plunking down \$20 for the full version of CubicEye? Nope, but the free lite edition is worth a gander if your PC is up to the task. One thing's for sure: You won't be bored.

On a personal note, occupying this page has been a blast, but it's time for a breather. PC World Contributing Editor and old pal Brad Grimes takes over next month. See you elsewhere in PC World.

Harry McCracken is an executive editor for PC World. Find files mentioned in this column at PCWorld.com's Downloads. ■

GIMME FIVE

Home Electronics Hot Spots



GODZILLA-SIZE TV sets, brainy remote controls, and other tech toys are the stars at these worthy sites:

1. AV Science Ultimate Forum: Home to message boards bursting with audiovisual opinion, facts, and troubleshooting help. www.avforum.com

2. Secrets of Home Theater and High Fidelity: Everything from speaker tips to DVD reviews. www.hometheaterhifi.com

3. Active Buyers Guide: Custom buying advice on audio and video equipment of all sorts. www.activebuyersguide.com

4. The Not Too Technical Home Theater Handbook: A nifty guide whose name says it all. 16by9tv.com

5. Home-Automation.org: This minimalist site just sends you to information elsewhere on the Web—but with more than 550 links, there's a lot to explore.

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The Skinny on Web Searching

THE SQUIRREL IS BACK. It raids the backyard bird feeder, outmaneuvering me, my squirt gun, and both pooches. (Hey, no chuckling. Squirrels are a birder's equivalent of a Windows General Protection Fault.) With last month's column in mind (see www.pcworld.com/features/july2001/find_files), I decided to scour the Internet for a squirrel-defense system. Along the way, I picked up some Web searching tricks and three cool search programs.

Here's my favorite search shortcut: Suppose you want to find articles on Microsoft's site that deal with shutdown problems for Windows 95, but not Windows 98. Microsoft's Knowledge Base has masses of useful articles, especially if you need to troubleshoot a Windows error. But instead of using the site's lame search tool, go to Google.com and type **shutdown articles 95-98 site:microsoft.com** in the search box. (Don't forget the space after '95'.) You can search in practically the same way at the Fast site (www.alltheweb.com/cgi-bin/advsearch): Enter **shutdown 95-98** in the search engine's 'Search for' field, and **microsoft.com** in the Domain Filters 'Only include' field. This makes searching one or several specific sites incredibly easy. Pretty soon you'll feel like you could pluck a needle out of a dozen haystacks—or Web sites—without breaking a sweat.

You can dredge up secrets about virtually any search site just by looking at its help or advanced search pages. For instance, Google's Preferences page lets me open its search results in a new browser window, and I can customize AltaVista and Fast to highlight my search terms in their lists of results. And if you have children, you may appreciate being able to instruct all three search sites to filter out pages containing offensive language.

If a lengthy URL (the link's string of



You can dredge up secrets about **virtually any** search site by looking at its help or **advanced search** pages.

characters) in your search results is dead—returning a message similar to “This page could not be found”—start at the right end of the string and remove everything up to the rightmost slash; then hit **<Enter>** again. This will likely take you to a part of the site that's “up the path” from the page you were trying to open.

You may also get a dead link in a Google search result. But Google keeps a copy of practically every page it looks at while collecting links for its database. Just click the word *Cached* toward the end of the Google search result to view the stored copy.

SEARCH HELPERS

I USE THREE TOOLS to blast my way through Internet searches. They're all free, and I consider each a must-have.

I'm hooked on the indispensable Google Toolbar, which has taken up per-

manent residence on my Internet Explorer screen. (Sorry, the Toolbar wasn't available for Netscape at press time, but you can use the browser button on Google's own site for the time being. It's at www.google.com/options/winnetscape.html.) Google's Toolbar highlights my search terms in the text of the Web pages it retrieves. It also provides quick newsgroup searches and keeps a search history. Another handy trick is the Toolbar's ability to search only the currently active page. Don't want the Toolbar? Make Google your browser's default search engine.

Check here for details: www.google.com/options/defaults.html.

Katiesoft (www.katiesoft.com) is a nifty utility for opening as many as four browser and site windows—ideal for moving quickly from site to site. It's a no-brainer to use: Drag URLs from the two windows showing the search engines, and drop them into the other two windows. You'll find the Google Toolbar and Katiesoft at PCWorld.com's Downloads.

One downside of Katiesoft is that it quarters your active browser window, and the three added vertical and horizontal scroll bars further reduce the remaining visible area. If your screen real estate is limited, try Quickbrowse. Go to www.qbsearch.com, select up to 19 search engines, and watch the site stitch together all of your search-results pages into one long page that you scroll down in a single window. Quickbrowse is Web-based, so there is nothing to download.

For a great search tutorial, visit Search Tips From the Internet Coach at www.coachfind.com. Then check out the Power Searching page at searchenginewatch.com/facts/powersearch.html.

And yes, I did find a way to thwart that pesky squirrel. You can see it for yourself at www.yankeeflipper.com.



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Service packs from Microsoft and Corel ♦ Outlook worm ♦ Handheld HotSync snag

500 Fixes for Windows 2000

IMAGINE IF you bought a brand-new car only to find it had 500 annoying problems. You'd probably return the car to the dealer. Yet when Microsoft makes 500 errors in an operating system, the company gets congratulated for its best work in years. Welcome to Windows 2000: It may well be more stable than its sibling OSs, but Microsoft, nonetheless, had to post a second update for Windows 2000 users.

Service Pack 2 fixes hundreds of pesky bugs. For example, Windows 2000 doesn't recognize some USB devices when the OS wakes from hibernation mode, it doesn't always play video properly, and it has a slew of recently discovered security holes. Not all 500 fixes affect you if you're running Windows 2000 Pro, but you'll still want to get SP2.

Warning: At 20MB, this service pack isn't svelte. To get the update, go to www.microsoft.com/windows2000/downloads/servicepacks/sp2/default.asp. Alternatively, you can order the service pack on CD-ROM for \$14.95 (plus \$5 shipping and handling); visit www.microsoft.com/windows2000/downloads/servicepacks/sp2/ordercd.asp, or call Microsoft at 800/360-7561.

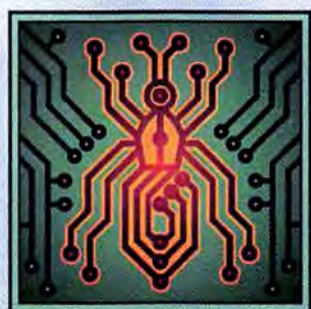
WORDPERFECT OFFICE 2002: UPDATE ALREADY?

OUCH. Corel's WordPerfect Office 2002 was hardly on store shelves two weeks before the company had to ship its first update. Service Pack 1 fixes a major problem: Some Windows 2000 users couldn't run the suite at all. When they tried, they encountered an obscure error message, "Unable to load WPMIN10.DLL."

To download the 811KB patch, named WPO2002Patch.exe, point your browser to www.corel.com/support/ftp/site/pub/

Handspring and Palm: HotSync Sunk?

ACCORDING TO bug-tracking firm BugNet, some owners of the Handspring Visor PDA are encountering weird behavior in their to-do lists. After a HotSync synchronization with the user's PC, the Visor's to-do list becomes unreadable; characters appear as rectangles. A small number of Palm owners using the old OS (version 1.0 or 2.0) are experiencing the same problem when they upgrade to a newer OS. For Handspring's instructions on how to fix the problem, hop to www.handspring.com/support/ts_soft_handheld.html. For Palm's help, visit www.palm.com/support, click *Knowledge Find*, and type rectangles in the field set up for asking questions.



I N B R I E F

QuickBooks 2000 and 2001 Glitch

IF YOU USE QuickBooks 2000 or 2001, you might be experiencing one of two problems: The program may refuse to open, or you may run into an esoteric error message and the program may crash. According to Intuit, you may have caught a virus. To find out if your computer is infected and to get removal instructions, go to www.quickbooks.com/support/faqs/win5/6360.html.

Would You Like Cheese on That Linux?

IF YOU HAVE Linux running on a network, you need to know about a Linux worm making the rounds. The worm, dubbed Cheese, attempts to fix damage done by an earlier virus, but instead it actually messes up your system. For more details, check out www.cert.org/incident_notes/IN-2001-05.html.

wordperfect/wpwin/office2002/index.htm. According to a Corel spokesperson, the company is already shipping the updated code in the latest shrink-wrapped versions of the product.

WORM MASQUERADES AS VIRUS ALERT

THE LATEST SCARE on the virus front is a worm that affects Outlook and Outlook Express users. An e-mail message appears with the subject line "FW: Symantec Anti-Virus Warning." The message purports to be from someone named F. Jones. If you click the file attachment, titled www.Symantec.com.vbs, the worm will infect your computer. The damage? The rogue program sends copies of itself to everyone in your Outlook address book. It also changes your browser's default home page to a fake virus information page and changes some Windows Registry settings.

To get rid of the worm (also known as VBS.Hard.A@mm), load the latest virus update from your antivirus software company. If your machine runs Symantec's Norton AntiVirus or McAfee's VirusScan, any virus definition update dated May 12, 2001, or later will protect you against this interloper. Symantec and McAfee have posted detailed instructions online on how to handle the worm. For Symantec's help, visit www.symantec.com/avcenter/venc/data/vbs.hard.a@mm.html; for McAfee's advice, check out vil.mcafee.com/dispVirus.asp?virus_k=99087&.



You'll find files from this article at www.pcworld.com/downloads. Stuart J. Johnston is a contributing editor for PC World.

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TOP OF THE NEWS

Readers to Microsoft: Copy Controls? No Way!

"WHY SHOULD I want an upgrade that creates headaches for me?"

"I will not use software that requires me to justify my system changes to Microsoft."

"They expect me to purchase their products and then get their permission to use them? I don't think so!"

If you had any doubts about the unpopularity of Microsoft's antipiracy Product Activation feature, you can put them to rest. We asked PCWorld.com visitors for their opinions of the hardware-scanning, license-enforcement technology that is built into Office XP, recent versions of Office 2000, and the forthcoming Windows XP operating system. The verdict of our readers was a near-unanimous thumbs-down.

Citing privacy concerns, inconvenience during software installs and hardware upgrades, and just plain righteous indignation at having to ask permission to use a bought-and-paid-for product,

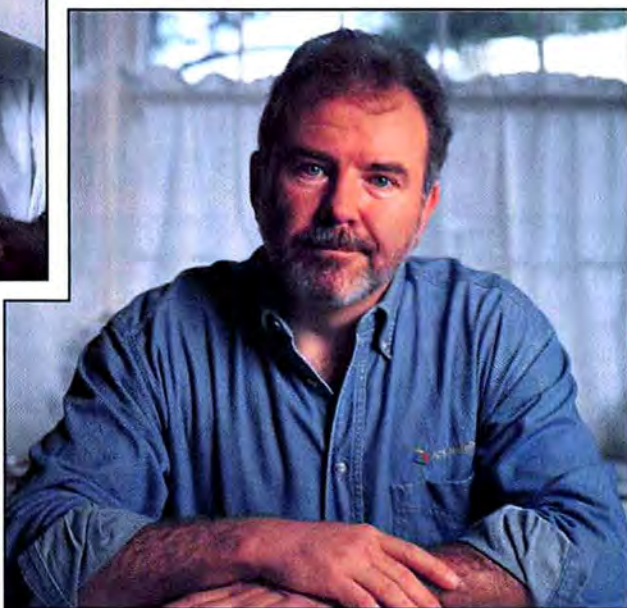


"I will not be upgrading."

**RON BRUNTON, EXECUTIVE STAFF OFFICER,
NOVA SCOTIA TEACHERS' UNION**

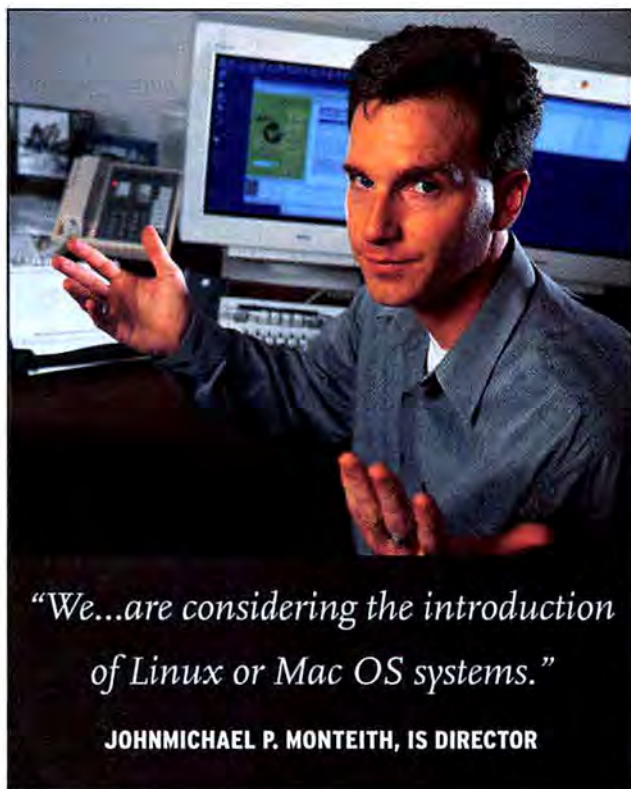
many participants in the informal survey declared they'd just say no to upgrades that require Product Activation. Instead, they vowed to stick with their current version of Office or Windows, or look into software alternatives such as Linux, Macintosh, Sun's StarOffice, Lotus SmartSuite, and Corel WordPerfect Office.

"Microsoft is telling customers that we can't be trusted," concludes Glastonbury, Connecticut, engineer Chris Cavanaugh, who encountered Product Activation in a copy of



"The wrong people are being punished for the actions of a few."

CHRIS CAVANAUGH, DEVELOPMENT ENGINEER



FrontPage 2000 that he had bought for home use. When Cavanaugh wanted to install the program on a PC other than the one he'd originally installed it on, the installation program refused—even though he had removed the application from the original computer.

"Running the Microsoft gauntlet to get it changed isn't worth it," Cavanaugh comments. "I don't [work with] bootleg software. The wrong people are being punished for the actions of a few."

"Any time you create a situation where people feel coerced into something they did not agree to, they're going to be upset," says IDC system software analyst Dan Kusnetzky. "This is a pretty heavy-handed approach to protecting

Microsoft from the few people who pay no attention to licensing agreements."

The furor over Product Activation may be based more on gut reaction than on the tech-

Antipiracy technology in Windows XP could prove a major **deal breaker** for would-be upgraders.

◆ **By Scott Spanbauer**

nology itself. Privacy concerns are probably the most overblown, since Product Activation transmits neither the user's personal information nor the actual identity of the hardware that is in use on the licensed machine (see "A

Walk Through Product Activation" on page 46).

"We don't capture or retain any information that is traceable to the user," notes Allen Nieman, Microsoft technical product manager for licensing technologies. Nieman says a Product Activation design goal from day one—aside from the primary goal of combating casual copying—has been to avoid requiring or transmitting personal information.

HANDS OFF MY PC

BUT USERS seem not to be getting—or accepting—that message, so Microsoft has responded by making changes to the Product Activation user interface in Windows XP Release Candidate 1 to underscore that activation and registration are separate processes.

"Activation is this required activity, and it's anonymous," Nieman explains. "Registration isn't a required activity, and by definition, of course, you have to provide some personal information."

But no matter how often and how forcefully Microsoft insists that personal information isn't being transmitted, customers may remain skeptical, IDC analyst Al Gillen says.

"The problem is, first of all, do people believe that? And secondly, do people want that happening anyway? I think the answer is no in both cases," he concludes.

Microsoft may yet do more than tweak the surface of Product Ac- ▶



Product Pipeline

▶ **Twice as Nice:** Gunning for still more of Intel's lunch, AMD announced in June its first CPU and chip set for multiprocessor servers and workstations, the Athlon MP and 760 MP CPU chip set. Competing with Intel's Xeon CPUs, the AMD chip comes in 1- and 1.2-GHz flavors. Systems are available now from smaller vendors, but no top-tier sellers yet.

▶ **Netscape Tries Again:** Pledging a more stable (read: crash-free) experience with better support for popular plug-ins, Netscape has posted its 6.1 beta-version browser. It adds offline access to Netscape WebMail, URL auto-completion, synchronization of Netscape 6.1's address book with those of AOL and Netscape WebMail, and a History tab for recently visited sites. See www.pcworld.com/downloads.

▶ **NVIDIA's NForce:** Graphics king NVIDIA now offers the NForce, its first PC motherboard chip set. Initially paired with AMD Athlon and Duron chips and due in PCs this fall, the NForce will have the integrated graphics of NVIDIA's popular GeForce2 chip. NVIDIA says the NForce will improve PC performance, thanks to a double-wide DDR memory interface, fast system bus, and speculative-processing technology. Also included: built-in networking, and support for a 4X AGP slot.



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tivation before Windows XP ships. Lead product manager Mark Croft says Microsoft is open to changing Product Activation's behavior if user feedback suggests that there is a serious problem.

"We are keenly monitoring what the perceived issues are, versus what the actual issues are, and people's legitimate

nience. Wolfville, Nova Scotia, reader Ron Brunton, executive staff officer for the Nova Scotia Teachers' Union, installed the Office XP preview on his computer at work to decide whether upgrading the entire office to it made sense. He then uninstalled the software and tried installing it on his home computer, to no avail.

his limited experience with Product Activation. In one case, he was unable to reinstall Office on an aging laptop that was being prepared for a new user. The company had to call Microsoft and explain that the reinstallation was to the same system originally activated. Monteith says Microsoft had no explanation for the glitch.

issues, Monteith says, his firm is looking at Product Activation-free software. "We have recently started issuing licenses for StarOffice...and are considering the introduction of Linux or Mac OS systems as a result of Microsoft's continued heavy-handed practices," Monteith comments.

NO BIG DEAL?

DESPITE stories like Monteith's, most business users and many home users will never experience Product Activation. Microsoft treats corporations with site licenses and people who purchase new computers with Windows XP preinstalled differently: These customers will encounter the watchdog code only if they modify the system's hardware sufficiently to trigger reactivation. That could happen less often than most people fear. Microsoft's Croft says that the company aims to allow common upgrades—like installing a new hard disk and graphics card simultaneously—to pass unchallenged.

"I think the things that are going to cause Microsoft more trouble are the processor, memory, and storage requirements of these products," says IDC's Kusnetzky.

He believes that Product Activation could cost Microsoft goodwill, but whether it will drive a significant number of customers to competitors' products remains to be seen.

"Microsoft is making decisions based on Microsoft's benefit and not necessarily the users' benefit. And in the longer term, that will anger people," Kusnetzky predicts.

He adds this warning: "If you push people far enough, they will do something."

A Walk Through Product Activation

PRODUCT ACTIVATION may sound as unpleasant as dental extraction, but the reality is slightly less fearsome, thanks to a soothing blue interface and reasonable-sounding on-screen explanations.

You'll bump into Product Activation toward the end of the installation or upgrade process but before the Windows XP (or Office) interface appears. A screen asks, "Are you ready to activate Windows?" You must then select one of two options: 'Yes, activate Windows over the Internet now,' or 'No, remind me every few days.'

If you choose no, Microsoft says, the reminders will continue for 30 days, at which point you'll be unable to log on to Windows XP until the product is activated. (You can launch Office XP components a total of 50 times before activation is required.) If you're in the mood to activate but have already booted up, you can use the Activate Windows wizard

concerns about using more than one PC or rebuilding machines," Croft states.

Even after XP ships, Microsoft can change the way Product Activation servers respond to incoming data. For example, the server can be made more accommodating of the major system overhauls that power users and gamers commonly undertake.

DO THE HASSLE

EVEN IF Microsoft gets the message out that Product Activation isn't an invasion of privacy, the company may lose customers who value convenience.

that lurks on Windows' Start menu to do the job.

If you click the Yes option, Windows next asks if you'd like to register, a separate and optional process. The program then forwards the activation and registration data to Microsoft via the Internet. Microsoft's servers either accept the data or send a message saying you need to contact Microsoft.

A third option—calling a Microsoft operator on a toll-free number—will also be available at XP's launch, Microsoft says. This involves reading a 50-digit installation ID number on your screen to the operator, who will read back a 42-digit number for you to type on the screen. You may want to get that Internet connection working instead.



That experience was enough to sour him on Office XP. "The copy protection scheme has answered my upgrade quandary," Brunton declares. "I will not be upgrading."

Other users fear bugs and unexpected behavior could make Product Activation even more of a pain. Johnmichael P. Monteith, information services director for a Bellevue, Washington, insurance brokerage house, hit bad luck in

On another occasion, he adds, Microsoft's Web-based Product Activation was unable to get past his company's firewall (Microsoft says that this can happen if Secure Sockets Layer—a widely used protocol for online shopping—has been blocked). A technician had to go through the tortuous phone-activation procedure (see "A Walk Through Product Activation," above). In light of these and other upgrade

Tidbytes

► **Good-Bye Kaypro:** Premio, which purchased the defunct Kaypro name in 1999 and revived it as a line of desktop PCs, has decided to end Kaypro's brief afterlife. Premio promises to honor all of its Kaypro service and warranty agreements. The original Kaypros from the early 1980s were a popular line of portable PCs weighing less than 30 pounds.

► **CyberRebate Files Ch. 11:** You may have to wait a long time for a rebate from Net retailer CyberRebate.com—the company has filed for Chapter 11 bankruptcy protection from creditors. A statement on its site says all retail operations have ceased while it tries to reorganize, and asks customers not to return items until the bankruptcy court has approved a policy covering buys made in the 30 days prior to the filing. The popular site sold various products, often at two to ten times their retail value, but offered rebates up to 100 percent of the purchase cost.

► **Your Slice of the Tax-Cut Pie:** Want to know your share of the \$1.35 trillion tax cut? See Intuit's calculator at www.quicken.com/taxes/taxrelief/estimator. Have your tax and finance info handy: You'll need to answer 24 questions to get your estimate.

The Living Room Screening Room: Data Projectors for Home Theater



THE LIGHTS dim, the picture starts, and the magic begins. There's nothing like watching a movie on a big screen in a darkened room. But until recently, only the very rich could indulge in that experience at home. Now, however, a new generation of data projectors makes it possible to watch a 13-by-10-foot version of *Pearl Harbor* for the price of a smaller rear-projection TV.

No wonder business users sneak their portable projectors home after hours. In minutes, a data projector can transform a living room or den into a private screening room for everything from movies—on DVD, videocassette, TV, or laser disc—to digital photos and computer games. The latest models require far less space than a big-screen TV or CRT projection system—and when you're done, they take up no space at all. Simply plop the projector on a coffee table and

place the viewing screen directly against a wall—or use the wall itself, if it's sufficiently reflective and light-hued.

And while portable projectors aren't exactly cheap, you

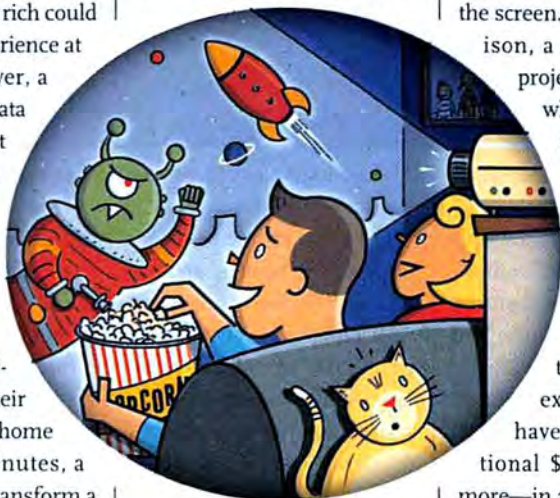
tem today can deliver the cinematic feel of a big-screen image measuring 200 inches on the diagonal, or 13 feet wide by 10 feet high, at a distance of approximately 25 feet from the screen. By way of comparison, a 60-inch-diagonal projection TV costs anywhere from \$1400 to \$2500. Of course, with a projector, you can expect to spend \$450 or more every few years to replace the lamp. And on top of all the other expenses, you may have to invest an additional \$100 to \$200—or more—in a projection screen.

PROJECTOR CHOICES

WE LOOKED AT Canon's LV-5100, Optoma's EzPro 702, Panasonic's PT-LC50U, and Sony's SuperLite VPL-CS3. All four models weigh 6 pounds or less, have a native resolution of 800 by 600 pixels, and are bright enough to project a clear, strong image up to 30 feet away in a dark room ►

can now buy a unit suitable for home use for less per viewing-inch than its TV competitors. Street prices have dropped to about \$2000 for several models that are capable of projecting far larger and brighter images than those produced by the largest picture-tube or rear-projection TV sets.

A typical low-priced SVGA (800-by-600-resolution) sys-



Matinee Idols: Data Projectors for Home Theater Budgets

PROJECTOR	Street price	Projector type	Weight (pounds)	Brightness (ANSI lumens) ¹	Rated lamp life (hours)/replacement cost	Comments
Canon LV-5100 800/652-2666 www.canon.com	\$1935	LCD	6	700	2000/\$520	Most accurate color; optical zoom, horizontal design, mouse control, quiet operation
Optoma EzPro 702 888/942-2929 www.optoma.com	\$2095	DLP	4.6	800	2000/\$495	Brightest image; sleek upright design, no optical zoom or component video
Panasonic PT-LC50U 800/528-8601 www.panasonic.com	\$2148	LCD	5.5	700	2000/\$450	Most saturated color; optical zoom, horizontal design, swivel stand, remote storage slot
Sony SuperLite VPL-CS3 800/686-7669 www.sony.com	\$2086	LCD	5.5	700	2000/\$520	Dimmest image; optical zoom, compact horizontal design, stereo speakers

¹ ANSI lumens are an industry standard measure of brightness.

(see "Matinee Idols," page 47).

The Canon, Panasonic, and Sony units use three-panel LCD projection systems; the Optoma employs Texas Instruments' single-chip Digital Light Processing technology. LCDs generally deliver richer, more-saturated color than DLP, though DLP tends to be brighter overall. Not surprisingly, the Optoma projector's brightness rating of 800 ANSI lumens (an industry standard measurement) was the highest. Lamps on all four have a 2000-hour life, but you may need to replace them sooner, since they lose their brightness gradually over time.

Given their business legacy, you would expect these units to connect to a standard PC's display adapter. But in addition they serve home-theater buffs well (see photo below), with support for composite video and S-Video (also known as S-VHS). All but the Optoma also support component video, which consists of three signals that convey separate luminance and color differences and provide the best picture quality of all. For now, only high-end VCRs, DVD players, and TVs support component video—and you'll need to buy a \$40 to \$60 cable not included in our units.

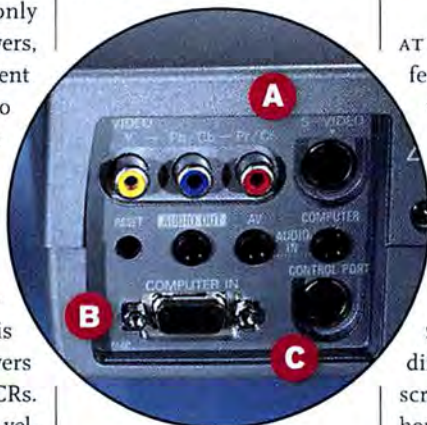
The next-best choice for good picture quality is S-Video, which carries separate signals for luminance and for color and is found on most DVD players and on a few high-end VCRs. Composite video uses the yellow input (an RCA-type jack labeled "Video") found on the back of most VCRs, DVD players, and large TV sets. Its picture quality is less clean and accurate than that of the oth-



CINEMA SCORES: Panasonic's PT-LC50U and Canon's LV-5100.

ers because it compresses all the signals into one cable.

Each projector comes with an RGB cable for PC connections, but only the Optoma also includes composite and S-Video cables. The Canon model has a cable for connecting the projector to a PC's mouse port so you can control the computer with the remote. You can use remotes or the built-in controls on the top panel of each projector to access on-screen menus for changing image brightness, contrast, color, and the like.



GOOD CONNECTIONS: Canon's LV-5100 accepts component, composite, and S-Video inputs (A) or a standard PC video cable (B). A mouse port connection (C) enables remote control of a PC.

All four units carry three-year warranties for parts and labor.

The four projectors were fairly easy to hook up and use (via an S-Video connection) with a low-end DVD player (a Zenith DVD2000) connected to a Dolby Pro Logic speaker system. Afterward we enjoyed theater-type surround sound (fan noise from the projectors did not interfere in the least). We also viewed movies using the DVD drive in a Dell Inspiron 7500 notebook PC.

HOME CINEMA PREMIERE

AT A DISTANCE of about 12 feet from a highly reflective white wall, each projector successfully displayed an image about 78 diagonal inches in size (roughly 5.25 feet wide by 4 feet high). All except the Optoma also have a manual zoom lens for focusing at different distances from the screen—a useful feature for home use, since you may not have much latitude in placing the projector itself. And all of the projectors let you choose between wide-screen (16:9) and a more conventional 4:3 display aspect ratio.

Overall, the Canon and Panasonic units had the best picture quality—including the richest colors and sharpest focus. Canon's color looked a bit more realistic and less saturated, but the Panasonic's focus seemed slightly sharper. The Optoma's image was brightest, but its colors were not quite as attractive as the other units'. The Sony's images were noticeably less brilliant than the rest.

One surprise: Though we screened most movies in a dark living room, some were easy to view in daylight as well—especially those with a lot of daytime scenes.

Of the four projectors, we'd recommend the Canon or the Panasonic for home use, mainly because of their image quality. Though the Panasonic costs about \$200 more than the Canon, the Canon's replacement lamp costs about \$70 more, bringing the prices closer over time. If you plan to use the projector with a PC, however, the Canon's remote mouse control makes it a better deal. You'd have to pay \$180 for a Panasonic remote that supports mouse control.

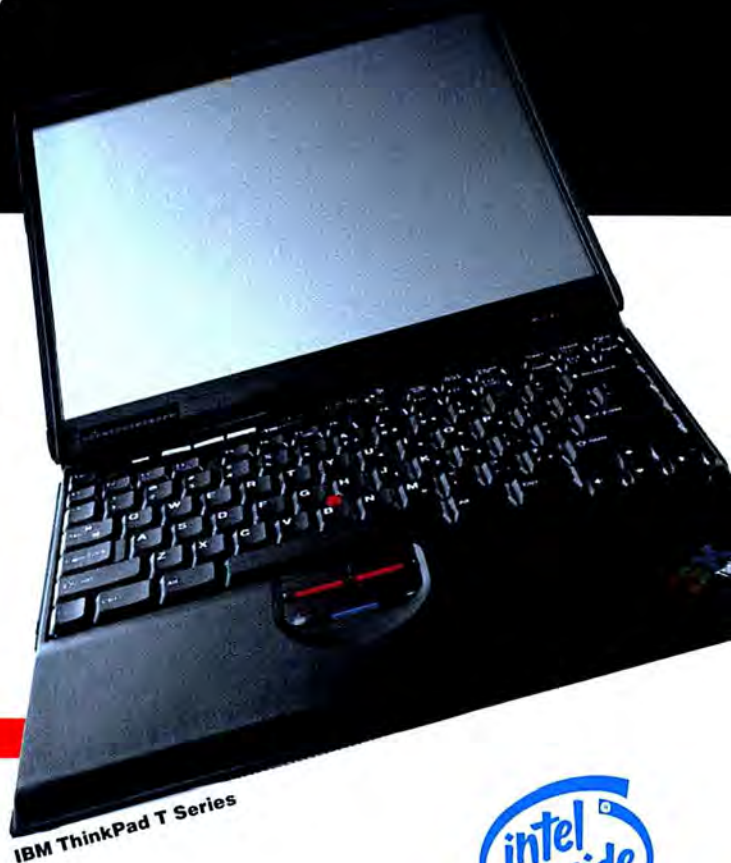
—Richard Jantz ►

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Next-Generation Dial-Up Modems Poised to Improve Performance

FIRST LOOK

STILL SURFING the Web with a dial-up modem? You're not alone. Ninety percent of U.S. Web surfers connect at speeds of less than 56 kilobits per second. Fortunately, help is on the way: Two new dial-up modem standards promise faster speeds and new features to improve surfing the old-fashioned way.

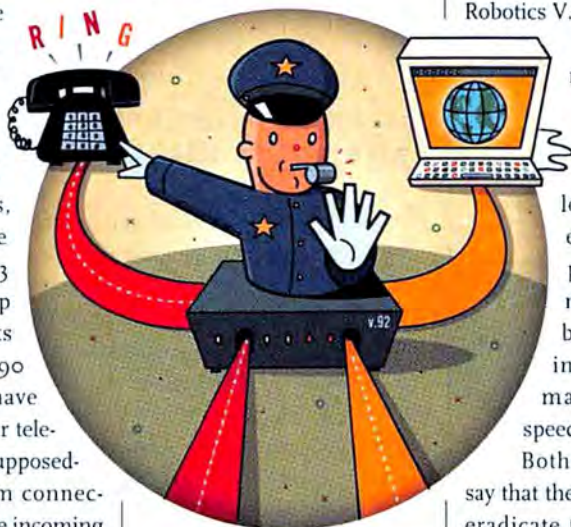
The first and better known, called V.92, can boost theoretical upload speeds to 48 kbps, up from an average maximum of just 33 kbps with a dial-up modem that works with the current V.90 standard. If you have call waiting on your telephone line, V.92 supposedly will put modem connections on hold to take incoming phone calls. The other newly arrived standard, called V.44, improves compression and promises to make downloading Web pages snappier.

A couple of vendors now sell V.92 and V.44 modems. The modems, which cost about \$15 more than their V.90 counterparts, are available from both U.S. Robotics and Zoom Telephonics, including the latter's Hayes division.

U.S. Robotics modems support only the V.92 standard so far; Zoom sells a modem that supports both new standards.

But though the modems are ready, your ISP must support V.92 for advanced features to work—otherwise the modem

will operate no better, and possibly worse, than a V.90. Thus far, the big ISPs have been lukewarm toward the new standard. For example, MSN and EarthLink say they are still evaluating V.92. America Online says it's waiting to see if other ISPs support the standard before it commits.



Smaller ISPs may be more willing to adopt V.92, notes Nicholas Sten. He is manager of the network solutions group for Option One, which resells Internet access to 130 ISPs in California and elsewhere. "We see it as giving our smaller ISPs an edge over the AOLs of the world," Sten says.

SPEED BUMPS

A HANDS-ON evaluation of U.S. Robotics and Zoom V.92 modems suggests that the more advanced aspects of the standard aren't completely ready for prime time.

When I tested the U.S. Robotics modem, its "modem on hold" feature worked less than

half the time. When I tried the same function with Zoom's V.92 modem, an inbound telephone call severed my Net connection without warning. An informal test of the V.44 modem compression standard with Zoom's modem revealed no appreciable speed increases compared with U.S. Robotics V.90 modems.

But a "quick connect" feature did cut in half the time that either modem took to log on to a V.92-equipped service provider. Simultaneously, Zoom has begun implementing a feature that maximizes upload speeds to 48 kbps.

Both modem makers say that they are still trying to eradicate the bugs in their software and that they will provide upgrades to existing V.92 modem owners as they make improvements. U.S. Robotics also offers free upgrade software for many of its V.90 models. However, most older modems aren't upgradable.

Replacing an otherwise satisfactory V.90 modem with a V.92 model is still premature. But if you are shopping for a new modem anyway, buying a V.92 model could turn out to be a wise investment.

By fall, network infrastructures will slowly catch up, and your ISP may eventually offer a V.92 line for you to dial in to. If it does, you'll be ready.

—Tom Spring ►

Tidbytes

► **Sega and Sony Play Together:** Owners of Sega Dreamcast and Sony PlayStation devices could soon be playing each other over the Net using their game consoles. In August, Sega will release new versions of its Dreamcast games, followed by the same titles for PS2 and PCs. Deals with Nintendo and Microsoft may be forthcoming. Sega America has yet to make a similar announcement. Sega recently exited the game console hardware market.



► **One Pentium 4, Hold the Rambus:** Buying a Pentium 4 PC once meant spending extra for the dubious advantage of Rambus (RDRAM) memory, the only option. Not anymore: In the second half of 2001, Intel will announce the 845 chip set, which supports less-expensive SDRAM and DDR memory. P4 PCs with SDRAM should appear about the time of the announcement; the DDR version won't ship until 2002. For the impatient, Via's P4X266 chip set, with a P4/DDR combo, is due to ship any day.

► **Bigger, Denser Disks:** IBM has developed a new magnetic coating technology that increases possible hard disk capacity to more than four times that of today's largest drives. The new technology (called antiferromagnetically-coupled media) lets you pack as much as 100 gigabits of data per square inch, up from the current max of 20 to 40 gigabits per square inch. The technology appears in IBM's Travelstar notebook drives today, but it won't reach its full potential until about 2003, when a wave of 400GB desktop drives and 200GB notebook drives could hit store shelves.



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What Have You Signed Away Today? Software Makers Play Hardball With You

CONSUMER ALERT

JUNO WANTS to sell your computer's idle time. Microsoft wanted the rights to all content passing through its Passport Web services. Some vendors want no liability for their products—even if they know about product defects in advance. And chances are, you've legally agreed to let vendors have what they want.

All it takes is clicking an "I Accept" button or ripping the shrink-wrap off a new box of software. Both software and Web services come with End User License Agreements (EULAs) or Terms of Service (TOSs), and few people read them. Until recently, buyers didn't need to. Historically, EULAs were confusing and rarely invoked—but EULA and TOS contracts have always been legally binding.

This "fine print" has suddenly become a cause célèbre as states around the country move toward adopting a set of proposed e-commerce rules called the Uniform Computer Information Transactions Act (UCITA). If UCITA is adopted nationwide, it will give ominous legal power to previously unenforceable parts of End User License Agreements—in fact, it has already started to.

IT'S YOUR PROBLEM

ALTHOUGH ONLY Maryland and Virginia have enacted UCITA, consumers around the country are beginning to feel its impact. For one thing, companies are demanding far more in their EULAs. Some

agreements let a software maker perform highly invasive scans of a user's system. Others limit the methods by which consumers can seek to resolve disputes with vendors; some also attempt to restrain

million bidding error. Last year, the Washington State Supreme Court ruled that Timberline was not liable for the buggy program—despite the fact the company knew about the bug before putting



customers from complaining publicly about a product.

In some cases, EULAs insulate firms from liability for a defective product—even if the company knew the product had defects prior to shipping it.

Consider the case of M.A. Mortenson, a contracting firm that sued Timberline Software of Oregon; the suit alleged that defects in a Timberline bid-preparation program caused Mortenson to make a \$1.95

the software on the market. The reason: Timberline's EULA exempted the company from responsibility "for any damages of any type" resulting from use of its products.

"It [UCITA] does away with product liability so far as software manufacturers are concerned," says Gordon Pence, intellectual property counsel for Caterpillar Inc. in Peoria, Illinois. (Pence represents the company in Americans for

Fair Electronic Commerce Transactions, a business coalition that opposes UCITA.)

CAN YOU FIGHT BACK?

CONSUMERS' angry reaction to some of these new rules has been swift: In recent months, Juno, Microsoft, Verant Interactive, and other Web and software firms have felt the sting of a backlash against particularly unreasonable terms.

For example, earlier this spring Microsoft abandoned its reviled Passport TOS in the face of widespread criticism. The policy granted the company and unspecified affiliates the right to "use, modify, copy, distribute, transmit, [and] publicly display" any message, file, or data that users entered into the Passport site.

"We were in error for having that up there," says Tom Pilla, a Microsoft spokesperson. He said Microsoft hadn't updated Passport's terms of use to reflect its business policies, or even to adhere to Passport's privacy statement. "It was very old language," he said.

Similarly, software maker Verant Interactive quickly jettisoned plans to introduce a monitoring tool to its popular multiplayer online game EverQuest. Citing the proliferation of cheating tools, Verant wanted all game players to permit the company to scan their hard drives for illicit utilities. Users protested and, within a day, Verant rescinded the plan.

But some vendors have not changed aggressive policies. In February, Juno, the nation's largest provider of free Internet service (which recently merged with NetZero), submitted a new TOS to its users, announcing its plans to enlist them in a distributed com-



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puting project. Much like SETI@Home—the voluntary distributed computing project that searches for extraterrestrial life—Juno's Virtual Supercomputer project requires users to install software that will use their PC while it's idle to chug through complex computations. Juno plans to sell that computing power to third parties, and it disclaims any liability for costs or for PC problems resulting from the software or the computations. Also, though Juno spokespersons claim user participation is currently voluntary, the TOS clearly reserves the right to require participation by users of its free service, and Juno could even order users to keep their PCs on all the time to perform the computations. Juno says it must investigate this option as it strives to stay in business and turn a profit.

NOT SO FREE SPEECH

SOME CONSUMER groups argue that the most restrictive EULA clauses violate users' right to privacy and, potentially, their right to free speech.

Microsoft again came under fire last year when it clashed

with techie news site Slashdot over criticism Slashdot readers posted there after Microsoft released part of its Windows 2000 specification on the Net.

Microsoft demanded that Slashdot remove the posts, arguing that the comments—some of which contained the

UCITA's unclear language gives companies free rein to craft egregious terms into their End User License Agreements, says one critic.

specification—constituted a violation of 1998's Digital Millennium Copyright Act, as well as a breach of the confidentiality agreement on which Microsoft had conditioned the spec's original Net release. Slashdot protested, encouraging its users do the same, and Microsoft backed down.

Critics say strict enforcement of agreements like Microsoft's would make it all but impossible for users to grouse about software publicly.

Microsoft is not alone in adopting contract clauses that may serve to muzzle critics. Vergil Bushnell, e-commerce analyst for the advocacy group

Consumer Project on Technology, points to a particularly aggressive clause in the TOS for a recent version of Network Associates' McAfee VirusScan. According to Bushnell, the TOS language "would presumably prevent users—or journalists—from publishing benchmark tests or reviews of the software without prior permission from [Network Associates]." As a result, at least one publication has declined to review it.

Lisa Citron, manager of retail marketing at Network Associates, says the company is revising the TOS for the launch of its newest Office Utilities. She says Network Associates has had problems with people publishing product reviews and tests that misrepresented the product. The company's only goal, she explains, is to ensure that anything published has accurate and up-to-date information on the product's capabilities.

The CPT's Bushnell charges that UCITA's unclear provisions give companies free rein to craft egregious EULA terms. UCITA's drafters, he says, "adopted nebulous standards, rejecting more-specific lan-

guage that would have ruled out contractual restrictions on free expression."

A PLACE FOR EULAs?

EVEN CRITICS admit these licenses serve a purpose. Consumers want to use software, and vendors want some way to secure their licensing rights.

And many agreements have no outrageous or excessive restrictions. Some also make users scroll through or check boxes in the EULA to indicate that they've read—or lingered by—the terms within. That's a step in the right direction.

Of course, anyone can click a EULA's "I Decline" button. But if you do, you won't be able to use the software or Web service. The average user has no real, practical opportunity to negotiate EULA terms.

Meanwhile, 10 states have legislation pending that would enact UCITA. Attorneys general in 26 states oppose the measure, and some experts consider it unlikely to win favor in all 50 states this year.

But as UCITA grinds forward, this might be a good time to start reading—very carefully—before you click.

—Andrew Brandt and William Wallace ►

Read With Care: Buzzwords to Watch For

HERE ARE SOME key terms in EULA and TOS contracts, and what they mean to you.

Computer-specific license Allows software to be used exclusively on one particular hard drive permanently attached to one PC. The software may not be used on other computers or by any other PCs attached to a network. (See **Transfer restrictions** at right.)

Disclaimer A provision in a license that allows a person or organization to deny responsibility for problems related to the use or misuse of the product. Some EULAs include a disclaimer that purports to free the

manufacturer of a piece of software from liability for the product, even if the manufacturer knows of defects in the design.

Where it applies, UCITA would make the law governing disclaimers uniform and limit the chance to collect damages in cases where a faulty product has caused actual harm.

Reverse engineering The process of examining a computer program or digital product to determine how it is constructed. This technique is used in debugging programs and in developing products that can function with the one being reverse-engineered. It can

also be used to analyze and critique software.

UCITA would make manufacturers' contracts prohibiting reverse engineering legally enforceable wherever UCITA applies.

Transfer restrictions Limitations on a purchaser's ability to transfer a piece of software or a digital product to another user. Some clauses might bar giving away a copy of a product as a gift. These restrictions also apply to products bundled with software, such as game consoles and digital cameras.

Where it applies, UCITA would require uniform enforcement of transfer restrictions.



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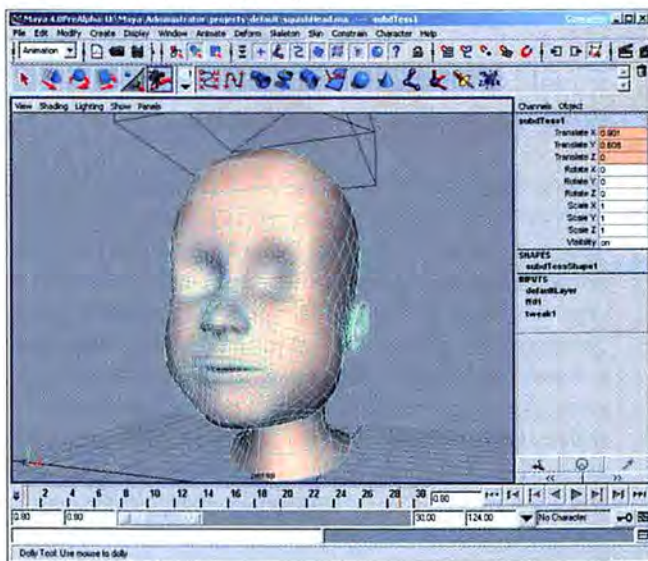
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A Windows for Supercomputing? Microsoft's 64-Bit OS for Intel's Itanium

BETA

WINDOWS XP won't make its formal bow until October 25, but its 64-bit big brother is quietly launching on a small group of high-end computers. Windows for Itanium (Intel's first 64-bit CPU, introduced simultaneously with the OS in late spring) is Microsoft's first venture into 64-bit computing.

Itanium adopters will basically get interim versions with support from Microsoft and free upgrades to final code. That code is due on October 25 for the workstation (called Windows XP 64-Bit Edition) and three to six months later for servers (dubbed Windows Advanced Server Limited Edition; the final names aren't set).



A PRE-BETA OF Maya 4.0, a 3D modeling app for 64-bit Windows.

a market long dominated by companies like Sun Microsystems and Silicon Graphics. Itanium and 64-bit Windows represent the next generation of Wintel computing—but it's a future that most people won't see for a while.

The new OS won't be sold in stores. Instead, both server and workstation versions will come preinstalled on high-end Itanium-based computers. And since both versions will only be finalized alongside their respective 32-bit Windows XP counterparts, early

The 64-bit Windows servers are intended for e-commerce, huge databases, or other applications that need more data-crunching muscle than they can get from Xeon or Pentium systems running Microsoft's existing 32-bit servers or its upcoming XP lines. Windows XP 64-bit workstations are expected to cost \$7000 and up; they're geared toward such computation-intensive tasks as high-end engineering design and modeling, and professional video editing.

Since commercial 64-bit

applications won't be available at launch, the first systems—from HP, Dell, Compaq, and IBM—will go to customers who want to create custom or commercial 64-bit apps. One major selling point, at least from Microsoft's perspective: 64-bit Windows will run most existing 32-bit Windows apps, so engineers and developers who previously used a Sun UltraSparc or HP-UX box for their core tasks and a Windows PC for Microsoft Office could do everything on one machine from now on.

SLOW OFFICE

BUT BECAUSE 64-bit Windows has to emulate the 32-bit version to run 32-bit apps, the apps' performance will be slower on a 64-bit machine than on a Pentium III PC of comparable clock speed (Itanium launched at 733 and 800 MHz). And according to analyst Chris LeTocq of Guernsey Research, most engineers will not want to slow down their workstations with 32-bit apps.

Windows for Itanium won't support DOS or Windows 3.x applications either, and it is not expected to include such Windows XP features as Netmeeting and power management sleep states. Some of these elements may resurface as 64-bit computing trickles to consumers, but LeTocq says he doesn't expect that to happen for another three to five years. Bottom line for most users: Don't hold your breath.

—Yardena Arar ■



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THE SOHO REPORT

Ready, Set,

The network's
the thing in the
SOHO today

Connect!

When writer Lynn Ginsburg and her husband, Josef Pusedu, quit New York City for Boulder, Colorado, seven years ago, home office networking wasn't the first thing on their minds. Both had been raised in nearby Colorado Springs, and after years of toiling for Manhattan's hi-tech publishers, the couple was homesick. "We missed the mountains," Ginsburg says. But instead of returning to the corporate world of cubicles and bad coffee, Ginsburg and Pusedu created a home office and became a husband-and-wife, hi-tech writing team.

Pusedu, a graphic designer, tries out new software products on his PC, then he and Ginsburg collaborate on writing reviews for the country's leading computer magazines. At home, the couple set their own working hours: "Our most productive times are often around midnight," Ginsburg says. And that leaves more time for daytime hiking and biking.

But creating a collaborative home office was difficult, even for two technology experts. "We set up two PCs," Pusedu says, "and connected them with an Ethernet hub, with a 10/100 PCI network card inside each PC. It definitely took some tech know-how to get the network working. It also took a lot of patience and trial and error."

Truly effortless, plug-and-play home office networking via Windows "is still far down the road," Ginsburg says, and users have few alternatives at the moment.

Bluetooth, a once promising wireless networking standard, is losing ground to competing standards like the 802.11b wireless LAN protocol. Both Bluetooth and 802.11b devices promise to eliminate the "rat's nest" wiring phenomenon in the workplace, but their reliance on the 2.4GHz radio

band makes both technologies vulnerable to interference from a variety of other devices.

PROTECTING SOHO LIFEBLOOD

Of course, the best laid office technology plan can and will fall flat on its face if the technology's lifeblood — its power supply — fails. That's why the BackUp-Time or BT series of uninterruptible power systems (UPS) from OPTI-UPS (www.opti-ups.com) provide the perfect insurance against power spikes or outages. Offering big protection in a small package for small offices, the 525BT and 825BT protect against inevitable surges, while delivering continuous power during an outage. The BT series has been specifically engineered for stand-alone systems and Internet/network line protection.

Many experts eschew the do-it-yourself approach to small office/home office (SOHO) networking. "You should ask yourself what your time is worth before you entan-

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SOHO market gets tools to leverage Net

In order for small office/home office (SOHO) businesses to truly leverage the Internet, they need affordable, highly reliable technology. One company, NETGEAR, Inc. (www.netgear.com), has dedicated itself to providing just that. NETGEAR designs and develops products that enable home and small business users to share Internet access, peripherals, digital content and applications among multiple personal computers and other Internet-enabled devices.

Consider NETGEAR's new MR314 wireless router, the only wireless router that comes out of the box with auto-content filtering capabilities, logging and reporting. All cabling is included in the router, as well as an auto-uplink feature, and virtual private network (VPN) pass-

through. Construction is all-metal, with no flimsy plastic like other wireless routers.

For fast-growing businesses with storage needs that can increase suddenly, NETGEAR offers a line of network disk drives that use high-speed networking technology to simplify the use and installation of network storage space. By using a high-speed network rather than adding internal hard drives, you can more easily and quickly add storage capacity without complicated server setup or hardware installation.

NETGEAR's line of dual-speed (DS) hubs offer a series of features tailored to SOHO users, includ-

ing full connectivity among devices, plug-and-play installation, network ports with built-in LEDs, and the same free 24-hour phone support available for all NETGEAR products. Advanced models in the DS line easily expand to support up to 192 users.

For more information on these and other products geared for the SOHO market, go to www.netgear.com.



NETGEAR's MR314 wireless router

NetLedger 1 System™

gle yourself in a networking project," says Lisa Kanarek, founder of HomeOfficeLife.com, a firm that advises corporations and individuals on setting up and managing small and home offices.

Kanarek often encourages her clients to hire technology consultants for the installation and maintenance of their small office networks. "You should at least try to find a consultant you can keep on retainer – one you can call anytime," she says.

Another option is to seek out integrated products that can help streamline your business processes, products like NetLedger 1 System from NetLedger, Inc. (www.netledger.com). More importantly, NetLedger 1 ends all the headaches associated with multiple, incompatible programs, giving your business an easy way to manage such tasks as payroll, bill payment, order processing, and customer and supplier relationships. NetLedger 1 was designed from the ground up to work well in both product- and service-based businesses, allowing any group to extend its business relationships using the power of the Internet.

HIGH-SPEED ACCESS KEY

For SOHO users like Ginsburg and Pusedu, the most crucial networking decision is often choosing the Internet connection best suited to their business. Kanarek says "the fastest connection

you can possibly get" is essential for most SOHO business applications. For everything from e-mail and real-time collaboration, to file transfer and Web hosting, broadband Net access is fast becoming absolutely necessary.

Kanarek outsources the management of her own Web site to an ISP near her home office in Dallas, Texas, to ease the burden on her own network. "Often, only a Web hosting service has the expertise and the wherewithal you need to ensure that your site is up and running 24x7," she says. "And that's especially important if you're providing streaming media or e-commerce applications."

For a fast-growing number of companies, the economical answer to getting all office employees online through a single Internet connection is WinProxy from Osis Software (www.ositis.com). WinProxy offers a stealth firewall, incoming and outgoing virus protection, site filtering, advanced alerting, and caching. It provides complete control over Internet access and customizable alerts for events. WinProxy can limit access by individual computer, time of day, or by specific activities such as browsing, chat or email.

For high-speed Internet access, many users can now choose between cable modem or digital subscriber line (DSL) services. There are important differences between the two, although sub-



WinProxy from Osis Software

5

Are you sick of spending your time trying to get your business applications to work together?

4

Are you spending too much on complicated software upgrades and system maintenance that are only a temporary fix?

3

Are you fed up with the lack of information you need, when you need it, to make smart business decisions?

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THE SOHO REPORT >> CONTINUED FROM PAGE 3

scribers to either service will see substantial gains over the performance of 56K modems. Cable modems offers faster downloads from the Net, but performance declines as new users in the same neighborhood come online. DSL users often receive secure, single-user Net access and enjoy faster upload speeds than cable subscribers. WinProxy users also enjoy free telephone and email support.

Research firm International Data Corp. expects the percentage of U.S. homes using broadband will increase from 11% at the end of 2000 to 50% by the end of 2004. (IDC also predicts that DSL service will likely become more widely used than cable modems by 2004.)

Some parts of the United States are still awaiting broadband access, but fortunately it didn't take long for high-speed access to catch up with Ginsburg and Pusedu. They were able to install DSL last fall, and Ginsburg now wonders how she managed without it. "I'm basically on the Internet day and night," she says, "so an always-on connection like DSL is exactly what I needed." <<<<<<

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NEW PRODUCTS

New Technologies to Burn CDs Your Way

CD-RW's

NO SOONER does one CD-Rewritable drive technology reach the market than another technology is on its way—a phenomenon exemplified by two next-generation drives from Yamaha and Sony. Yamaha's **CRW2200EZ** raises the bar for performance, writing CD-Recordable discs at 20X. Meanwhile, Sony's **Double Density CD-RW CRX200E** represents the first salvo fired in the latest high-capacity challenge. As its name suggests, it can write 1.3GB of data to a single disc—nearly twice as much as a standard CD-RW drive can.

The Yamaha CRW2200EZ is the first drive to crack the 20X CD-R barrier; 24X drives

should arrive later this summer. To write to CD-Rs reliably and consistently at these higher speeds, manufacturers employ one of two technologies: Zone CLV and Partial CAV. Yamaha is using Partial CAV on its 20X/10X/40X CD-RW drive. It involves a gradual buildup to high-speed CD writing; the drive writes at a constant speed in the inner portion of the disc, and gets faster as it approaches the outer portions of the disc.

SPEED WRITER

NOT SURPRISINGLY, in *PC World* tests, the \$250 shipping Yamaha CRW2200EZ outperformed the current number one Best Buy on our *Top 10*

CD-RW Drives chart, TDK's 16/10/40 VeloCD ReWriter. The Yamaha was able to write our 650MB test image file to CD-R in just 4 minutes, 41 seconds—36 seconds faster than the TDK. The CRW2200EZ uses Yamaha's SafeBurn buffer underrun technology in conjunction with a large 8MB buffer to help you avoid burning bad discs.

This drive also excelled at writing to CD-R discs on the fly, taking 4 minutes, 49 seconds to write 650MB of files. It even performed well when writing to a CD-RW disc, copying 100MB of data to CD-RW with packet writing in only 1 minute, 16 seconds, shaving 7 seconds off the TDK VeloCD's record. Yamaha provides a very detailed user manual with the drive, as well as assorted software, including Ahead Nero 5.5 for CD mastering, Ahead InCD for packet writing, Adobe PhotoDeluxe Business Edition, and Music-Match Jukebox 6.

If the 700MB capacity of conventional CD-R and CD-RW media seems skimpy to you,

CRW2200EZ

PRO: First drive to write CD-Rs at 20X; superfast performance.

CON: Price is higher than for 16X/10X/40X CD-RW drives.

VALUE: Excellent choice if you want speed and value-added software.

Street price: \$250

Yamaha

888/926-2426

www.yamaha.com

Double Density CD-RW CRX200E

PRO: Can burn CDs at nearly twice the capacity of standard media.

CON: Double Density media carries a hefty premium over regular media.

VALUE: Good if you need high-capacity optical backup right now.

Street price: \$250

Sony

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TEST THESE PRODUCTS have been evaluated using tests designed by the PC World Test Center.



FAST OR HIGH-CAPACITY: The latest CD-RW drives from Yamaha, top, and Sony.

the silver-hued, \$250 Sony Double Density drive might be worth a look—although it costs about \$50 more than standard 12X/10X/32X CD-RW drives. One catch: Double Density (DD) media sells for about \$2 per DD-Recordable disc and \$3 per DD-Rewritable disc, versus approximately 40 cents per disc and \$1 per disc for the corresponding single-density media. Also, the new 1.3GB DD discs can be used only with the Sony Double Density drive.

But the CRX200E can write to ordinary CD-R and CD-RW

media, too, performing on a par with or better than other CD-RW drives with similar speed ratings. And the Sony smoothly passed our Double Density tests. There's no buffer underrun compensation technology, but the drive has a large 8MB buffer that effectively prevented buffer under-runs from occurring in our

tests. The shipping Double Density drive includes Sony's CD Complete Pro software suite, which has a handy all-in-one installer for its individual components: Sony CD Extreme, Sony AbCD, Liquid Player, and Dantz Development's Retrospect Express.

Hungry for extra capacity and don't mind the extra

costs? Sony's Double Density drive is a viable option. Speed demons will relish Yamaha's CRW2200EZ, which showed excellent performance across the board and costs only about \$20 more than a 16X drive. But remember, 24X drives that promise a little more are on the horizon.

—Melissa J. Perenson

Sony's Digital Studio: Popcorn Optional



VAIO CON DS: This PC records TV to its hard drive.

DESKTOP

THE MOST POTENT argument yet for using your PC as a home entertainment center: Sony's **VAIO Digital Studio PCV-RX490TV**. The VAIO Digital Studio packs such usual PC multimedia features as CD audio and Internet radio, but also has a TV tuner/video capture card that records TV programs to your hard drive à la TiVo. It even offers one-touch scheduling of recordings via the Internet, and an infrared remote control.

The VAIO's array of video

workstation features includes a DVD-R/RW drive for burning your video to DVD-player-compatible media, IEEE 1394 ports, and S-Video-in and -out. Sony even throws in a large bundle of third-party software—Sonic's DVDit, Prassi's PrimoDVD, Microsoft Word 2002, and Sony's own TV/video capture software and multimedia apps. Performance isn't bad, either. My shipping PC scored 176 in PC WorldBench 2000 tests—about average for its class.

When the VAIO Digital Studio is used as a personal video recorder, its massive 80GB hard drive can hold up to 18

hours of high-quality MPEG-2 video, 35 hours of standard-quality MPEG-2, or almost 100 hours of MPEG-1 in long-play mode. The MPEG-1 suffered from jaggies and other compression defects in my tests, but MPEG-2 video was excellent in both modes.

All this AV prowess doesn't come cheap: The stylish VAIO retails for \$2600—sans monitor (look for \$100 PC rebates, good at least through August). The steep price is partly due to components like the DVD-R/RW drive, the 1.7-GHz Pentium 4 processor, 128MB of RDRAM, and the 32MB GeForce2 MX graphics card. You pay a bit extra for the Sony name, but if you don't already have home audio and video components, the system would be a great substitute. Unfortunately, the VAIO's components aren't quite as easy to use as their consumer electronics counterparts: The remote doesn't control all features, the interface should be larger to permit easier viewing on a TV and from a distance, and there's no subwoofer to beef up audio playback.

- 66** New CD-RW technologies from Sony and Yamaha
- 67** Sony VAIO Digital Studio PC
- 68** Polywell Poly 880K7-1400 with a 1.4-GHz Athlon CPU; Corex Technologies CardScan 600c
- 70** Bose Wave/PC Interactive Audio System; HandEra 330
- 74** Adobe Acrobat 5; Timex Internet Messenger watch
- 79** Portable hard drives from Archos and Pockey Drives
- 80** Olympus DS-320 Digital Voice Recorder; Adobe Systems Acrobat Reader for Palm OS
- 82** Dantz Retrospect Express 5.5; Buffalo Technology AirStation wireless printer server



FOR MORE PRODUCT news and the latest announcements, check the PC World Daily News Service at www.pcworld.com/news. And to try out some of the software mentioned here, go online to www.pcworld.com/downloads.

Still, this PC is a bargain for people who want an all-in-one AV entertainment center—provided you don't mind getting up now and again to use the mouse. Now, if it would only butter the popcorn.

—Jon L. Jacobi ►

VAIO Digital Studio PCV-RX490TV

PRO: Stylish PC includes TV tuner, MPEG-2 recording, remote control, Internet program scheduling, and video editing software.

CON: Interface a bit complicated.

VALUE: A PC, home entertainment center, and video workstation.

List price: \$2600

Sony

800/476-6972

www.sonymstyle.com/vaio



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

Great Performance From Polywell 1.4-GHz PC

DESKTOP

AMD KEEPS rolling out processors that set *PC World* performance records—and the Polywell Poly 880K7-1400, equipped with the new 1.4-GHz Athlon CPU, is no exception. At \$2888, the system can't claim bargain status, but it is loaded with hardware and can handle just about any task.

Polywell gears the system toward budding video editors by adding an IEEE 1394 card and Pinnacle's Studio DV software, which together allow you to capture digital video and perform basic editing. But this system has the muscle to do much more. A whopping 512MB of DDR SDRAM complements the PC's speedy CPU, so demanding applica-

tions won't swamp the system. An NVIDIA GeForce3-based graphics card with 64MB of DDR memory and two 40GB hard drives linked through a RAID controller give you the graphics power and storage necessary for video editing. Missing, however, are analog inputs to handle videotape, and a more robust video editing package.

A shipping unit of the Poly 880K7 scored 246 on our PC WorldBench 2000 tests, establishing it as the fastest Windows 2000 Professional system we've seen yet. You could save about \$140 by opting for 256MB of DDR memory without losing much oomph: For example, a 1.4-GHz Xi unit with 256MB scored 242—12 percent better than the average of five similarly configured 1.7-GHz Pentium 4 PCs, and about 8 percent better than the average of four 1.33-GHz Athlon systems.

Polywell 880K7-1400

PRO: Top-notch performance and a load of high-end hardware.

CON: A touch pricey; no high-end video editing software or analog video inputs.

VALUE: Well suited for digital video.

Street price: \$2888

Polywell

800/999-1278

www.polywell.com

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

Included are a 16X DVD-ROM drive, a 16X/10X/40X CD-RW drive, a 19-inch ViewSonic monitor, a 56-kbps modem, 10/100 ethernet, and the PCWorks sound system with subwoofer from Cambridge SoundWorks. The midsize tower case's interior has plenty of expansion room.

This powerful, versatile system, though not the cheapest around, is very competitively priced, especially compared to high-end P4 PCs.

—Anush Yeghazarian



THE POLY 880K7-1400.

Scan Your Business Cards in Color

BUSINESS CARD SCANNER

SUCCESS sometimes isn't a matter of who you know, but whose business card you can locate. I've used Corex Technologies' CardScan Executive business card scanner and electronic address book for some time, and found it an invaluable tool for searching, updating, and transferring those important names and numbers to my various digital address books.

Corex's newest update, the \$299 CardScan 600c with ver-

sion 6 software, adds some useful refinements—most notably the ability to scan in color—to a useful product.

Like earlier versions, this package contains a small, dedicated scanner and an on-screen, Rolodex-like application for managing digitized business cards. The 600c scanner is faster, sleeker, and smaller (by about a third) than the older 500 model, and it replaces the wire card catcher on the back with a foldout plastic shelf. To help shrink

the dimensions, however, Corex abandoned the 500's parallel port—the 600c has only a USB connector. Adding color does not slow the unit's scan speed appreciably: The monochrome 500 scanner takes about 7 seconds per card; the 600c takes about a second longer to scan in color.

The 600c lets you switch back to monochrome. In my tests of a preproduction unit, doing that reduced the scanning time to under 4 seconds—which is helpful if you

are scanning a stack of cards.

Also new is a Tools menu that helps you manage sync settings with your PDA and other applications.

—Tracey Capen ►

CardScan 600c

PRO: Fast, accurate business card scans in monochrome or color.

CON: Expensive compared to more flexible desktop scanners.

VALUE: Not a must-have, but new features are welcome additions.

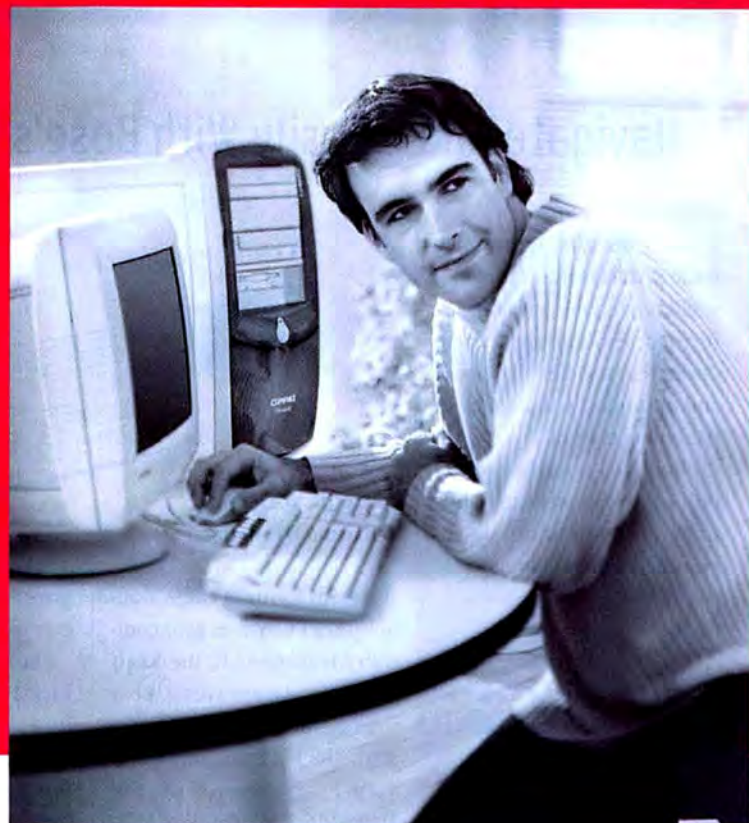
List price: Scanner with software \$299; software only \$79

Corex Technologies

800/942-6739

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Navigate Audio Easily With Bose's Wave/PC

PC AUDIO

BOSE's Wave/PC Interactive Audio System is the company's well-known table radio transformed into a multitasking device that handles all types of audio formats with a touch of its remote control.

Bose says it designed the unit for people who don't like to grapple with multiple devices and software to listen to



THE BOSE WAVE/PC and its simple interface.

Wave/PC Interactive Audio System

PRO: Compact table radio and powerful PC software offer easy and convenient control over CD audio, MP3s, AM/FM, and Internet radio.

CON: Inflexible speaker placement.

VALUE: Great-sounding, versatile device for space-constrained office.

List price: \$449

Bose

800/999-2673

wavepc.bose.com

the many forms of audio available on a PC. When your computer is turned off, the \$449 appliance operates like a stand-alone AM/FM radio with clock alarm. But when your PC is powered on, the Wave/PC can also play MP3 music files, audio CDs, Internet radio stations, and any other PC-generated sounds.

The Wave/PC's sound quality excels, but note that its built-in speakers can't be

placed wherever you like.

The shipping Wave/PC unit I tried seduced me, first with its ease of setup and use—either with the PC software or the wafer-thin remote control—and then with its versatility. Six buttons on your PC's screen (also on the remote) link to six favorite AM/FM radio stations, or six favorite MP3 playlists, or six favorite Internet radio stations.



Press another button on the remote, and the software automatically senses the type of media you request—broadcast radio, Internet radio, MP3s, or audio CDs. If you choose

radio, it delivers a list of local stations, their frequencies and call letters, their locations, and their type of programming. If you use the remote control or the console itself to turn the radio on, the software con-

trols pop up on your PC's screen (when it's on).

What's more, I could rip MP3 files from a CD while I listened to them. And, if you have an Internet connection, the software automatically logs on to CDDDB, the Internet Compact Disc Database, to download artist and content information about your CD.

—Michael S. Lasky

Palm-Style PDA Doubles Up on Expansion

PDA

HANDERA MAKES all the right moves in the Palm OS industry's dizzy dance of bigger, brighter screens, faster processors, and different sizes and expansion features.

By adding two standardized expansion features—a CompactFlash slot and a smaller Secure Digital slot—on its \$350 HandEra 330 handheld computer, HandEra (formerly TRG Products) one-ups its competition. Palm's latest devices, the M500 and M505, include a single MultiMediaCard expansion slot, and Handspring's Visor accepts

only proprietary expansion modules. But HandEra does take a step backward by using the older, thick Palm III case.

That's a relatively minor shortcoming, and HandEra compensates with a fast 33-MHz processor and a 240-by-320 screen that has 25 percent more viewable area and three times more pixels (for better resolution and visibility) than its competitors. Unlike other Palm devices, the HandEra 330 bases its Graffiti handwriting area on software, so you can hide it when you need more screen real estate for display. Screen rotation allows

users to view spreadsheets, e-books, or other apps in landscape format. You also get a larger selection of fonts; enhanced backlighting; and visible inking graffiti, which lets you see your handwriting

HandEra 330

PRO: Palm device with dual expansion ports; bigger, brighter screen.

CON: Bulky Palm III-style case.

VALUE: Standardized expansion options good for those using a PDA for more than basic PIM functions.

List price: \$350

HandEra

515/252-7522

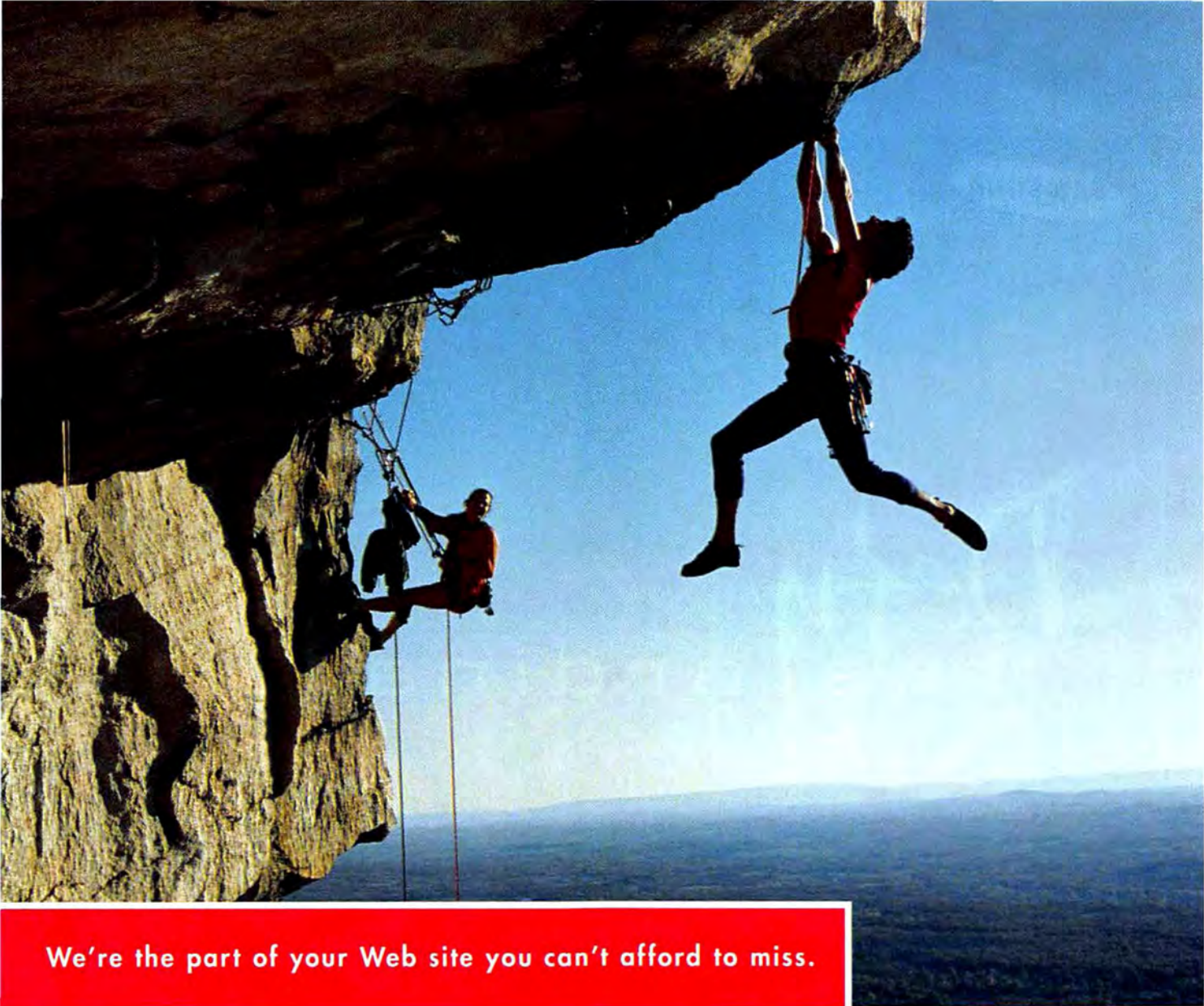
www.handera.com

strokes as you write (unlike with other Palm devices).

On the shipping unit I tested, a left-side scroll-wheel button made for effortless, one-handed selection of apps, addresses, and other items. I even operated the convenient integrated voice recorder with one hand. An included app allows quick backup to memory cards and rapid uploading of apps to the device's 8MB of internal RAM or 2MB of internal flash memory.

The HandEra 330 runs on four AAA batteries (twice as many as most Palm devices use). Based on my testing, you can expect to go four to six weeks between changes.

—Michael S. Lasky



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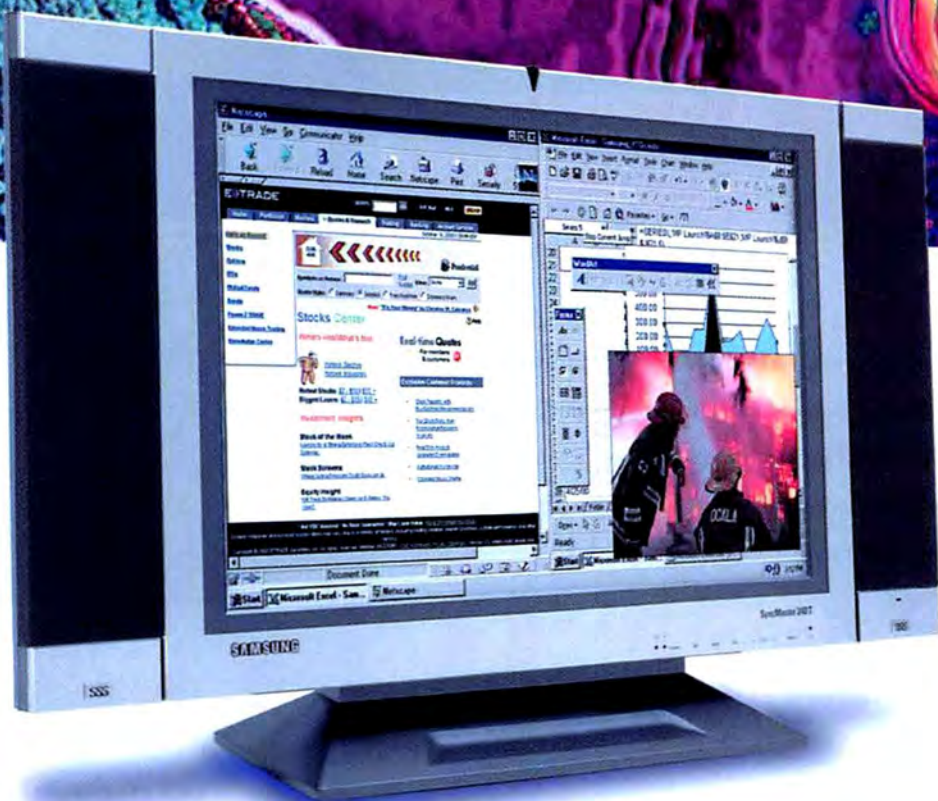
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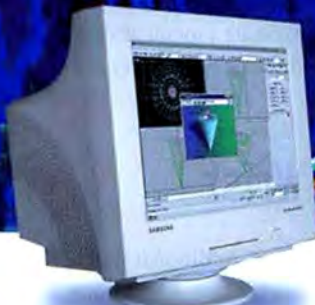


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Adobe Acrobat 5 Shows Good Form

DESKTOP PUBLISHING

IN ITS NEW **Acrobat 5**, Adobe Systems concentrates on upgrading business-oriented features to make workgroup collaboration easier. Acrobat lets you control access to, share, and print documents created by any application, while preserving the document's layout and formatting.

Like earlier editions, version 5 allows multiple users to add comments to documents that

are saved in Acrobat's Portable Document Format. But now users who have the full \$249 version of Acrobat 5 (not just the free Acrobat Reader) installed can introduce annotations via Web browsers, rather than exclusively within the Acrobat application.

Unfortunately, the markup tools still don't work well with data in tables. When using my shipping version to try to highlight the Comments box in a PDF version of *PC World's*

Top 10 Digital Cameras, for example, I couldn't avoid snagging the camera's name and the vendor's phone number and Web address as well. A new spelling checker in Acrobat 5 contains 20 dictionaries, but you can't use this tool to

check body text—only comments and form fields.

Another advance: You can now post highly formatted Acrobat documents online

text for one option and then click *Add*. In addition, you can arrange for menu items to come alive (such as by making a movie play or executing a JavaScript) when the user's mouse pointer hovers over them, using preset actions

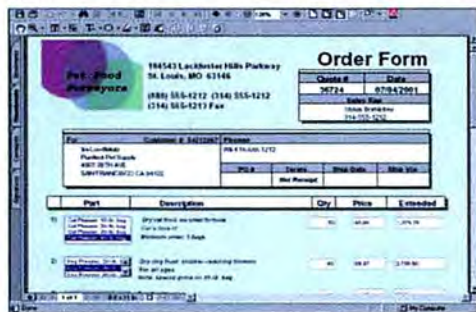
that look as though they have been borrowed from Adobe's GoLive HTML editor.

If you're a graphics professional who wants to share, display, and print image-laden layouts, Acrobat 5 lets you view and print PDF files containing transparencies created by Adobe Il-

lustrator 9 or Photoshop 6. Acrobat 5 now uses the same color-management system as these applications.

Acrobat 5 should smooth workflow, especially for those doing business over the Web.

—Alan Stafford



FORMS IN ADOBE 5 can now feed databases, and customers can fill out forms via their Web browsers.

with embedded forms—an order form, say—and make the form data interact with a database. An easy-to-use dialog box helps you create your forms. For example, if you want to create a menu of shipping options, just enter the

Skytel charges fees, however, for the various e-mail services it offers—\$5 a month for numeric only, for instance.

You can't use the watch to send messages. But if you need to get messages and alerts throughout the day, this Timex has arrived just in time.

—Michael S. Lasky

E-Mail Now Arriving on Your Wrist

PAGER WATCH

MY FLIGHT is leaving on time at 5:16 p.m. from Gate 77. I know because my watch told me. Yes, my watch: Timex's new \$99 **Internet Messenger**. This time-

piece receives alphanumeric, text, and e-mail messages.

Of course, the messages must be short—no more than 100 characters long—but that is about the maximum you'd

want to read on the 12-character, single-line, scrolling display on the watch's face, anyway. An earlier, bulkier version handled messaging and stored phone numbers and other data, but this Timex is slimmed down by 28 percent.

A touch of an Indiglo button sharply illuminates the digital

watch face. Additional watch features include a 100-hour chronograph, eight-lap memory recall, a countdown timer, five alarm settings, and dual time zones automatically set by radio communication. The watch can use either vibration or a set of customizable musical chimes to notify you of incoming pages and messages.

The e-mail address of the watch is its toll-free paging number at timex.skytel.com. You can arrange to get free custom message alerts for news, weather, specific sports scores, and the like from other sites, such as Yahoo Mobile.



TIMEX Internet Messenger.

Internet Messenger

PRO: Unobtrusive watch receives pages and short e-mail messages.

CON: One-way messaging only; monthly service fees.

VALUE: Excellent watch, pager, and e-mail combo for people on the go.

Price: \$99

Timex

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\$4638.88 CDW 190858

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i n v e n t

ViewSonic LiteBird PJ1075

1024 x 768 XGA projector

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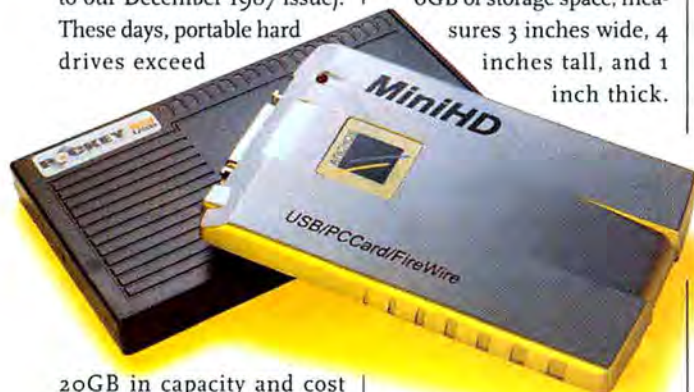
PC STORAGE

BACK IN 1987, the Remedy Removable Winchester hard drive cost a whopping \$1495 for 47MB of storage—about \$32 per megabyte (according to our December 1987 issue). These days, portable hard drives exceed

runs Win 98 SE or higher or Macintosh OS 8.6 or higher.

MP3s AND DATA, TOO

ARCHOS'S SILVER Jukebox 6000, an MP3 player with 6GB of storage space, measures 3 inches wide, 4 inches tall, and 1 inch thick.



20GB in capacity and cost mere pennies per megabyte. I looked at three new ones: the 6GB Jukebox 6000 (\$249) and the 6GB MiniHD (\$199) from Archos, and the 20GB Pockey (\$249) from Pockey Drives.

I tested shipping versions of the drives on a Dell Dimension XPS 300 with 128MB of RAM, a 300-MHz PII processor, and Windows 98 SE. All three require a system that

SMALL BACKUP PACKAGES:

The Pockey, left, and the MiniHD.

Along the edges, blue foam padding provides protection against drops and bumps. Of the three, the 12-ounce Jukebox 6000 was the heaviest.

Installation was simple: I connected the Jukebox to my PC's USB port, waited for Windows to recognize it, and installed the software from its CD-ROM. Windows then displayed the device and assigned it a drive letter. From there, I could simply drag and drop files onto the drive.

In my informal tests, copying a 390MB file from my local hard drive to the Jukebox

took 8 minutes, 27 seconds, and copying it back took 8 minutes, 15 seconds. My only gripe: The user interface was clumsy. For instance, adjusting the volume took three steps; a dedicated volume button would be much easier.

The Jukebox 6000 comes with two sets of rechargeable NiMH AA batteries, an AC adapter, a USB cable, a driver CD-ROM, Music Match CD software, a carrying case, and an installation guide. In my tests, the batteries lasted for about 8 hours.

ITTY-BITTY BACKUP

ARCHOS'S 6GB MiniHD hard drive weighs about 7 ounces and is approximately 4 inches long, 2 inches wide, and 0.5 inch thick. It includes USB and PC Card attachments, a PS2 power adapter, a manual, and V Communications' AutoSave backup software. For \$30 more, you can buy an IEEE 1394 adapter from Archos.

Installation with the USB attachment was a snap. If your USB port does not supply enough power, though, you'll have to hook up the PS2 adapter. When you install the drivers, you can opt to install the included backup software as well, and then set the software to back up your files to the MiniHD.

However, it isn't the fastest. I copied my 390MB file to the MiniHD in 11 minutes, 22 seconds, and then copied the file back to the desktop in 8 minutes, 17 seconds.

POCKETABLE POCKEY

THE 20GB POCKEY, by far the least expensive per megabyte of the three, weighs about 5 ounces. It's about 5 inches long, 0.5 inch thick, and 3 inches wide, and it doesn't require additional power: It gets all it needs from your PC's USB port. (Note: USB ports on Toshiba and NEC laptops may be incompatible.)

I simply plugged in the USB cable and installed the drivers from the CD. To transfer files, I just dragged and dropped. The Pockey was slightly slower than the Jukebox, taking 9 minutes, 12 seconds to copy a 390MB file from my PC to itself, and 8 minutes, 5 seconds to copy the file back.

The Jukebox 6000 was the most versatile of the three, especially if you have a large MP3 collection. For travelers who need a quick way to back up files without carrying a power



THE JUKEBOX

6000 holds 6GB and plays MP3s.

cord or batteries, the Pockey is an excellent choice. I liked the many input options of the MiniHD, but the unit's transfer speeds were slower, and you may need to use its power cord, especially with laptops.

—Alexandra Krasne ►

Jukebox 6000

PRO: MP3 player and data storage.

CON: Clumsy controls, rather heavy.

VALUE: A solid choice for audiophiles who work on multiple systems and want to take their music along.

Price: \$249

MiniHD

PRO: Small and light; includes IEEE 1394 adapter, a PS2 power adapter, and a PC Card.

CON: May require additional power.

VALUE: A versatile backup system with multiple connection options.

Price: \$199

Archos

949/453-1121

www.archos.com

Pockey

PRO: This small hard drive doesn't need any external power supply.

CON: Transfer speeds a bit sluggish.

VALUE: Great for travelers.

Pockey Drives

818/717-9556

www.pockeydrives.com

Price: \$249

Digital Voice Recorder Turns Dictation Into PC Text

VOICE RECOGNITION

ARE YOU overflowing with ideas and action plans—but don't have time to jot them down? The Olympus **DS-320 Digital Voice Recorder** can capture your spoken thoughts as digital files. Then, when back at your computer, you can use the bundled IBM ViaVoice Version 8 software to convert your recorded words into text on the screen.

To get the recorder to work effectively, though, you need to spend a long time training the software to recognize your pronunciation and intonation.

The silver shipping DS-320 I tested weighed a mere 2.5 ounces, including two AAA batteries. Its 16MB of memory holds a full 150 minutes of recordings in .dss file format (up to 99 individual files in each of two folders).

But it isn't the most intuitive device around. Some of its buttons are tiny and difficult to press. And you need to rely too much on the handbook to figure out how to use it.

Before you begin transcribing your recorded mumblings, you must plug the DS-320 into your system's sound card

and read a series of paragraphs aloud for about 15 minutes to train the software. You then use the package's serial cable to hook up the recorder to your PC. Select the files you want transcribed, and ViaVoice steps in to let loose your words on the screen. In my early tests, the software's accuracy was not very impressive. For example, "Please call me" became "Keith Coleman," and "Thank you" was picked up as "Haiti." Like all voice recognition programs, however, ViaVoice does improve its accuracy

with additional training.

At \$199, the DS-320 is a pricey alternative to pen and paper—even with Big Blue's software factored in. If you're on the road regularly and need a tool to convert your recorded notes into editable text, it might come in handy. But be prepared to do a lot of editing—and training—to make using this voice recorder worthwhile.

—Aoife McEvoy



THE TINY
OLYMPUS DS-320
needs lots of training
time to get up to speed.

Display PDF Graphics on Your PDA

DOCUMENT READER

THE ABILITY to read text-only documents on a Palm's small screen is nothing new. But how about viewing documents with their images still intact? Until now, that was just a fantasy.

Enter Adobe Systems' new **Acrobat Reader for Palm OS**. This program does an admirable though imperfect job of extrapolating each element on a page and reproducing those elements—pictures and all—in a single-column form.

Using a beta version of the free software, I found that the concept underlying Adobe's Portable Document Format files—to allow documents to retain the look and feel of their original form, right down to the layout and fonts—translated surprisingly well.

Installation was reasonably straightforward: I downloaded a desktop application to my

PC (the system you use must have Microsoft Windows 98 or higher or Windows NT 4 or higher) and used Hot Syncing to link the reader component to my Handspring Visor Deluxe (the program is compatible with Palm OS version 3.0.1 or higher). I then launched the PC software and added PDF files to the transfer queue, deciding whether to save space by removing the images.

Though the resulting display was not an exact replica, the gist of my magazine pages was largely retained, and the resulting single-column translations were easy to read. You can enlarge images to see small portions at a time.

Gliches may arise when you view files not created using Acrobat 5—which embeds information for reconstructing a document into the PDF file. I encountered misplaced hyphens, misidentified head-

lines and titles, and misinterpreted text elements that Acrobat Reader recognized and displayed as graphics instead.

A second limitation: You can't view encrypted PDFs, such as those on some product spec sheets or prescription drug inserts. Even so, Acrobat Reader is a useful and worthwhile addition to your handheld's repertoire of software for the Palm OS.

—Melissa J. Perenson ►

DS-320 Digital Voice Recorder

PRO: Portable device turns recordings into text, comes with latest IBM ViaVoice software.

CON: Requires lots of training.

VALUE: With enough time investment, could be a viable tool for those on the go.

Street price: \$199

Olympus

800/622-6372

www.olympusamerica.com

Acrobat Reader for Palm OS

PRO: View most PDF documents with incorporated graphics on your Palm-based handheld.

CON: Not all formatting is retained, particularly with files not created using Acrobat 5.

VALUE: The price is right.

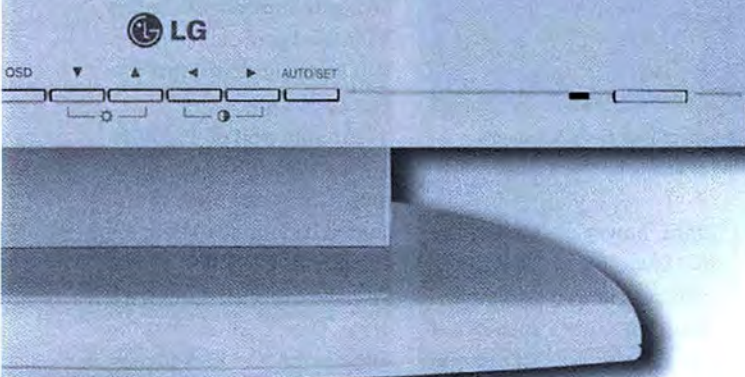
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Retrospect Express 5.5: Better Basic Backups

BACKUP

LAST YEAR'S version of Dantz Software's Retrospect Express Backup software performed capably as a light-duty backup program with the unique ability to restore backups in one pass. Regrettably, however, that version lacked disaster-recovery features offered by competitors such as Backup Exec from Veritas.

Retrospect Express 5.5

PRO: Easy to use.

CON: Limited tape-drive support, incomplete disaster recovery.

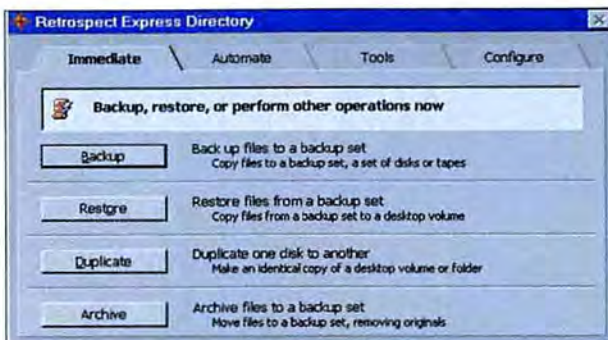
VALUE: Inexpensive, capable backup program that possesses limited disaster-recovery features.

Street price: \$50

Dantz Software

800/225-4880

www.dantz.com



EASY BACKUP MANAGEMENT: Retrospect Express 5.5's simple interface makes tasks like duplicating or archiving files a snap.

Dantz's new \$50 **Retrospect Express 5.5** remedies that deficiency—sort of. Express can now create an ISO 9660 (an international file system standard for CD-ROMs) image of your boot partition for use when your system commits digital suicide. You also need a separate CD mastering pro-

gram, however, to burn the ISO image file to CD-R.

Express is a cross-platform program with a somewhat atypical interface that's easy to use once you become familiar with it. Selecting or deselecting individual files to back up involves previewing them. You can define and reuse the

backup rules for file types, such as .exe, but you can't reuse the selection of individual files in Express. (You can do that with Dantz's more expensive backup software.)

Express offers scripted unattended backups, plus a wizard to help you create new backup scripts. Its support for tape backup is limited to OnStream ADR (advanced digital recording) drives or drives that use Travan cartridges.

I ran into a bit of trouble in my tests when my shipping copy took 15 minutes, 53 seconds to back up 560MB to my 10X Ricoh CD-RW—a time I'd have expected from a 4X drive. Dantz claims that the software throttles back to compensate for packet-writing problems with Ricoh drives.

If you need a basic backup program, this is worth a look.

—Jon L. Jacobini

Anywhere Printing for Wireless Networks

NETWORKING

IF YOUR home or small business uses an 802.11b wireless network to share files and Internet access, Buffalo Technology's **AirStation Wireless Printer Server LPV-WL11** can make sharing a printer more convenient than ever. Basic-

ly a wireless network adapter with a parallel port, it lets you set up even the lowest-priced parallel-port-based printer anywhere within your network's range—just like an expensive network printer on a wired ethernet network.

I tested a shipping unit on my 802.11b network, which uses a D-Link residential gateway. I followed the somewhat complicated but well-documented installation routine (which involved installation of several network protocols besides TCP/IP) without

mishap. I plugged a printer cable from an HP Deskjet 995c into the parallel port of the LPV-WL11 and was printing in about 20 minutes.

At \$299, however, the LPV-WL11 isn't for everybody. For starters, it doesn't support USB printers. More important, you can already use any printer attached to any PC on your network through the file-and-printer-sharing utility included in all recent versions of Windows. If you don't want to keep a PC turned on just to use its attached printer, consider purchasing a residential gateway such as the \$289 Linksys EtherFast Wireless AP + Cable/DSL Router BEFW11P1,

with a built-in printer server.

Buffalo Technology's LPV-WL11 is worthwhile for situations where neither alternative works. For a busy small office, \$299 may be a reasonable price to pay to be able to place a low-cost printer wherever you please. And that's the major benefit the LPV-WL11 delivers.

—Yardena Arar ►



THE AIRSTATION Wireless Printer Server.

AirStation Wireless Printer Server LPV-WL11

PRO: Lets you print over an 802.11b network to any parallel-port printer anywhere within network range.

CON: Pricey.

VALUE: May be worthwhile to centrally locate a workgroup's printer.

Street price: \$299

Buffalo Technology

800/508-1110

www.buffalotech.com

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

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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.



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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.

Environmental Monitoring Card

Works with your APC Smart-UPS® or Matrix-UPS® 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. Via SNMP-enabled APC UPSs, schedule the software to gather information from the UPSs, then select any one of the eleven predefined reports.



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 and desktops, workstations and servers.
- **2-Post Racks / 4-Post Open Frame Racks**



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Best of the Web 2001

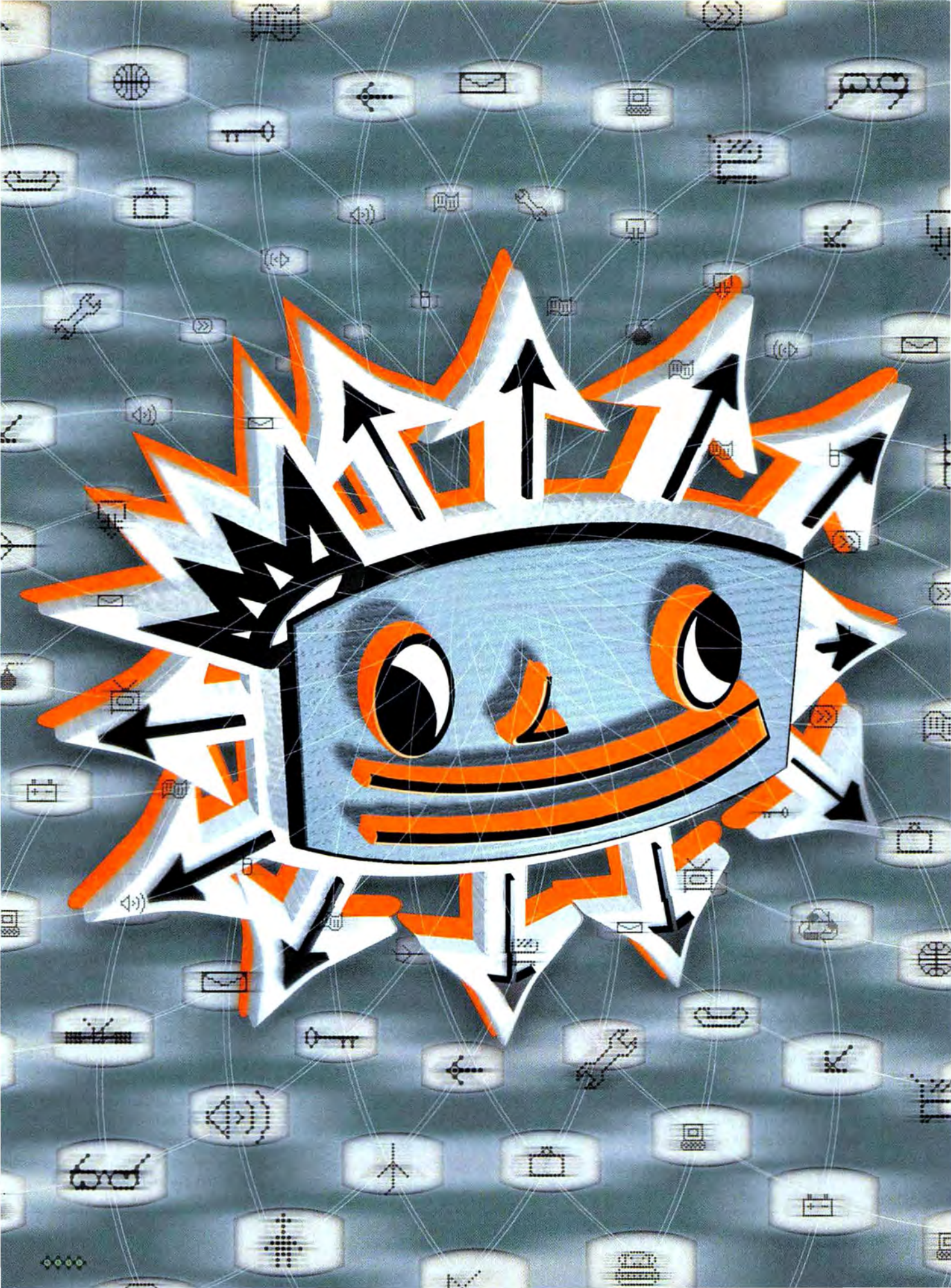


Wouldn't it be great if you knew exactly where to go on the Web to get the information you need? The Web is huge, however, and there's no single place to find everything. So we've done the hunting for you. Our intrepid editors and reporters checked out the best sites in 33 categories, with a focus on sites that make you a smarter and happier technology user. We zeroed in on the best places for audio downloads and security diagnostics, for information about hardware and games, for clip art to use on your Web site, and for driver updates for Windows. In making our judgments, we considered ease of use, breadth of content, and usefulness of information, and we looked at sites that offer free stuff as well as stuff that's worth its asking price. We chose a top pick and a runner-up in each category (which gives you more options); we've also included personal favorites from four *PC World* editors. But if you don't like our picks—or have other favorites—feel free to send in your own nominees to bestofweb@pcworld.com.

We pick the top sites for PC users in 33 categories—from free tech support to essential Web services.

**EDITED
BY KIM ZETTER**







Online Services

Stealth Surfing

SafeWeb

With so many Web sites tracking you online, it's nice to know you can reclaim your privacy at anonymous browsing sites like SafeWeb (www.safeweb.com). Dozens of services offer stealth surfing, but many of them crowd their sites with ads. SafeWeb's straightforward interface lets you call up Web pages through its proxy servers, preventing sites from identifying you. SafeWeb also encrypts your connection to its servers, filters potentially malicious scripts from Web pages, and lets you block cookies. The free service is supported by small banner ads. **Runner-Up:** The ad-free Anonymizer.com offers similar features but will cost you \$50 per year. —Sean Captain

Radio Stars

Echo

Though it was in a beta version when we tested it, Echo (www.echo.com) looked formidable. With a few mouse clicks you can create a personal "radio station" from Echo's extensive list of music styles, or you can tune in to other member's stations. Anyone can listen to your collection, and you can invite people to rate songs, groups, and albums to refine your own playlist. Throw in a slick interface, and you're in music lovers' paradise. **Runner-Up:** Spinner (www.spinner.com) has plenty to love—150 music channels playing everything from rockabilly to reggae, a free Spinner Plus player, and minimal ads. If only it were more customizable. —Emru Townsend

Counting the Days

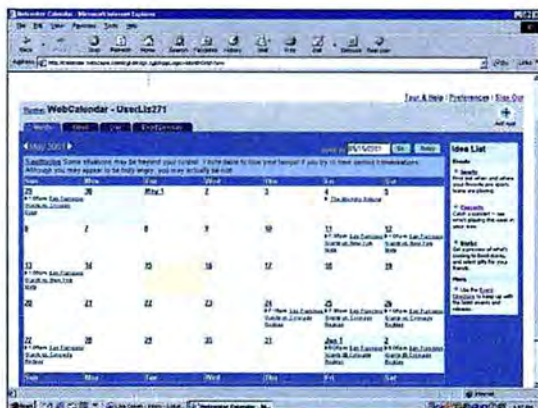
Netscape WebCalendar

Of the online calendars we reviewed, Netscape's WebCalendar (www.netscape.com/calendar) offers the most flexibility and breadth of content. In addition to marking birthdays, anniversaries, holidays, and appointments, you can add daily weather reports and—after supplying your birthday—daily horoscopes. The calendar's Event Directory lets you track new movie releases and sports events, and also links to Netscape's city guides so you can add cultural events as well. **Runner-Up:** ScheduleOnline (www.scheduleonline.com) is a calendar and project management site. It allows you to track almost every aspect of a project and includes an e-mail program, a file manager, and a bulletin board. —Lisa Cekan

Seek and Find

Google

With rapid, germane results to queries, Google (www.google.com) wins again as our favorite search engine. Whether you search for "Nantucket salt grinder" to find a mate for your pepper mill or "Digital Relay" to find a hot new CD-RW, Google whips you there faster and deliv-



LIFE AT A GLANCE: Netscape's online calendar lets you track important dates and also links to the company's city guides for cultural events.

ers more-relevant results than its competitors. And with its new translation function, Google will convert Italian, French, Spanish, German, or Portuguese pages into English for you—though the beta version we tested was clunky. A Lucent press release, for instance, was translated from the French as: "We are happy to accompany BLR services in its will to be an actor of foreground on this market with a future." Huh? **Runner-Up:** Fast (www.alltheweb.com) is the little-known search engine that could. The search site has a streamlined interface; it returns results from more than 1.5 billion Web pages; and as the company name implies, it's fast! —Anne B. McDonald

DESKTOP DJ: Tired of Top 10 replays and lounge-lizard DJs? Create your own Echo music station with your personal favorites.



Space Stations

Xdrive Plus

Numerous sites offer online storage space, but Xdrive Plus (plus.xdrive.com) downloaded and uploaded data the quickest in our informal testing. You can access Xdrive Plus from any PC, PDA, or Web-enabled cell phone, and it offers select instant downloads from partners such as Symantec and Microsoft. For example, if you

want an applet from Microsoft's site, you can post it to your Xdrive space instantly by clicking on the download, rather than grabbing it through your modem. The site gives you 25MB of space for \$5 per month, with additional 25MB chunks available for \$3 each per month. **Runner-Up:** Myplay (www.myplay.com) is a storage site with a specialty: MP3s and other music files. You get 3GB of free space for digital tunes, and the site has agreements with major music companies that ensure it won't someday find itself in Napster-like limbo. —Michael S. Lasky

In Synch

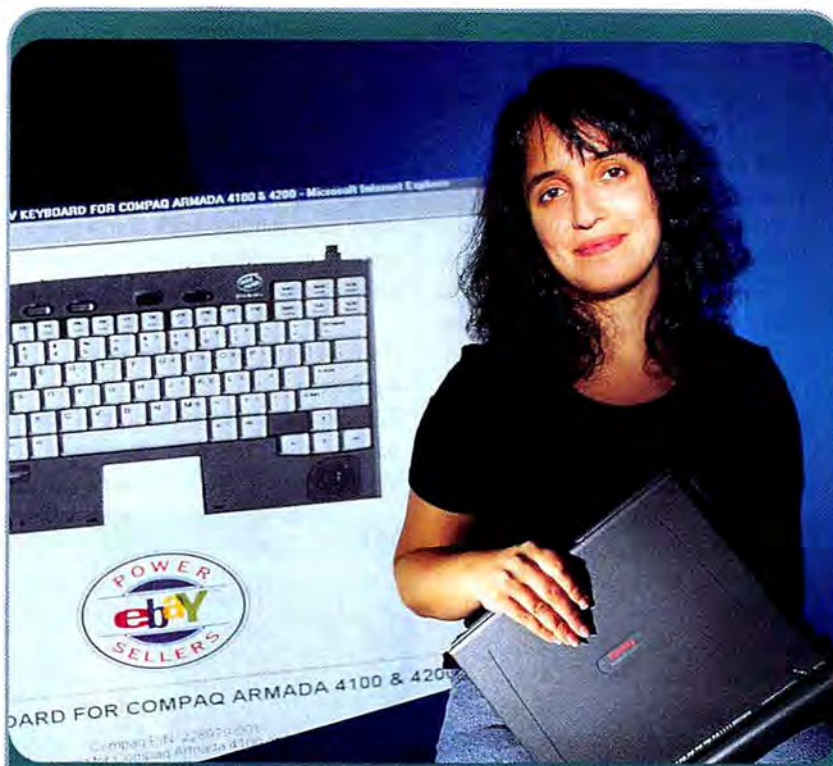
MyPalm

MyPalm (www.palm.net) succeeds for the same reason Palm is the most popular PDA device: divine simplicity. The site lets Palm owners sync calendars, contacts, and tasks to a free, personalized Web account so that you can access a virtual digital assistant from a PC anytime you're sans Palm. You can add or edit data online, then sync it to your real Palm. The customizable Publish option lets designated users view portions of your calendar. **Runner-Up:** MyPalm is limited to Palm OS users (including Handspring and Sony CLIE owners), but FusionOne (www.fusionone.com) works with PCs, some cell phones, and Palm devices. FusionOne Basic is free; the more comprehensive FusionOne Plus costs \$10 a month. —Michael S. Lasky

Tech Tune-Ups

PC Pitstop

You check your car's oil regularly, don't you? So why not do maintenance on your PC? PC Pitstop (www.pcpitstop.com) is a free site that uses ActiveX controls and JavaScript to diagnose your hardware, hard disks, and Internet connection, and to sweep your system for viruses. (PCWorld.com and PC Pitstop recently partnered to offer the latter's free service through our site.) You just click a link to start the tune-up, and then leave your computer alone for a few minutes. PC Pitstop provides a summary report of your system's condition, including explanations of problems it has



my top pick

EBay

You already know that EBay (www.ebay.com) is a good all-around auction site. But I've found an unexpected use for it: tracking down hard-to-find parts for my outdated computer. The site has been a great resource for locating refurbished, used, and surplus parts for my beloved four-year-old 133-MHz laptop. Among my bargain finds: a spare trackball (\$20), a new floppy drive (\$25), and a new plastic casing for the battery to replace my cracked one (\$30). —Melissa J. Perenson

found and tips for maximizing your PC's performance. You can use the TechExpress service to e-mail the results to a technician or to your brainy nephew. **Runner-Up:** A good complementary site to PC Pitstop is CatchUp (www.catchup.com), which is a cool tool that scans your hard drive, then points you to updates, security patches, and tips for the specific apps on your PC. —Emru Townsend

Call Security!

Panda ActiveScan

In a perfect world, we'd all floss religiously, pay our parking tickets on time,

and never use a PC that wasn't running antivirus software with the latest updates. But this is reality—and reality demands Panda Software's ActiveScan (www.pandasoftware.com/activescan.com). ActiveScan's free browser-based tool is a snap to use, and it can find and remove over 55,000 viruses and Trojan horses. And unlike some rivals, ActiveScan is updated daily. You can check your entire PC or a specific folder or file, or you can make sure the latest outbreak hasn't infected your Outlook or Outlook Express in-box. **Runner-Up:** Trend Micro's Housecall (www.antivirus.com) offers ▶

a free online scanner that will not only find viruses on your system but also remove most of them. —Harry McCracken

Office Spree

Personable.com

No matter what your business, you'll probably have to share files with someone, so compatibility with Microsoft Office files is a must. Personable.com isn't just compatible with Office 2000, it is Office 2000. Once you subscribe (\$25 one-time activation fee, and monthly charges that range from \$20 to \$60), you can access Word, Excel, PowerPoint, and Outlook from any PC with a Net connection. The site plans to offer Office XP in the future, but no release date was available at press time. **Runner-Up:** FreeDesk (www.freedesk.com) is less compatible, but it's fine for simple documents—and it's free. Apps are pretty speedy; but test the limits of document import and export before relying on the apps for your needs. —Emru Townsend

Going Postal

Yahoo Mail

Though Hotmail is still the most famous free e-mail service, Yahoo easily tops it by adding every possible mail feature to its system without sacrificing clarity or usability. For example, Yahoo makes it a snap to set up forwarding addresses, POP3 mail, and filters. Factor in the easy sign-up procedure—which demands minimal private information—and you may want to become a Yahoo!liger, too. **Runner-Up:** Hotmail (www.hotmail.com), the pioneer of Web-based e-mail, remains a strong contender, but we found it sluggish. And its scant in-box capacity (2MB to Yahoo's 6MB) keeps it in second place. —Emru Townsend

Direct Delivery

Yahoo

Looking for order on the Web? Yahoo's venerable directory (www.yahoo.com) organizes its multitude of sites into 14 neatly charted categories and intuitive subcategories, and has a separate section for shopping. You quickly reach actual links within one or two subcategory lev-

els. It also offers one of the best selections of international sites, with 21 country-specific directories. **Runner-Up:** The Open Directory Project (www.dmoz.org) offers a clean interface and good cross-categorization of sites. It also lets you easily work your way back from a specific site to its category so you can broaden your search. —Anush Yeghazarian

Home, Home on the Web

Homestead

These days you're no one if you don't have your own Web page. But designing a personal page can be frustrating and

time-consuming. Homestead (www.homestead.com) provides the best templates and tools to get your site up quickly and to customize your site to give it your own stamp. It's free, too. A nice bonus for you and your visitors: no cookie clutter and no annoying pop-up ads.

Runner-Up: Yahoo's Geocities (geocities.yahoo.com), also free, can help you post a customized site in less than 15 minutes. But the customization process is a bit clunkier than Homestead's, and you must deal with pop-up ads. Like Homestead, Geocities offers about 16MB of free space. —Anush Yeghazarian ▶



my top pick

Zoetrope

As a fledgling fiction writer tapping out stories on my home PC, I stumbled onto director Francis Coppola's Zoetrope Studios (www.zoetrope.com), and found it to be the best online writer's workshop I've seen. Members have to read and rate others' stories before posting their own, and the feedback can be very valuable. There are sections for musicians, photographers, and directors, too. And with Coppola behind the site, you get the feeling you might be discovered any day. —Lisa Cekan



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— 4th Quarter 2000, March 21, 2001

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BUSINESS LEASE: \$21/MO., 48 MOS.¹¹

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BUSINESS LEASE: \$17/MO., 48 MOS.¹¹

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- 1-Yr Ltd Warranty² ■ 1-Yr NBD On-Site Service³

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BUSINESS LEASE: \$21/MO., 48 MOS.¹¹

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- 1-Yr Ltd Warranty² ■ 1-Yr NBD On-Site Service³

\$999  **E-VALUE CODE**
03879-590709

BUSINESS LEASE: \$28/MO., 48 MOS.¹¹

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- 128MB 100MHz SDRAM ■ 6GB¹ Ultra ATA HD
- Fixed Internal 24X Max Variable CD-ROM
- Intel® Integrated 3D® AGP Video with up to 8MB System Memory
- 26.5Whr Li-Ion Battery
- Internal Mini-PCI 56K Capable⁶ Modem
- MS® Works Suite 2001 ■ MS® Windows® Me
- 1-Yr Ltd Warranty²; 1-Yr Mail-in Service, 1-Yr Phone Tech Support

\$949  **E-VALUE CODE**
03879-890709

BUSINESS LEASE: \$26/MO., 48 MOS.¹¹

- 3-Yr Mail-in Service with Lifetime Phone Tech Support, add \$99
- Upgrade to 128MB 100MHz SDRAM, add \$75
- APC® Notebook Surge Protector, add \$30

DELL™ INSPIRON™ 8000

Pinnacle of Performance Notebook

- Intel® Pentium® III Processor at 900MHz
- 15" Super XGA+ TFT Display
- 128MB 100MHz SDRAM ■ 10GB¹ Ultra ATA HD
- Fixed CD-ROM (Upgrade to CD-RW or DVD)
- Modular Floppy (Upgrade to Optical or Zip)
- 16MB ATI® Mobility™-M4 3D® Video, 4X AGP
- 59Whr Li-Ion Battery w/ExpressCharge™ Technology
- Internal Mini-PCI 56K Capable⁶ Modem
- MS® Office XP Small Business
- MS® Windows® Me
- 1-Yr Ltd Warranty²; 1-Yr Mail-in Service, 1-Yr Phone Tech Support

\$1799  **E-VALUE CODE**
03879-890717

BUSINESS LEASE: \$50/MO., 48 MOS.¹¹

- 3-Yr Mail-in Service with CompleteCare™ Service²⁰ and Lifetime Phone Tech Support, add \$269

DELL™ LATITUDE™ C500

NEW—Wireless-Ready Value Notebook

- Intel® Celeron™ Processor at 700MHz
- 12.1" SVGA Active Matrix Display (14.1" XGA Available)
- 64MB SDRAM ■ 6GB¹ Ultra ATA HD
- 8MB ATI® Mobility™ 128 Video, 2X AGP
- MS® Windows® 98, Second Edition
- Modular 24X Max CD-ROM/Floppy Drive
- Internal Mini-PCI 56K Capable⁶ SoftModem
- Li-Ion Battery w/ExpressCharge™ Technology
- Dual Pointing – Touchpad and Pointing Stick
- 1-Yr NBD On-Site Service³

\$1299  **E-VALUE CODE**
03879-790712

BUSINESS LEASE: \$36/MO., 48 MOS.¹¹

- 14.1" XGA Active Matrix Display, add \$150
- Deluxe Nylon Carrying Case, add \$69

DELL™ DESKTOPS:

DELL™ OPTIPLEX™ GX150

Network-Optimized Managed PC

- Intel® Pentium® III Processor at 933MHz
- 64MB SharedSM SDRAM (up to 512MB)
- 10GB¹ (7200 RPM) ATA/100 HD
- 15" (13.8" vis) E551 Monitor
- Integrated 3Com® 10/100 NIC
- Intel® Integrated 3D² Direct AGP Graphics
- 48X Max CD-ROM
- Integrated AC97 Audio
- MS® Windows® 2000 Professional
- OptiFrame™ Small Desktop Chassis
- 3-Yr NBD On-Site Service³

\$999  **E-VALUE CODE**
03879-390709a

BUSINESS LEASE: \$28/MO., 48 MOS.⁴

- APC® SurgeStation Pro8T2 (8 Outlets), add \$39
- Lexmark® E312L Laser Printer, add \$269

DELL™ OPTIPLEX™ GX150

Network-Optimized Managed PC

- Intel® Pentium® III Processor at 1.0GHz
- 128MB PC133 SharedSM SDRAM (up to 512MB)
- 20GB¹ (7200 RPM) ATA/100 HD (up to 40GB¹)
- 17" (16.0" vis) M781p Monitor
- NVIDIA® TNT2 Pro 16MB Graphics Card
- 48X Max CD-ROM ■ Integrated AC97 Audio
- Integrated 3Com® 10/100 NIC
- MS® Windows® 2000 Professional
- NEW OptiFrame™ Small Mini-Tower Tool-less Chassis in Midnight Gray
- 3-Yr NBD On-Site Service³

\$1299  **E-VALUE CODE**
03879-390712a

BUSINESS LEASE: \$36/MO., 48 MOS.⁴

- APC® Back-UPS 500VA, add \$129
- 3Com® SS3 12-port Baseline Switch, add \$378

DELL™ PRECISION® 330

Advanced Performance Workstation

- Intel® Pentium® 4 Processor at 1.4GHz (up to 1.7GHz)
- Tower Chassis in Midnight Gray
- Single Processor/RAID Capable
- 128MB PC600 RDRAM (up to 2GB)
- 10GB¹ (7200 RPM) EIDE HD (up to 73.4GB¹ 10K RPM SCSI)
- NVIDIA® TNT2 Pro 16MB 4X AGP Graphics Card
- Integrated NIC & Sound ■ 48X Max CD-ROM
- MS® Windows® 2000 Professional
- 3-Yr NBD On-Site Service³
- 7x24 Dedicated Workstation Phone Tech Support

\$1299  **E-VALUE CODE**
03879-490712

BUSINESS LEASE: \$36/MO., 48 MOS.⁴

- Monitor Sold as an Upgrade
- Sony 24" GDMFW 900 CRT Monitor, add \$1799

DELL™ SERVERS:

NEW POWEREDGE™ 300SC

NEW—Basic Server at Our Lowest Price

- Intel® Pentium® III Processor at 800MHz
- Dual Processor Capable
- 64MB 100MHz ECC SDRAM (up to 1GB)
- 10GB¹ (7200 RPM) IDE HD
- 48X Max IDE CD-ROM
- 1-Yr NBD On-Site Service³ Years 2 & 3 Parts
- 7x24 Phone Tech Support

\$769  **E-VALUE CODE**
03879-290707

BUSINESS LEASE: \$21/MO., 48 MOS.⁴

- 2nd Processor at 800MHz, add \$399
- Red Hat® Linux™ 7.0, Installed Upon Request

NEW POWEREDGE™ 1400SC

NEW—Small Business Value Server

- Intel® Pentium® III Processor at 933MHz
- Dual Processor Capable
- 128MB 133MHz ECC SDRAM (up to 2GB)
- 9GB¹ (10K RPM) Ultra3 (Ultra 160) SCSI HD (up to 36GB¹ 10K RPM)
- 48X Max IDE CD-ROM
- Embedded Ultra3 (Ultra 160) SCSI Controller
- Dell™ OpenManage™ Server Management
- 3-Yr NBD Bronze On-Site Service³
- 7x24 Phone Tech Support

\$1099  **E-VALUE CODE**
03879-290710

BUSINESS LEASE: \$31/MO., 48 MOS.⁴

- 2nd 9GB¹ (10K RPM) IDE HD, add \$249
- MS® Windows® 2000 Server, add \$799

NEW POWEREDGE™ 2500SC

NEW—Affordable Scalability Server

- Intel® Pentium® III Processor at 933MHz
- Dual Processor Capable
- 128MB 133MHz ECC SDRAM (up to 4GB)
- 9GB¹ (10K RPM) Ultra3 (Ultra 160) SCSI HD
- Dual Integrated Ultra3 SCSI Controllers
- 24X Max IDE CD-ROM
- Dell™ OpenManage™ Server Management
- 3-Yr NBD Bronze On-Site Service³
- 7x24 Phone Tech Support

\$1599  **E-VALUE CODE**
03879-290715

BUSINESS LEASE: \$44/MO., 48 MOS.⁴

- Basic Server Installation, add \$259
- MS® Small Business Server, add \$1299



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CT | Canada: 800-232-6978 | Mexico:
001-877-269-3379

Prices, specifications and availability may change without notice. Taxes and shipping charges extra, and vary. Cannot be combined with other offers or discounts. U.S. only. For a copy of our Guarantees or Limited Warranties, write Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, Texas 78682. ¹Service 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. ²For hard drives, GB means 1 billion bytes; accessible capacity varies with operating environment. ³Download speeds limited to 53Kbps. Upload speeds are less (about 30Kbps) and vary by modem manufacturer and line conditions. Analog phone line and compatible service required. ⁴Business leasing arranged by Dell Financial Services L.P., an independent entity, to qualified customers. Lease payments based on 48-month FMV purchase option lease and do not include taxes, fees and shipping charges. Subject to credit approval and availability. Lease terms subject to change without notice. ⁵CompleteCare 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/bsd/services/service_completecare_svc.htm. ⁶Up to 11MB of system memory may be allocated to support DMT Graphics. ⁷ZD Labs, Business Winstone 99 Performance, 11/99, at 64MB and 128MB of memory. ⁸Connect at a rate of 11Mbps up to 160m from connected access point. Range and speed may vary due to number of users, interference, transmission barriers (such as walls and building material) and other factors. ⁹NTL Average System Uptime Tests, 2/00. Dell, the stylized E logo, E-Value, Dimension, Inspiron, Latitude, OptiPlex, PowerEdge and Dell Precision are trademarks of Dell Computer Corporation. Intel, Intel Inside, Pentium and Celeron are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. MS, Microsoft, Windows NT and Windows are registered trademarks of Microsoft Corporation. 3Com and Fast EtherLink are registered trademarks of 3Com Corporation. Trinitron is a registered trademark of Sony Corporation. Dell cannot be held responsible for errors in typography or photography. ©2001 Dell Computer Corporation. All rights reserved.

Dell recommends Windows 2000 Professional for business.



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Dell computers are available pre-loaded with Microsoft Windows 2000 Professional, which is over 13 times more reliable⁴² and up to 30 percent faster⁴³ than Windows 98. Add MS Windows 2000 to your Dimension desktop or Inspiron notebook for \$99.



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IS IT LIGHT OR IS IT POWERFUL? YES.



PC World's Top 15 Notebook PCs,
#1 Midrange Notebook
Dell™ Inspiron™ 4000
— March 2001

You would love to have the power of a super-fast Intel® Pentium® III processor along with loads of hard drive space in your notebook. At the same time, you'd enjoy nothing more than to be able to carry your notebook around without giving your shoulders a workout. Well, whether for work or personal use, treat yourself to the best of both worlds with a Dell™ Inspiron™ 4000, the ultimate balance of uncompromising performance and mobility. It's also fully customizable, all the way to the swappable color palm rests. So, does the Inspiron 4000 have everything you could want in a notebook? Yes.

DELL™ INSPIRON™ 4000

Mainstream Thin and Light Notebook

- Intel® Pentium® III Processor at 700MHz
- 14.1" XGA Display
- 64MB 100MHz SDRAM
- 6GB* Ultra ATA HD
- Modular 24X Max Variable CD-ROM
- 8MB ATI® Rage Mobility™ 128 3D* Video, 2X AGP
- 26.5Whr Li-Ion Battery w/ExpressCharge™ Technology
- Internal Mini-PCI 56K Capable* Modem
- MS® Office XP Small Business
- MS® Windows® Me
- 1-Yr Ltd Warranty*, 1-Yr Mail-in Service, 1-Yr Phone Tech Support

\$1399  **E-VALUE CODE**
03880-890713

BUSINESS LEASE: \$39/MO., 48 MOS.**

- Upgrade to Modular 8X CD-RW, add \$199
- Internal Mini-PCI Dell™ TrueMobile™ 1150 Wireless NIC† Card, add \$99



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Advice & Information

Strike Up the Band

DSL Reports

Despite its name, DSL Reports (www.dslreports.com) offers information about all types of broadband Net connections, including cable and satellite hookups. Drawing input from an active and opinionated community of users, the site guides you through the often grueling process of going high-speed. On hand are tools to tell you what types of broadband connections are available in your area; ISP reviews; and reader forums with advice for solving post-installation glitches. **Runner-Up:** For information specifically about high-speed cable connections, CableModemHelp (www.cablemodemhelp.com) has lots of tips on cable connections, but little info on individual providers. —Edward N. Albro

Pixel This

Megapixel.net

If your pictures are in pixels but they still look pitiful, check out Megapixel.net. This slick digital-imaging site offers tons

WORTH A THOUSAND PIXELS: Digital sharpshooters can submit their own shots to Megapixel.net or get info from the pros.



of content, including articles that explain such concepts as focal length and such techniques as adjusting a picture's color balance. The site posts four new digital camera reviews each month, with test images. You'll also find a glossary, reader forums, and free classifieds. The site doesn't assault you with blinking "Buy me now" buttons. **Runner-Up:** Steve's DigiCams (www.steves-digicams.com) also offers a glossary, camera reviews, and discussion forums. But the site looks like it was designed in 1997—an odd way to lure those interested in state-of-the-art imaging. —Alan Stafford

Game Room

GameSpy

The Web is perfect terrain for the insular world of PC gaming—and the best gaming sites aren't for casual fans. GameSpy (www.gamespy.com) is our pick, though it tends toward super-detailed articles, inside jokes, and a bit of juvenile humor. GameSpy also hosts a network of "planet" sites devoted to individual games ranging from Black & White to Unreal Tournament. Use the site's menu bar to browse other sites like Action Planet (for first-person shooter games) and File Planet (for patches, demos, and downloads). **Runner-Up:** IGNPC (pc.ign.com) has up-to-the-minute news, previews, and reviews. —Eric Dahl

Tech Time

Tom's Hardware

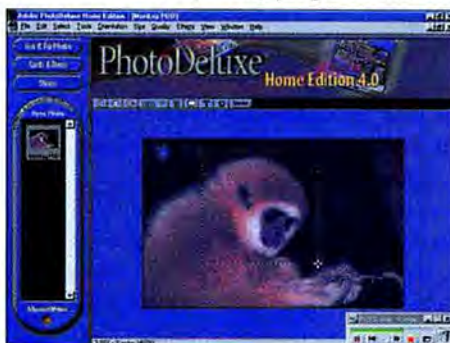
From motherboards to hard drives and all points between, Tom's Hardware (www.tomshardware.com) pushes PC parts to their limits and beyond. The staff has helped uncover CPU and chip-set bugs and has been the first to overclock new processors. For in-depth tests of motherboards, graphics cards, or RAM types, start

here. **Runner-Up:** AnandTech (www.anandtech.com) publishes insightful reviews of new CPUs, motherboards, and video cards. —Eric Dahl

Software News

BetaNews

Along with our own PCWorld.com, BetaNews (www.betanews.com) is one of the best sites for news and info about software, especially programs that are



SCHOOL'S IN: PC Show and Tell's detailed audiovisual tutorials, like this one for PhotoDeluxe, will push you to the head of the class.

still in beta. The site scours the market (such as Microsoft Developer Network) for news on upcoming software and offers free downloads of beta programs for unofficial testing. BetaNews also posts notes from companies searching for official beta testers. The download section includes programs for Windows, Linux, Macintosh, and Palm systems. **Runner-Up:** Woody's Watch (www.woodyswatch.com) offers Microsoft-centric newsletters and utilities, plus Woody's Palm Watch. You'll never find more thorough and (sometimes brutally) honest coverage. —Emru Townsend

Tech Reference

Webopedia

Technology is an ever-changing field, so you need a good reference guide to follow the latest terminology. Internet.com's Webopedia (www.webopedia.com) takes the prize for ease of use, depth of coverage, and comprehensible language. The hard-to-stump search engine offers clear definitions, together with links to terms within a definition that might require further explanation. ▶

tion. Category searches (covering areas such as wireless computing, multimedia, and microprocessors) and a list of related terms and links help with broader searches. **Runner-Up:** Though it lacks Webopedia's breadth, technology portal WhatIs.com lists categories and offers helpful article links. —Cameron Crouch

PC Rx

ExpertCity

Online technical support is getting harder to find, as sites offering free support disappear or abandon consumers for paying corporate customers. One site that still offers quick, efficient, reasonably priced help is ExpertCity (www.expertcity.com). The experts set their own fees (ranging from free to \$20 per question in our testing) and offer sound advice. The site includes a handy chat tool for interactive help sessions—especially useful for step-by-step instructions. If the steps get too complicated, you can call your expert on the phone. **Runner-Up:** Internet.com's cheery-looking VirtualDr (www.virtualdr.com) maintains a number of tutorials and busy discussion boards. —Yardena Arar

Digital Teachers

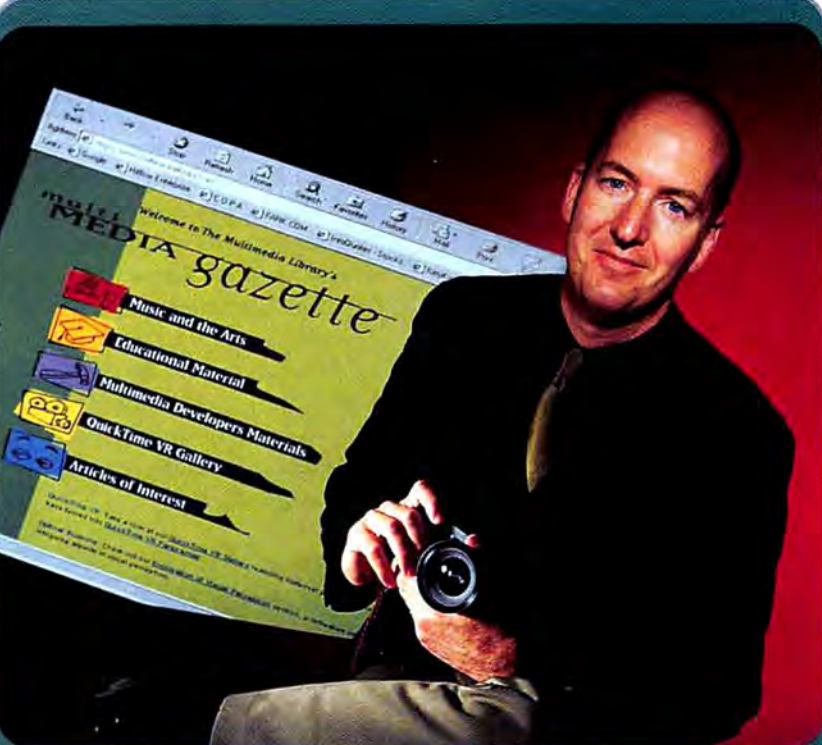
PC Show and Tell

Don't know how to change a formula in an Excel pivot table? PC Show and Tell (www.pcshowandtell.com) has streaming audiovisual tutorials covering thousands of tasks—everything from checking e-mail on AOL to enabling Java applets in FrontPage. A slightly creepy digital voice reads instructions while animated screen shots guide you through drop-down menus and command fields. A year's subscription costs \$30 and buys unlimited Web access. Or try the free 30-day trial membership. **Runner-Up:** EHow (www.ehow.com) provides answers for basic hardware questions, though the tutorials are unevenly detailed and the site lacks visuals. —Edward N. Albro

Web Designs 'R' Us

EarthwebDeveloper.com

Unless you have time on your hands, you should probably stay away from this



my top pick

Multimedia Library

Everyone's gotta have a hobby; mine is making QuickTime VR panoramas—360-degree digital images that you can spin with your mouse or magnify to view details. The Multimedia Library (www.multimedialibrary.com) is one of the best places to see these movies. It posts a QTVR movie of the week and supplies links to QTVR sites (offering virtual tours of Paris's Louvre museum, downtown Seattle, and even Mars), including ones containing tutorials for creating panoramas. —Alan Stafford

site. The wealth of resources for Web developers at EarthwebDeveloper.com (www.webdeveloper.earthweb.com) is overwhelming—ranging from the seemingly bottomless JavaScript library to the latest on CGI script security breaches. But what makes this site as sticky as flypaper is its collection of tools and tips for using JavaScript, HTML, CGI, Perl, Java, DHTML, and Active Server Pages. **Runner-Up:** WebReview.com is the online version of the respected Web design publication. It features style sheets, tools, and guides to design pages for specific browsers. —Dennis O'Reilly

Web Site Tips and Tools

Web Techniques

So you've posted a Web page, but now you've got no idea what to do with it? Web Techniques (www.webtechniques.com) will help you manage your creation, with articles, programming tutorials, product reviews, and insightful discussions of Web trends and issues. **Runner-Up:** The Software QA and Testing Resource Center's Web Tools section (www.softwareqatest.com/qatweb1.htm) has an incredible selection of free testing tools—to measure performance, for example. —Dennis O'Reilly ▶



Sends documents straight to the Web.

Self-diagnoses problems and helps you (or whomever you want) fix them.

Monitors supplies with hp smartprint supplies and notifies users when attention is needed.

Offers IT managers a simpler existence.

Comes disguised as a printer.

The new evolved printers from hp.

Suspiciously normal looking.





E-Commerce

Gavel Down

EBay

EBay (www.ebay.com) has long been synonymous with online auctions, despite competition from powerhouses like Yahoo and Amazon. Its 11 regional sites encourage international surfers to participate in an activity largely restricted in the past to U.S. residents. And unlike some of its competitors, EBay has the critical mass of users needed for a person-to-person marketplace to work. **Runner-Up:** EWanted (www.ewanted.com) puts a new spin on auctions: Buyers can post requests for items in the same way that sellers post their goods. —Emru Townsend

Cell Phone Plans

GetConnected.com

Choosing a cellular phone and service provider is an arduous chore. Fortunately, GetConnected.com helps you navigate the morass of pricing plans, service options, and phones with charts and shopping aids. Our favorite feature: Estimates of typical monthly bills for different plans based on the level of usage you forecast. The site also offers comparison-shopping sections for PDAs, satellite and cable TV services, and long-distance phone carriers. **Runner-Up:** Point.com has a good set of tools for cell phone shopping as well as articles about wireless services. —Yardena Arar

Consumer Advice

ConsumerSearch

Reading product reviews can be tedious, especially when it involves trying to make sense of divergent opinions. ConsumerSearch (www.consumersearch.com) simplifies this task. Pick any category, and you'll get detailed summaries of reviews from top magazines (including

PC World) and Web sites as well as a ranking of a reviewer's reliability; a breakdown of product features; and links to other resources. **Runner-Up:** Though not as thorough as ConsumerSearch, ReviewFinder (www.reviewfinder.com) casts a wider net for online reviews, and its editors sometimes write their own. —Emru Townsend

Buyer Beware

RatingWonders.com

You've found a great digital camera deal at an online store you've never heard of. Before you hand over your credit card number, get the lowdown on the ven-

dor's legitimacy. RatingWonders.com can provide an overall rating of the site or a department-by-department analysis that assesses everything from product selection to spelling and grammar. And if you decide to pass on the unknown supplier, RatingWonders.com can help you find another e-store based on the criteria you specify as most important. Customer comments and ratings provide insight into whether the store lives up to its promises. **Runner-Up:** BizRate.com's comparison-shopping tool lets you strike a balance between product price and store ratings. —Emru Townsend



my top pick

Kuro5hin

The New York Times is fine, but I want more from my information site. Throw the Times, The New Yorker, and the online magazine Salon.com into a blender; hit frappé; and you end up with Kuro5hin (www.kuro5hin.org). The site is a free-for-all of news and opinion written by readers—you're as likely to find a humorous discussion about listing "Jedi" as your religion on government census forms as a serious essay on using PC viruses to efficiently distribute security info. —Andrew Brandt

The new evolved printers from hp.



hp LaserJet 1220:

best choice for personal results | one-click color document image sending via e-mail | convert documents to digital with edit, store and manage abilities | send color images and documents to the web



hp LaserJet 2200:

optimum versatility for small work groups | includes web-enabled remote and print management | infrared port for wireless printing from mobile devices such as cell phones and PDAs



hp LaserJet 3200:

multiple equipment functions housed in single appliance | all-in-one printer, fax machine and color scanner with high-quality, professional output | increased connectivity options



hp LaserJet 4100:

evolved internet capability | includes web-enabled remote and print management | hp smartprint cartridge expands capabilities | offers sensor-enabled internet supply ordering | provides user assurance of job-length capabilities



hp LaserJet 9000:

sets a new performance standard in its class | includes web-enabled remote and print management | ideal for high-volume transaction printing applications

for more information on which printer best suits your office needs,
please visit www.hp.com/go/printers-us

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Build Your Own PC

NECX Direct

NECX Direct (www.necxdirect.com) sells everything you need to build a PC from scratch, and the site is well designed. You can usually reach a compact product listing in two clicks. From there, you can compare products or access detailed specs. Shipping costs are calculated automatically for the items in your shopping cart. **Runner-Up:** TC Computers (www.tccomputers.com) is less extensive but offers excellent prices and unique features like the Configurator, which lets you order all the parts for a custom-built PC in one interface. —Eric Dahl

Best Bot

My Simon

Most of us don't have time to hop from site to site ferreting out the best deal, so MySimon (www.mysimon.com) does the job for us. It's easy to use, and it tracks a large number of merchants (who pay a fee to be listed). The bot lets you reorganize listings—for example, by filtering out merchants that charge restocking fees. You can use customized menus to specify the product features you want. MySimon also includes merchant ratings by Gomez. **Runner-Up:** PriceGrabber.com lets you punch in your zip code to receive approximate shipping and tax charges with your product listing. (PriceGrabber.com provides prices and specs for PCWorld.com's Product Finder feature.) —Aoife McEvoy

ON CALL: Getconnected.com provides simple charts to help you choose the cell phone plan that suits your budget and your needs.



Downloads

Art to Go

ArtToday

The Web is bursting with free clip art. So why are we recommending a fee-based site? Quantity and usability. ArtToday (www.arttoday.com) has thousands of illustrations, photos, and Web animations. Keyword searching simplifies finding the art you seek—be it a cartoon kangaroo or a portrait of Einstein. ArtToday is free for three days; after that, it's \$30 a year (for access to some 870,000 items) or \$100 (over 1.2 million items).

Runner-Up: Ansel Adams photos, New Yorker cartoons, and other classy content make Corbis (www.corbis.com) the Rolls-Royce of art sites—but its per-item prices start at \$3 for home use and \$8 for businesses. —Harry McCracken

Downloads

Download.com

We're naturally biased toward our own download section at www.pcworld.com/downloads, which has a large library of carefully selected files. But to keep things fair, we excluded ourselves and went for the site with the greatest breadth—Download.com at CNet (download.cnet.com). The site has files for Windows, Windows

CE, DOS, Palm, Macintosh, Linux, and even BeOS. **Runner-Up:** Software.com offers a clean layout and fast searches; however, the site's selection is small.

—Emru Townsend

Palms Down

Tucows

With vast libraries of software downloads for

virtually any PDA, Tucows (pda.tucows.com/index.html) is a winner. And an array of local mirror sites in almost every state and country significantly decreases download times. **Runner-Up:** PalmGear.com hosts an extensive collection of Palm OS software, news, tips, and forums. —Michael S. Lasky

Music Downloads

Artist Direct

Napster may get all the press, but nothing outclasses Artist Direct (www.artistdirect.com) for atmosphere. The music site



PALMWARE: No other site beats Tucows for the number of PDA software downloads. And local mirror sites reduce download times.

features band information, links to official and fan Web sites, discographies, and legal free downloads (from artists such as Black Crowes and Sophie B. Hawkins). This site is a treasure trove for new discoveries. **Runner-Up:** With a straightforward home-page design reminiscent of Yahoo, MP3.com is another great place to find new and unsigned musical talent. —Emru Townsend

Software Tune-Ups

Tech Tracker

TechTracker (www.techtracker.com) is a collection of sites that monitor application and driver updates for Windows and Palm operating systems. The site's WindowsTracker.com lists 7000 applications and drivers, while PalmTracker.com catalogs close to 2000 apps. **Runners-Up:** DriversHQ (www.drivershq.com) and WinDrivers.com list more drivers than TechTracker does, but no applications. WinDrivers.com, however, lists Linux drivers. —Alan Stafford ■



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INTRODUCING *Peerless*: UP TO 20GB OF REMOVABLE STORAGE.

It's fast (up to 15MB per second with FireWire®).

It's portable (take it between home and work).

It's spacious (can back up an entire hard drive).

It's flexible (USB and FireWire® compatible).

It's Peerless.



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The company that practically invented removable digital storage has done it again—in a very big way.

Introducing Peerless; the groundbreaking storage solution from iomega. This sleek magnetic drive is super-fast, with transfer rates up to 15 MB/sec (with FireWire®). Compact and portable, the disk slides into a base station only slightly larger than the disk itself. In fact, the whole system fits in the palm of your hand. And Peerless is the first, true high-capacity removable storage medium with cartridges available in 10 or 20 Gigabyte configurations. That's right. Gigabytes. Adding extra space has never been easier.

Peerless offers modular interchangeable connectivity, so you can switch between FireWire® and USB computer interfaces. And Peerless is tough. A built-in shock-absorption system protects against drops up to 30 inches—just in case. Plus, it features an exclusive design that keeps the read/write heads secure from crashes and sealed away from dust and other contamination.

With Peerless, you can back up an entire computer on a single disk. It's powerful enough to store all your files, fast enough to run applications straight from the drive, and versatile enough to go anywhere you do. The system also comes with migration, backup, synchronization, video editing, and music management software.

Basically, Peerless offers all the space you need in one incredible, compact drive. It's the next big thing in removable digital storage. Would you expect anything less from iomega?

Complete system (includes base, 1 disk, software, cables, interface module, power supply and protective case for disk):

\$359.95—10GB

\$399.95—20GB

Available separately:

10GB Disks—\$159.95

20GB Disks—\$199.95

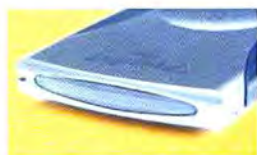
USB interface module—\$69.95

FireWire® interface module—\$89.95

Base station and interface module of your choice—\$249.95



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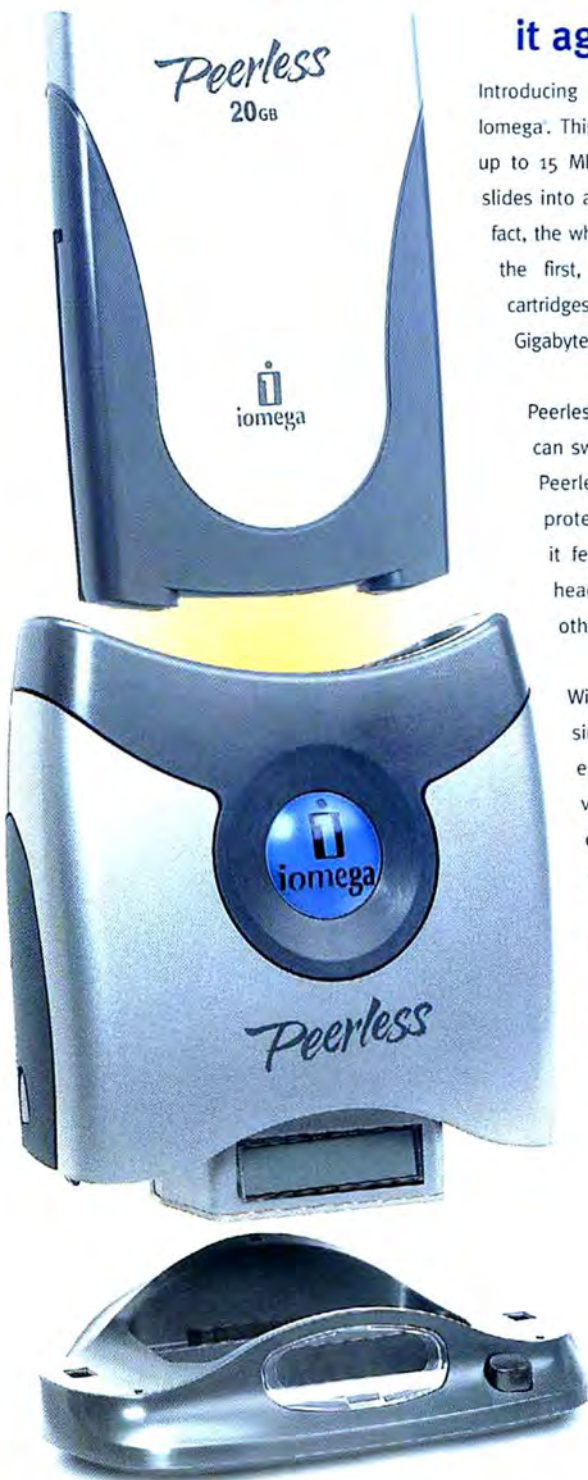
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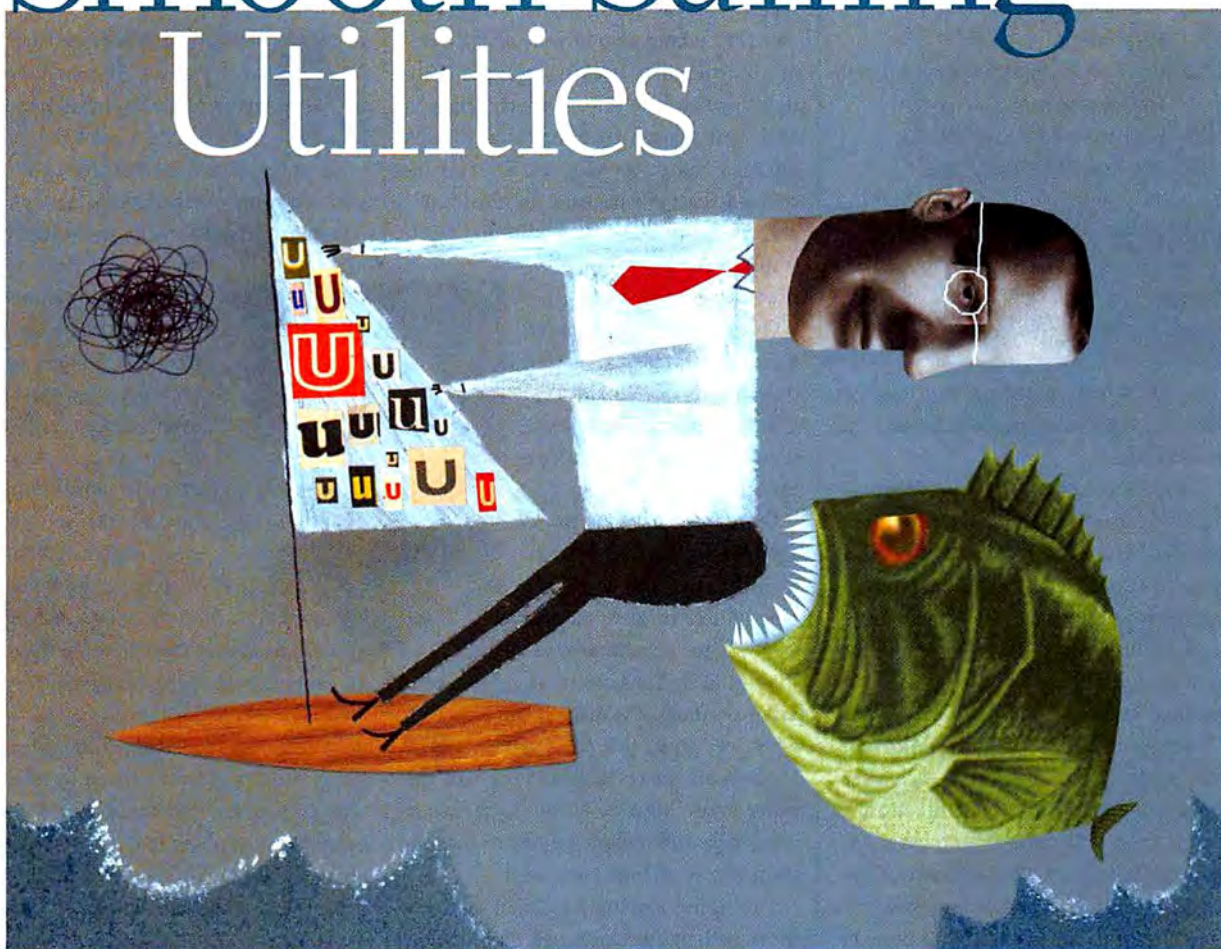
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Smooth-Sailing Utilities



Lots of packages claim to keep your PC running trouble-free. Here's the scoop on which ones really do the job.

BY LINCOLN SPECTOR

ONCE UPON A TIME (when PCs first got hard drives), people needed to be able to recover accidentally deleted files—so they bought programs like Norton Utilities. They also needed to scan their drives for errors and defragment their files. Today anyone can retrieve files from Windows' Recycling Bin, and the operating system has its own disk maintenance tools; increasingly, the features that used to require a separate program are being included in Windows. But companies continue to produce utilities, claiming that they are faster or better than the ones built into Windows.

It's a fact of modern life that computers have problems. Installing a new program can trash your operating system, and without regular maintenance the files on your hard ►

Sections

- 105 Diagnostics and Registry Cleanup
- 105 Scanning, Defragmenting, and Partitioning
- 112 Program Removal, File Cleanup, and File Management
- 113 Registry and Partition Backup
- 115 Antivirus and Privacy Tools



Get demo versions of all of the utility suites reviewed in this article from PCWorld.com's Downloads, at www.pcworld.com/downloads.

drive can get so mixed up that they get strewn across it, slowing down saving and reading data.

A good suite of utilities can diagnose and fix the conflicts and flaws in your system, maintain the health of your hard drive, and help you organize your files. Ineffective utilities can waste your time, and bad utilities can leave your computer in worse condition than before you installed them.

To test the claims of utility suite vendors, we looked at four suites, each offering a somewhat different collection of tools: Iolo's System Mechanic 3.6, McAfee Utilities 4, Ontrack's SystemSuite 3, and Symantec's Norton SystemWorks 2001 Professional Edition. We skipped a fifth package, Ultra WinCleaner Utility Suite (www.wincleaner.com), because the new version wasn't ready in time for our review (it is scheduled for release in September). Since you may need functions that the utility suites don't offer, we also looked at a selection of stand-alone utilities, including Smith Micro's CheckIt

Utilities, PowerQuest's PartitionMagic, and Vcom's DriveWorks.

We put the suites and the stand-alone programs through five common tasks: diagnosing and fixing what's wrong with your PC, taking care of your disks, managing your files, backing up your Windows environment, and protecting you and your system from external threats such as computer viruses. We recommend at least one package for most tasks, and when Windows' own built-in utility is the best choice, we note that as well.

Our conclusions are based on in-depth testing carried out by the PC World Test Center and our experience using the programs on a variety of PCs.

Of the four major packages, Ontrack's \$50 SystemSuite turned out to be the best choice in most categories, was easy to use, and proved reliable.

McAfee Utilities has more modest ambitions—most obviously, it lacks an antivirus program (McAfee sells McAfee VirusScan separately for \$30). On the other hand, McAfee Utilities costs only about \$30 and includes many of the features that most users will need.

The name Norton has been synonymous with utilities for nearly two decades, so at first glance, Symantec's Norton SystemWorks 2001 Professional Edition should be the leading program. SystemWorks 2001 Professional's collection of tools would seem to be worth its \$80 street price (Symantec also sells a version without the partition backup and fax components at a street price of \$55).

Ontrack's SystemSuite 3



NO SUITE DOES everything, and what they do they don't always do perfectly. But Ontrack's \$50 SystemSuite 3 came out on top in six of our categories and offers the best overall mixture of functionality, ease of use, dependability, and price. It's the best suite of

the bunch if you want to diagnose hardware problems or back up the Registry, thanks to its excellent diagnostics and maintenance tools. Nothing beats this package come spring-cleaning time, whether you want to clean out your hard drive or tidy up the Registry.

And the final touch is the bundled PowerDesk Pro, the file manager to beat all file managers.



But features aren't everything. Many of the Norton programs proved unreliable, with crashes and other odd behavior; you can read more about one person's experiences in "When Utilities Attack" on page 111. And some of the features of SystemWorks 2001—such as Registry Tracker and Norton Diagnostics—can't be used under Windows 2000.

Iolo's System Mechanic is even more modest than McAfee, lacking not only an antivirus utility but also disk-care and system file backup features. Unfortunately, the \$60 System Mechanic also lacks McAfee's modest price.

UTILITY SUITE

FEATURES COMPARISON

SUITE	Street price (5/5/01)	Hardware diagnostics	Registry cleanup	Disk scanning	Disk defragmenting	Program removal	File cleanup	File management/archiving	Registry backup	Partition backup	Virus protection
Iolo System Mechanic 3.6 877/239-4656 www.iolo.com	\$60	○	●	○	○	●	●	●	○	○	○
McAfee Utilities 4 800/492-2626 www.mcafee-at-home.com	\$30	●	●	●	●	○	●	●	●	○	○
Ontrack SystemSuite 3 800/872-2599 www.ontrack.com	\$50	●	●	●	●	●	●	●	●	○	●
Symantec Norton SystemWorks 2001 Professional Edition 800/441-7234 www.symantec.com	\$80	●	●	●	●	●	●	○	●	●	●



Best Buy

● Yes ○ No

Keep Your System Running

MODERN COMPUTERS, operating systems, and programs are so complicated that they often crash, leaving a potentially damaged system and all sorts of rubbish lying around your hard drive. A good diagnostic program and Registry cleaner can do wonders in identifying problems on your system and making sure that everything is in working order.

DIAGNOSTICS

RECOMMENDED: Smith Micro's CheckIt Utilities, Ontrack SystemSuite 3, McAfee 4 Utilities

THE FIRST THING you see when you load Symantec's Norton SystemWorks or Ontrack's SystemSuite is a one-click option to give your system a quick physical. Either of these checkups is worth doing, but neither should be your only diagnostic tool.

SystemSuite's PC Diagnostics offers the most thorough set of tests, allowing you to find problems in the hardware of your system (such as a so-called butterfly-seek test of drive A: that tests the drive motors, as well as polygon drawing by the video card). Some of these tests take hours, and others require user interaction, so you need to carefully consider which ones you'll run if you don't just go with the defaults. However, the default settings should be adequate for most users.

McAfee Utilities' First Aid isn't as thorough as SystemSuite's program, but it's friendlier. In fact, it opens up with a nice drawing of a computer sitting on a desk. If you want to test, say, your video card and monitor, you click on the monitor image.

Norton SystemWorks Professional offers neither Ontrack SystemSuite's extensive testing options nor McAfee's visual panache, although it does have some basic diagnostic tools in the form of Norton Diagnostics. System Mechanic doesn't include a diagnostic module.

For a better hardware diagnostic program than those in any of the suites, consider Smith Micro's \$50 CheckIt Utilities (www.checkit.com). As with SystemSuite, the tests are extensive, thorough, and completely under your control. CheckIt can even keep a history of your hardware configuration and benchmark results. Then, after you've fiddled with your settings and fixed any problems, you can compare how your system is doing now to how it was performing when you took the baseline measurement.

CheckIt can also give you advice. You select problems like "I added a new adapter card to my computer and now it doesn't work" or "My printer is printing strange characters and symbols" and get a list of possible solutions.

REGISTRY CLEANUP

RECOMMENDED: Symantec's Norton SystemWorks 2001 Professional Edition, Ontrack SystemSuite 3

NOT ALL PROBLEMS are hardware related. Glitches in the Registry (where Windows and your programs store their settings) can cause all sorts of conflicts. That's why you need a Registry cleaner—a program that examines your Windows Registry, lists problems, and (with your permission) fixes them. Microsoft also provides a free, bare-bones Registry cleaner program called RegClean that performs many of the functions of the suites but is

much less user friendly—for instance, it doesn't show you which Registry entries it is going to remove before deleting them. Download this from www.pcworld.com/aug2001/downloads/regclean.

All four suites come with Registry cleaners, and they all work reasonably well, although none will solve every Registry-based problem you might have. These programs tend to err on the side of caution, as deleting the wrong item in the Registry could seriously damage Windows. Even so, you should use them only after you do a full backup of your Registry.

Of the four, SystemWorks Professional and SystemSuite stand out as the best. Norton WinDoctor in Symantec SystemWorks Professional wins particular kudos for automatically backing up the Registry before scanning it—an obvious precaution that no other suite takes, although all can back up the Registry on request.

Ontrack SystemSuite's RegistryFixer was the easiest to use for examining problems and selecting a solution. When more than one solution is possible, RegistryFixer lets you select the solution you want to try from a handy drop-down menu.

Hard Drive Care and Feeding

HARD DRIVES need attention. They need to be scanned regularly for file-structure errors and bad sectors. They also need to be defragmented occasionally, to reunite files that have been split across different sectors.

Current versions of Windows come with perfectly good tools for both these jobs, but three of the four suites here offer scanners and defraggers that are faster or more flexible than the ones in Windows. But none of these suites improves upon Windows enough to make drive care alone worth the price of a utility suite.

SCANNING

RECOMMENDED: McAfee Utilities 4, Symantec's Norton SystemWorks 2001 Professional Edition, Ontrack SystemSuite 3

A DRIVE SCANNER looks for lost clusters (sections of the disk that contain data not associated with any file), cross-linked files (two files that have been assigned the same clusters of data), and other ►

E-mail virus scanning	Privacy tools	Other features	Comments
○	●	StartUp boot profile manager, NetBooster network optimizer	Some interesting tools, but missing many of the major features a typical user would need.
○	●	Crash Protector, McAfee Task-Master boot profile manager	A good selection of powerful tools at an attractive price, but no antivirus protection.
○	●	CrashProof crash protector, rescue disk	Our Best Buy offers a comprehensive selection of features at an attractive price.
●	●	Fax software, continuous background monitoring	Plenty of features, including the only drive imaging program, but it's expensive and its quality is uneven.

errors in your file and directory structure. If you don't mind waiting a while (sometimes hours), a scanner will physically test the surface of your disk, looking for spots that are in danger of going or have already gone bad.

McAfee Utilities, Symantec's Norton SystemWorks, and Ontrack SystemSuite all come with drive scanners that are nearly identical in function, and all seem better than ScanDisk, the one built into Windows. They can do more thorough (and therefore slower) physical tests, and check parts of the disk that ScanDisk skips, such as the partition table.

DEFRAGMENTING

RECOMMENDED: McAfee Utilities 4, Ontrack SystemSuite 3

AS YOU CREATE, modify, and delete files, their clusters get out of sequence—resulting in slower reads and writes. Defragging your disk puts each file's clusters in sequence and arranges your files or programs for faster access.

Windows comes with its own Disk Defragmenter, which McAfee Utilities, Norton SystemWorks, and Ontrack SystemSuite all try to improve on.

McAfee's DiskTune did the best job, providing the best defragger overall. It ran

Solo or Suite?

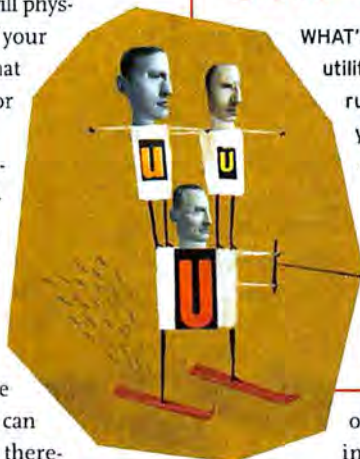
WHAT'S THE BEST way to fill your utility needs and keep your PC running smoothly? Should you buy an all-in-one suite or several stand-alone products? Neither solution is satisfactory.

No single suite can completely satisfy everyone's utility needs, but building a collection of

stand-alone utilities would be far more expensive than buying a suite.

Your best bet is to buy a good suite and then augment it with any additional utilities that you need. If you get McAfee Utilities, for instance, you should definitely invest in an additional antivirus program. You might also consider a full partition backup program, such as Drive Image.

Obviously, you don't want to break the bank buying utilities. Ask yourself what features you need most of all, and make your choices accordingly.



our tests smoothly, and in most of our tests, it proved faster than the competition, although all of the products took several hours to defragment the data on our test system (a Dell PC with a Pentium III 600-MHz processor, 128MB of RAM, and a 28GB drive with 7GB of data). SystemSuite's JetDefrag is another good choice—not as fast as McAfee, but faster than SystemWorks or Windows.

However, both Symantec's SpeedDisk and Windows' Disk Defragmenter had a serious problem: They were plagued by constant restarts, making it difficult to complete our tests. After some investigation, we found that the problem was with the Windows swap file, which is used to store virtual memory. As the defragging program ran, it used more memory, causing the swap file to grow, which in turn

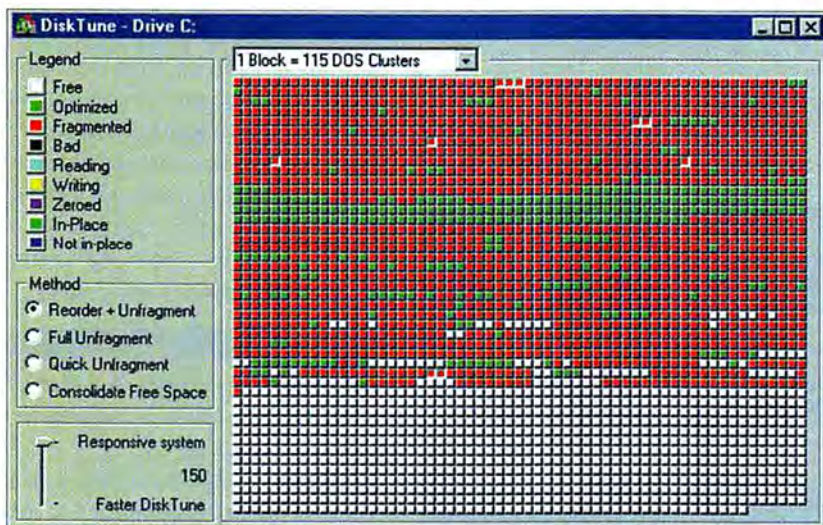
caused the defragger to restart because the contents of the disk had changed. Symantec recommended that we change the virtual memory settings to stop the swap file from growing, as detailed in the SystemWorks readme file (but not in the manual). But even with this fix, Norton's defrag took several times longer than the defraggers bundled with the other suites. Symantec claims that it is working on a patch to deal with this problem, but it was not available to test at the time of writing.

All defraggers have this restart problem to some degree, and if another program writes something to disk during the defragging process, that too can force the defragging program to restart. It seems to make sense, therefore, to have no other program running when a defrag is in progress. However, on our test system, SystemWorks was the only program to display this problem.


McAfee Utilities has another program, ActiveTune, which defrags in the background by saving data in parts of the drive where it won't get fragmented. In our informal tests, Active Tune didn't affect performance one way or another, although it may be that it takes a long time (and a lot of writing to and reading the disk) to make a difference.

PARTITIONING

RECOMMENDED: DriveWorks, PartitionMagic
SOME PEOPLE prefer to work with their hard disk set up as one large space; others like to partition and organize their disk into multiple logical drives, each with its own drive letter. A partition manager lets you create, resize, and move partitions on the hard drive—without disturbing



McAfee's DiskTune, like most disk defragmenters, provides a visual representation of the defragmentation process by mapping the data on the disk in color.

A warm, close-up photograph of a family enjoying a meal. In the foreground, a young boy with short brown hair is focused on eating a slice of pie topped with fruit. He has some fruit smeared on his chin. Behind him, a man and a woman are also eating, their faces partially visible in profile. The scene is dimly lit, creating a cozy, intimate atmosphere. The text "More of what you're hungry for." is superimposed in the upper left area.

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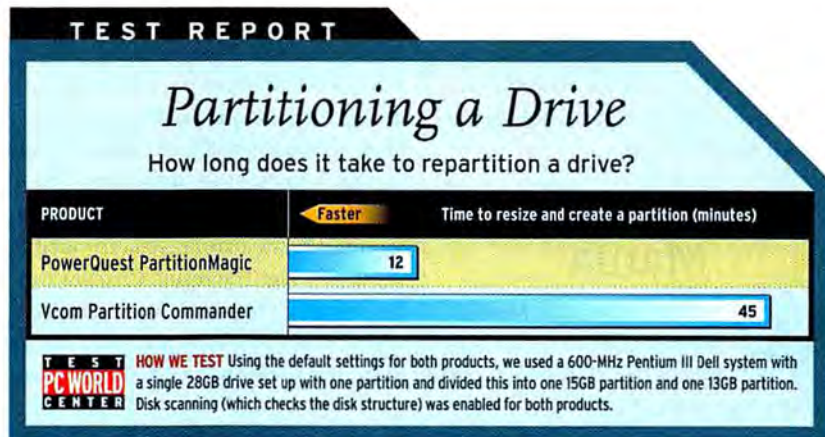
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the data. As such, it's one of the utilities we recommend for every power user who wants to take control of their drives.

None of the utility suites reviewed here offers a partition manager. Windows includes the fdisk utility for partitioning, but using it will delete every existing file on the hard drive—so you must back up your data first and reinstall the OS, your apps, and your data after partitioning. If you want to manage partitions without disturbing data (although you should always back up anything you can't replace before making any changes), you need to buy another program for the job.

We looked at two partitioning programs, PowerQuest's PartitionMagic (\$55, www.powerquest.com) and Vcom's DriveWorks (\$57, www.vcom.com).

PartitionMagic is the more powerful of the two programs. For one thing, it's faster, resizing an existing partition in a little more than a quarter of the time DriveWorks took. It does other tricks as well, such as password-protecting partitions and converting them between dif-



ferent file systems. It even comes with an extra program that helps installed applications adjust to the new drive-letter mapping that comes with partitioning.

Managing partitions—at least managing a partition you're using—is one of those jobs that can't be done from inside a multitasking environment like Windows. Nevertheless, PartitionMagic is a Windows program. How does it do its tricks? Simple. You tell it what changes you want to make, click a button, and it exits Win-

dows, changes the partition, and reboots back into Windows.

DriveWorks costs about as much as PartitionMagic, but lacks such features as password protection and the ability to switch between multiple OSes on the same PC. So why even consider it? Because it's four utilities (disk partitioning, disk imaging, disk copying, and secure erasing of partitions) for the same price as PartitionMagic. In addition to managing partitions, DriveWorks backs them up ▶

When Utilities Attack

WHEN UTILITY SUITES go bad, watch out. Ironically, you might buy one of these programs to back up your vital system files, only to wish you had made such a backup before you installed it.

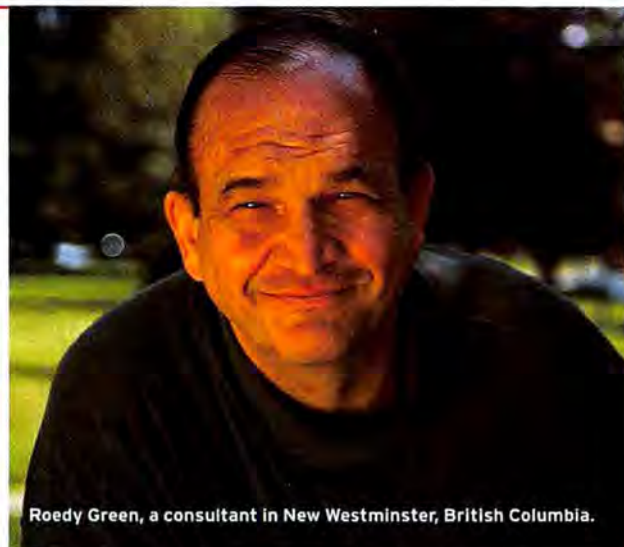
Consider the case of Roedy Green, a consultant in New Westminster, British Columbia. Green had been a fan of Norton Utilities and Norton SystemWorks for years, but when he installed SystemWorks 2001 on his Windows NT machine, what followed was a nightmare. The first time around, the installation proceeded without a hitch. Then, Green says, when he tried to run the program a second time, "nothing happened."

So he tried uninstalling, then reinstalling it. But now the program wouldn't install. Nor would it uninstall. "I tried maybe 10 or 20 times to uninstall it. I just

couldn't believe that this thing wouldn't work." He eventually succeeded in getting SystemWorks installed. But first he had to manually remove every reference to Symantec from the Registry, then delete every Symantec.dll file.

WINDOCTOR AND OFFICE 2000 DON'T MIX

HE HAS since managed to get SystemWorks running, but he is still having headaches with clients using it. For instance, under Windows 2000, the SystemWorks component WinDoctor reports a large number of problems if Office 2000 is installed. "Symantec admits that [WinDoctor] does this, and they say it's Office 2000's fault because it has a funny way of installing itself. Their suggestion was to tell WinDoctor to ignore



Roedy Green, a consultant in New Westminster, British Columbia.

these errors, which is an odd way to deal with this problem."

He has also encountered the same problems with the Symantec disk defrager that our tests found: "It kept restarting. I couldn't track down what it is that makes it keep restarting. One thing I did find that was causing it was LiveUpdate, [Symantec's] own updater appli-

cation, which is rather embarrassing for them."

But Green still uses the program and will probably buy the next version as well. "I will certainly have a look at it, because they might have listened to my complaints. I think the problem (with this version) was testing, and pushing the product out to market before it was ready."

(see "Preserve Your Windows Setup" on page 113). To get both partition management and backup from PowerQuest, you'd have to buy the \$70 Drive Image as well as PartitionMagic.

Avoiding File Mania

WINDOWS HAS a nasty habit of littering your disk with junk files when it crashes, and many programs can leave files behind when you uninstall them. And unless your own work habits are absolutely perfect, you might lose track of your own files too. That's why you need help cleaning out unnecessary files, organizing the necessary ones, and archiving those you want to put away for a while. Iolo's System Mechanic has the best tools for finding files suitable for deletion, but Ontrack's SystemSuite has other file management tricks up its sleeve.

However, there's one job at which all the suites we looked at fail miserably: uninstalling applications.

PROGRAM REMOVAL

RECOMMENDED: Windows

MOST WINDOWS applications extend tentacles deep into the operating system and never let go: They put files into various directories, stick stuff into the Registry, and even deposit files in the Windows folder. These same applications come with uninstall programs that don't always remove all those tentacles. Windows' own Install/Uninstall utility, which you can access from Add/Remove Programs in Windows' Control Panel, simply launches the applications' own uninstallers.

Both Symantec's Norton SystemWorks 2001 Professional and Ontrack's SystemSuite come with more ambitious uninstaller programs, called CleanSweep and EasyUninstall, respectively, that are supposed to do a better job of removing any application. There are two approaches to this task: monitoring the installation (which CleanSweep and EasyUninstall do) or keeping an eye on any and all new files that are added to the system during

an installation (which only EasyUninstall does). Our tests showed disappointing results with monitoring an installation because of the way the monitoring works. Many modern installers actually do nothing but launch other programs. These alter your system while the uninstaller is monitoring the main installer, which is doing nothing. The result: Changes happen but aren't recorded. We ran our tests several times to ensure accuracy, but we found that CleanSweep did not work consistently: On the same machine with exactly the same data on the drive, it monitored the installation of Adobe Photoshop once, then failed to monitor it the second time. SystemSuite's EasyUninstall also failed to note that any changes had been made when we installed Photoshop.

EasyUninstall also had problems when we tried monitoring changes to the system. It monitored the installation of another program without incident, but when we tried removing that program, EasyUninstall crashed and then made the machine unbootable because it had deleted several key files, even though it was supposed to protect such files.

Both Ontrack and Symantec admitted that there are issues with their uninstallers, but they were unable to provide us with solutions. Basically, modern installation programs are too complex for uninstalling utilities to deal with. We advise you to stick with the uninstallation routine recommended by the program's vendor and not use these uninstallers, because they don't work.

Skipping the Shrink-Wrap

DON'T WANT to buy and install a utility suite? You can get many of the same benefits these days through online services.

McAfee.com provides the most comprehensive online utilities service. For a yearly subscription, it offers extensive diagnostics and

system optimization and protection tools. McAfee.com's services include virus scanning—whether you're connected to the Internet or not—a performance optimizer, advice on configuring Windows, an uninstaller, and a tool for recovering damaged files. Most of these online services are based on the same code that underlies McAfee Utilities.

But Web-based utility services have their own problems. Despite claims that McAfee.com works with Internet Explorer 4.0 and higher, many of its features refused to work when we tried them with Internet Explorer 5.0. The problem was fixed when we upgraded, on McAfee's recommendation, to Internet Explorer 5.5.

Ironically, one of the features we could not test until we upgraded the browser was Oil Change, a tool for upgrading your software to the latest versions available.

Oil Change is one of several Web-based upgrade aids. These sites scan your hard drive for programs, and then tell you what updates are available for your applications. They also give you information to help you decide if the changes are worthwhile, and provide links for downloading the necessary files.

Oil Change charges \$19.95 a year for its services. Two of the site's competitors, Catchup.com and Norton Web Services (nortonweb.zdnet.com), are free. (Both Catchup.com and Norton Web Services are operated by CNet Networks, a PC World competitor.)

Both Norton SystemWorks and Ontrack SystemSuite, by the way, try to pass off a free online application updating tool as a feature you've paid for. SystemWorks has a link to Norton Web Services, and SystemSuite points you to updates.com. But both of these services are free, whether or not you've purchased a suite.



FILE CLEANUP

RECOMMENDED: Iolo System Mechanic 3.6

NORTON SYSTEMWORKS' CleanSweep and Ontrack SystemSuite's EasyUninstall aren't totally worthless, since they do another job very well: cleaning out unnecessary files. System Mechanic and McAfee Utilities can also do this.

But Iolo's System Mechanic has the best file cleaner, making it the one job this suite excels at. You can search for duplicate or obsolete files—and you can easily define just what an obsolete file is. You can limit the search by file extension, date, or location. Once System Mechanic finds the files, you can delete them or move them to a different location, such as another folder, partition, or drive.

By contrast, McAfee Utilities offers only a slimmed-down version of the company's separately sold uninstaller and cleanup program, McAfee QuickClean. This simple program is easy to use but doesn't offer much control. It gives you the option to shred your unwanted files so they can't be recovered, but not to store them elsewhere—a far more practical choice for most people.

The capabilities of Symantec's SystemWorks Professional and of Ontrack SystemSuite fall in between these extremes. They each have a quick, easy cleanup tool similar to McAfee's, plus a more substantial program that lets you filter your search. But neither of these programs is as flexible as System Mechanic.

FILE MANAGEMENT

RECOMMENDED: Ontrack SystemSuite 3

ONTRACK'S SYSTEMSUITE offers two neat file management tools—one major, one minor. The minor one, Size Manager, can display your drive as a bar graph, showing just how much room each folder and its subfolders are taking.

The major one is PowerDesk 4 Pro (which is also available separately for about \$20). PowerDesk is the file manager that Windows Explorer should have been. It lets you view, copy, and print the contents of just about any file; easily upload and download files using the Internet's FTP protocol; and copy and move files to folders that aren't currently visible.

In addition to PowerDesk, SystemSuite offers Zip Tools, a very robust program

TEST REPORT

Drive Imaging

How long does it take to save and restore a drive image?

PRODUCT	Faster	Time to create image (minutes)	Faster	Time to restore image (minutes)
Norton SystemWorks 2001		76		44
Vcom DriveWorks		136		53
PowerQuest Drive Image		44		26



HOW WE TEST We saved an image of an entire partition containing approximately 8GB of data (including programs, MP3s, and other files) to another partition on the same drive, and then restored this data to the original partition. Tests were run on a 600-MHz Pentium III Dell system with 128MB of RAM and running Windows Me.

that extends PowerDesk's compression features with tricks like zipping files and attaching them to e-mail, zipping files in Windows Explorer with a single mouse click, and backing up your documents.

McAfee's similar Zip Manager also integrates with Windows Explorer. It's a decent, basic tool similar to WinZip.

Preserve Your Windows Setup

IT'S ALL TOO EASY to break Windows and create problems that don't go away with a reboot. Run a buggy program or change your configuration, and—boom!—your CD-ROM drive won't work. Or Windows won't boot at all.

System meltdowns are why you need ways to back up and restore the key files of your Windows configuration. Or for the ultimate in protection, you might want to

back up your entire partition or hard drive so you can easily restore it.

REGISTRY BACKUP

RECOMMENDED: Windows Millennium Edition, Ontrack SystemSuite 3

THREE OF THE four suites (but not Iolo's System Mechanic) have tools that can take a "snapshot" of the Windows Registry and other important system files, and then restore these files from the snapshot. So does Windows Millennium Edition.

The System Restore feature of Windows Me takes snapshots of the Registry and other files at regular intervals, and at your request. If Windows is so broken it won't boot, you can restore the files from Win Me's Emergency Boot Disk. If you have Windows Me, you don't need to buy another program just for this purpose.

McAfee Utilities, Norton SystemWorks, and Ontrack SystemSuite all come

SYMANTEC'S NORTON SYSTEMWORKS 2001 Professional Edition provides a convenient entry screen for accessing the suite's extensive set of utilities.

with their own Registry backup programs. If you don't have Windows Me, use one of them. Besides, if you're using a suite to clean and tune up your Registry, it's handy (and a good idea) to use the Registry backup that's at your fingertips before you start modifying.

SystemSuite's SystemSaver is the best of the lot. It's simple and straightforward to use, and it offers the option to save your backups as .zip archives. Best of all, you control which files and settings you want to back up. If you decide, for instance, that the structure of your Start menu is worth saving, you can keep it.

McAfee's Registry Wizard performs decent, uncomplicated Registry backups and restores (as well as Registry cleanup). But the program lacks SystemSuite's versatility. It's also way too easy to inadvertently overwrite one backup with another.

Norton Registry Tracker is far more ambitious than the others. It's also far more complex and confusing, and this means that it is not as effective.

By default, Registry Tracker doesn't track the entire Registry. If you don't go in and fiddle with the settings, you may discover that you didn't back up the right part of the Registry until it's too late. Registry Tracker is also not installed if your OS is Windows 2000: As with several other components of Norton Utilities, Symantec did not update this tool for Windows 2000.

PARTITION BACKUP

RECOMMENDED: Vcom DriveWorks

ULTIMATELY, THERE'S no protection like full protection. A partition backup program makes a copy of your entire partition, or your entire drive, including every file and setting. You can then return everything to exactly the condition it was in when you made the copy—data, programs, Windows, the works.

Of course, that kind of backup can take a lot of time and disk space. And like par-

ately, and it's not part of the \$55 truncated version, SystemWorks 2001.

Unfortunately, Ghost is not friendly; in fact, its terminology may scare some users. If you tell Ghost to back up your hard drive, the utility asks if you want to "proceed with partition dump." A dump is the last place we'd want to put our files. And if your "dump" is larger than 2GB, you'll be requested to "Insert Next Media" even if you're backing up to a hard drive with plenty of room. Ghost also has the minimal interface you'd expect in a program aimed at computing professionals.

What's worse, we found Ghost occasionally unreliable. Although it usually performed our tests without problems, sometimes a restored partition was unbootable because of missing or corrupted

files, and we couldn't start the PC using the bootable CD-Rs Ghost created during a backup. Even with Symantec's assistance, we could not fix these glitches.

PowerQuest's \$70 Drive Image worked through all of our tests without fuss, and the files were always restored. Our tests also showed Drive Image to be nearly twice as fast as Ghost in all operations.

Drive Image is easier to use than Ghost, although it too is more suitable for users with some experience. The on-screen commands are clear and understandable, but the program's error messages tell you nothing and are horribly documented.

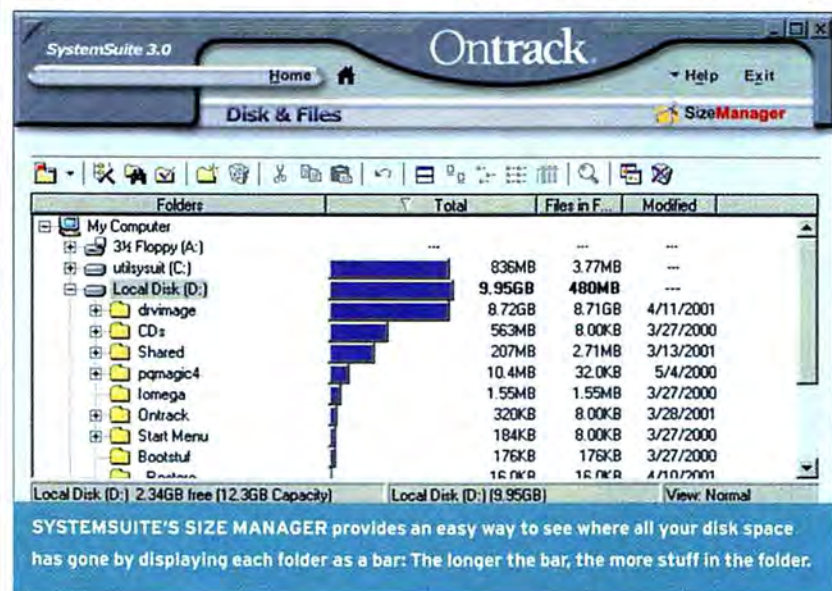
On the other hand, Vcom has made its partition backup program as easy to use as its partition manager. But that's because DriveWorks does both backup and partitioning. DriveWorks may not run within Windows, but it looks like Windows. And you can resize a partition or back it up from the same Start button, making life easier if you want to do a backup before you change anything.

But the low cost of DriveWorks (\$57, compared with the cost of PartitionMagic and Drive Image combined) has its trade-offs. DriveWorks lacks Ghost's and Drive Image's functionality. For instance, it cannot write to a CD-R or CD-RW disc, and it can't restore an individual file from a backup. And DriveWorks is even slower than Ghost. However, DriveWorks'

Norton Registry Tracker is far more ambitious than the others. It's also far more complex and confusing, and this means that it is not as effective.

tion management, partition backup can't be done within Windows: All partition backup programs must be the only application running, so you have to exit Windows to do the backup. A partition restore should also be approached with some caution: You can't do just a partial restore of a partition. Although Norton Ghost and PowerQuest's Drive Image do allow you to restore individual files from a partition backup, if you restore an entire partition, every change made since the backup was done will be irreversibly lost.

Norton SystemWorks Pro is the only suite with a partition backup program—Norton Ghost. Ghost is also sold sepa-



ease of use and lower price mean that it gets our recommendation.

Shield Yourself From Harm

YOU'VE BEEN told over and over that you need to guard against viruses and prying eyes—and all four of the suites reviewed here offer some kind of safety and privacy tools. No single program gets our recommendation in this category, but several of the suites have some nice features. For instance, Norton SystemWorks beats all the other suites in virus protection.

ANTIVIRUS

RECOMMENDED: Symantec's Norton SystemWorks 2001 Professional Edition

MAKE NO MISTAKE about it, a good antivirus program is the most important utility you should own—the one absolute must-have tool. It's so important, in fact, that *PC World* will be doing a full comparative review of antivirus programs in our next issue, where we will be testing the ability of antivirus programs to find and kill viruses. In this story we look only at the speed of the antivirus modules and how easy they are to use.

The important features of any modern antivirus program (aside from the ability to find viruses) are easy updates, speed of virus scanning, integration into Windows, and e-mail support. Screening e-mail is an especially important capability, since many viruses travel by e-mail these days.

Only two suites, Norton SystemWorks and Ontrack SystemSuite, come with antivirus programs. Of those two, only Norton AntiVirus has true e-mail support. NAV integrates with the major e-mail programs (including Outlook, Outlook Express, Eudora, and Netscape Messenger) and checks e-mail coming into your computer via the Internet's generic POP3 e-mail standard, aiming to catch viruses before you receive them. This approach also works with other e-mail programs that use the POP3 standard to receive e-mail. Norton AntiVirus, which we found far more stable than the other programs in SystemWorks 2001 Professional, is also available separately for \$40.

SystemSuite's VirusScanner, by con-



trast, scans e-mail attachments only when they are saved to a drive.

PRIVACY TOOLS

RECOMMENDED: McAfee Utilities 4

IS SOMEONE ELSE watching you? Windows keeps details of what you're doing in a number of ways, and it is possible for someone to read these and see what you've been doing on your PC. If you want to protect your privacy, you'll have to regularly wipe out certain files and lists.

All four suites offer tools to purge these files, including the Internet cache and history, and the list of recently used documents. Cookies are small files used by Web sites to identify you. SystemSuite has the best cookie remover, making it easy to select just the cookies you want to delete. SystemSuite has similar tools for clearing out the Internet cache and history.

To keep your data truly private, you have to encrypt it. McAfee Utilities is the clear winner here: It comes with PGP, widely regarded as one of the best encryption programs around, with easy-to-set-up tools for encrypting files, folders, and e-mail on the fly.

The only other suite that includes encryption is SystemSuite, as part of PowerDesk 4 Pro. But PowerDesk's encryption is nowhere near as easy to use as PGP—if you use your encrypted files frequently, you'll be tempted to keep them

open to everyone. PowerDesk also lacks PGP's easy e-mail integration.

All four suites let you destroy a file so that it cannot be recovered after deletion—they overwrite the area of the disk where the file was stored. You can read more about these and other products to protect your privacy in our "Fortress PC" story in the May issue, at www.pcworld.com/features/may2001/fortress.

No Size Fits All

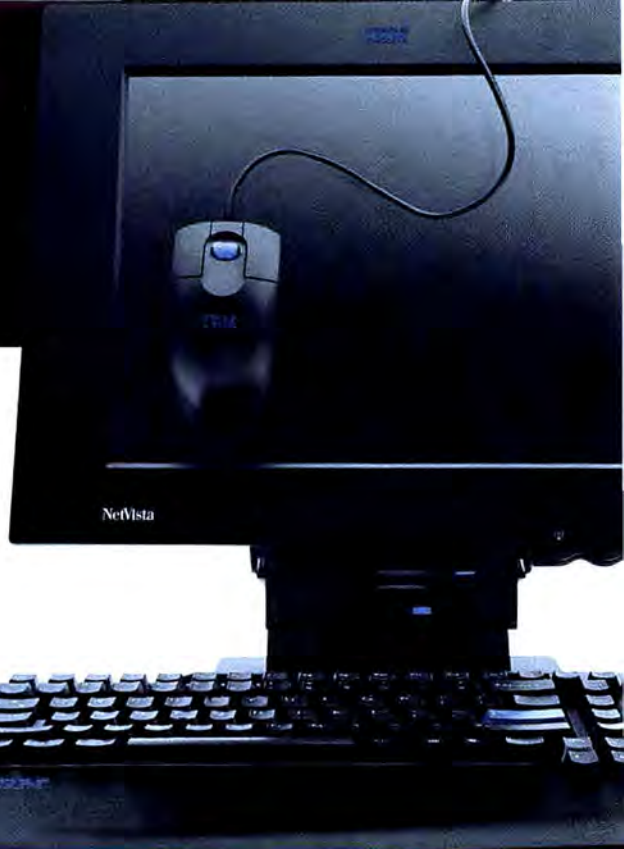
ALTHOUGH WE have selected Ontrack's SystemSuite 3 as our Best Buy, chances are that no suite will fill all your utility needs. Even SystemSuite lacks tools that we would like to see (such as proper e-mail virus scanning), and that lack may pose problems for some users. If you buy McAfee Utilities, for instance, you should definitely invest in an additional antivirus program and even a full partition backup program, such as Drive Image or DriveWorks.

You don't want to break the bank buying utilities. If you pick a strong package such as SystemSuite 3 and supplement it to fit your situation, you'll be well prepared for the inevitable computer emergencies and housekeeping chores.

PC World Contributing Editor Lincoln Spector frequently writes about utilities. ■



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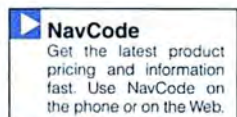
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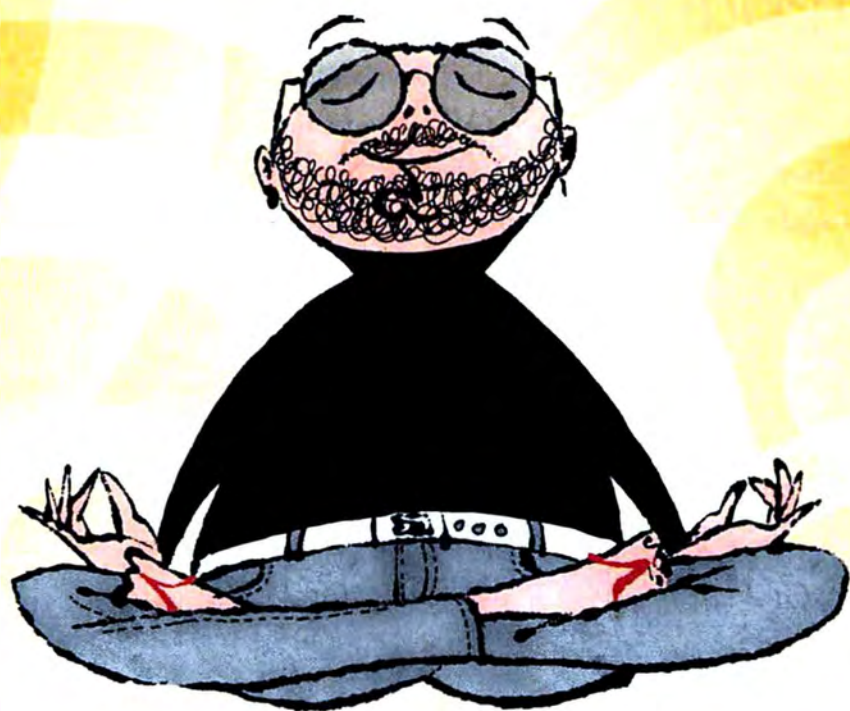
Who Knew Windows Could Do That?

Our Windows guru shares 40 unexpected, supereasy tips for every version of the OS.

BY SCOTT DUNN

“I sure wish Windows could...” Sound familiar? Well, guess what? Windows probably can. Over more than a decade of writing *PC World's Windows Tips* column, I've discovered hundreds of functions that lurk below the surface of Microsoft's now-venerable operating system. With the right shortcuts and speed tricks, you can cut much of the time you spend on many chores and eliminate others entirely—all without editing the Registry, reformatting your hard drive, or taking an advanced course in Windowsology. Some of my Windows tricks require nothing more than changing a few simple settings, while others take only a keystroke combination. So, off we go into the Windows of your wildest dreams. ►

ILLUSTRATIONS BY EDWIN FOTHERINGHAM



Mr. Folgeringham

Slam-Dunk Navigation

THINK OF ALL THE TIME you spend just getting from place to place on your PC: opening this folder, switching to that drive, connecting to the other network server—and where is that file, anyway? Here are some ways I've found to add supersonic speed to your desktop maneuvers.

Close Multiple Folders Quickly

ALL VERSIONS When you drill down through several nested folders, you open a window for each. You can close all or most of them with a single click by holding down the **<Shift>** key as you click the Close box in the upper-right corner of the folder window. Doing so closes the current folder and any open folders above it in the folder hierarchy.

Make Instant Shortcuts to Open Folders

ALL VERSIONS

The fastest way to navigate to a file or folder is via a shortcut icon. To create such an icon, select the target file or folder and choose **File>Create Shortcut** (or right-click and choose **Create Shortcut**). If you've already opened the folder you want to make a shortcut to, just drag the folder's icon from the top-left corner, the address bar, or anywhere else, and drop it onto the desktop or whatever folder the shortcut will reside in (see **FIGURE 1**). For another shortcut option, see "Copy, Move, or Shortcut?" on page 124. **Note:** For Windows 95, this tip requires Internet Explorer 4's Desktop Update.

Instant Shortcuts Can Also Open Files

ALL VERSIONS Want to make a shortcut to the file you're currently editing so that you can quickly reopen it later? First, save the file, then choose **File*Save As**. The document's icon should be visi-

ble in the dialog box. Use the right mouse button to drag the icon out of the dialog box and drop it onto the desktop or into any folder—just as you would from Explorer. Release the mouse button and choose **Create Shortcut(s) Here**. This tip works only with applications that use

Windows' common file dialog boxes. Unfortunately, Microsoft's own Word and Excel do not.

Open to a Location in a Document

ALL VERSIONS Shortcuts can do more than merely link to files, folders, or programs. If you're using Word, Excel, or another application that supports Object Linking and Embedding, you can make a shortcut that will take you to a spe-

cific place in a file—a boon if you work with long documents. The precise method varies by application, but one of these techniques should work: First, open your document and highlight the passage or cell(s) you want to bookmark with a shortcut. Right-click and drag the selection to the desktop or to the folder you desire, then choose **Create Document Shortcut Here**. If that doesn't work, highlight the selection and choose **Edit*Copy**. Right-click an empty area on the desktop or in a folder and select **Paste Shortcut**. Some applications also require you to return to the original document and choose **File*Save**. The next time you need to consult the desired passage, just launch the document shortcut (see **FIGURE 2**).

What Folder Is This File In?

ALL VERSIONS Shortcut icons are handy because they can open files, folders, or applications in far-flung locations on a local or network drive. But what if you need to know where the actual folder, program file, or document resides? Searching an entire network may not be an option. Fortunately, you don't have to. Just right-click the shortcut and choose **Properties**. Make sure the **Shortcut** tab is in front and click **Find Target** to instantly open the folder containing the item that



FIGURE 1: CREATE A shortcut from one folder to another by dragging and dropping its icon.

Closet Applications

IF YOU DIDN'T INSTALL WINDOWS YOURSELF, or if you used a standard install option such as Typical or Compact, chances are you're missing out on some free software that's sitting idle on your Windows CD-ROM or in .cab files on your hard disk. Here are some of the Windows utilities I consider most useful. **Note:** The Windows 2000 Control Panel doesn't let you add or remove the components mentioned here, but the best ones are installed by default anyway.

■ **Microsoft Backup:** Though features vary from version to version, this is still a handy tool for making backup copies of all or part of your system. In most Windows versions, select **Start*Settings*Control Panel** and open

Add/Remove Programs. Click the **Windows Setup** tab, scroll down the Components list, and double-click **System Tools**. In the System Tools dialog box that appears, check **Backup**, click **OK** as many times as needed, and

follow the prompts on screen. Unfortunately, Windows Me doesn't even list this utility as a setup option. If you installed Windows Me over a previous version, Backup may already be on your computer—just search for **msbackup.exe** or **backup.exe** and make a shortcut to it. Otherwise, pop in your Windows Me CD-ROM, browse to **add-ons\MSBackup**, and run **msbexp.exe** to install.

■ **Character Map:** If you've ever wondered how to enter a trademark or copyright symbol, find the right Wingding, or learn the keyboard shortcut for an em dash (—), this accessory is for you. You'll find Character Map in the System Tools section (to install it, follow the same instruc-

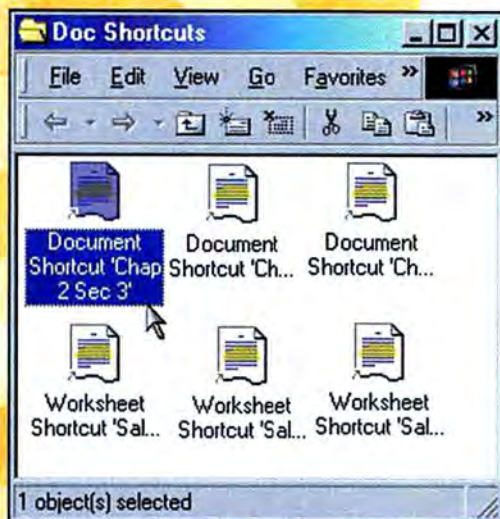


FIGURE 2: MAKE YOUR SHORTCUT open to a precise location in a file with a 'bookmark'.

the shortcut points to. **Note:** This trick doesn't work for Internet shortcuts.


Look Before You Double-Click

ALL VERSIONS Are you unsure where a folder shortcut will take you when you double-click it? If you have Windows 2000 or Windows Me, you can find out before you launch it. Click an empty space in the shortcut's container (either the desktop, a folder, or an Explorer view). Instead of selecting the shortcut, just hold the

pointer over it for a couple of seconds. An 'info tip' will appear that shows you the path to the target location (see **FIGURE 3**). To change the tip's contents, see "Create Your Own Shortcut Info Tips" on page 130.



Instant Backtracking, Part 1

ALL VERSIONS Did you double-click one too many times? Maybe you really wanted to see the contents of the folder containing the current folder. If the Address bar is visible (click **View>Toolbars>Address Bar** if it isn't),

press **<F4>** to display the drop-down list, then climb back up the folder hierarchy. Or click the **Up** button  on the Standard Buttons toolbar if you see it. But the fastest way to go up one level in the folder hierarchy is to press the **<Backspace>** key.

Instant Backtracking, Part 2

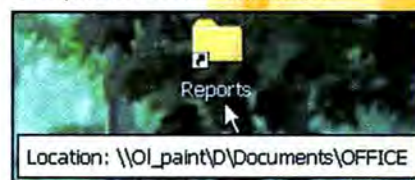
ALL VERSIONS Sometimes the last folder you opened before the current folder wasn't the current folder's parent, or any other relation; it may even have been on a different hard disk or computer. If you want to return to the previous folder (not necessarily the parent), click

the **Back** button  on the toolbar or press **<Alt><Left Arrow>**. Change your mind again? Click the **Forward** button  on the toolbar or press **<Alt><Right Arrow>**. **Note:** For Windows 95, this tip requires Internet Explorer 4's Desktop Update.

One Folder or Many?

ALL VERSIONS Do your folders open in a new window or the existing one? If you'd like to change this setting, choose **View>Options** or **View>Folder Options** in Windows 9x, or **Tools>Folder Options** in Windows 2000 and Me. Make sure the **Folder** tab (Windows 95) or **General** tab (all other versions) is selected.

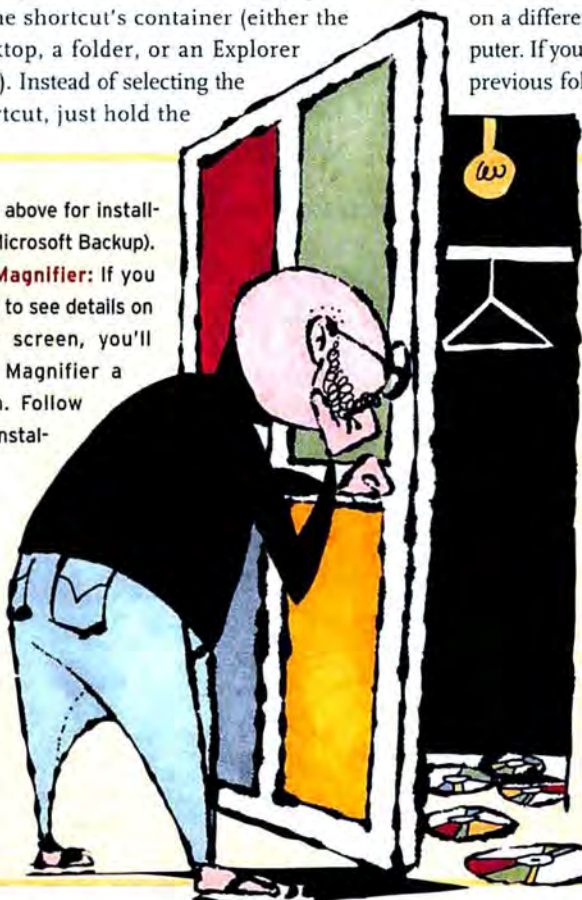
FIGURE 3: HOVER the mouse to see a shortcut's target.



If you're using Windows 95 with Internet Explorer 4's Desktop Update feature, or Windows 98 or 98 SE, click the **Settings** button. Now make your choice under 'Browsing options', 'Browse folders as follows', or 'Browse Folders', depending on your version of Windows. Click **OK**. ▶

tions above for installing Microsoft Backup).

■ **Magnifier:** If you need to see details on your screen, you'll find Magnifier a boon. Follow the instal-



lation instructions for Character Map above, but double-click **Accessibility** instead of **System Tools**. Check **Accessibility Tools**, click **OK** as many times as needed, and follow the remaining prompts on screen.

■ **System Configuration Utility:** This valuable diagnostic tool lets advanced users isolate software that may be causing system problems, and it provides a one-stop checklist of all the applications Windows is launching at startup. It's installed by default, but it doesn't appear as an individual icon, only as an item on the **Tools** menu in **System Information**. Find **msconfig.exe** in your **Windows\System** folder and make

a shortcut to it. **System Configuration Utility** is available only for Windows 98, 98 SE, and Me.

■ **TweakUI:** A lucky few Microsoft customers got this useful customizing Control Panel accessory on their Windows 98 CD-ROMs. Search for **tweakui.inf**, right-click it, and choose **Install**. If it's not there, get a free copy at www.pcworld.com/downloads.

■ **Compressed Folders:** If you have Windows Me, you don't have to acquire the acclaimed shareware WinZip. Instead, install this feature for making zip-compatible archives as easily as you would make and use folders. See the installation instructions above for Character Map—it too is in **System Tools**.

Custom Windows

YOU WOULD NEVER TAKE the wheel of a new car without adjusting the seat, mirrors, and radio presets to your liking. So why should your computer be any different? A few quick tweaks here and there in Windows can greatly increase your comfort zone.

Clean Up Toolbars Fast

ALL VERSIONS Your Explorer and folder windows can quickly become top-heavy with buttons, menus, and other controls if you turn on all the possible toolbars. It's easy to hide some of them by using the View•Toolbars menu. If you find these toolbars useful, however, you can quickly compact or expand them by positioning your pointer along the bottom edge of the bottom toolbar and dragging it up or down. This is handy if you're only cleaning things up on the fly, but if you're looking for a more permanent solution, drag the handle on the left edge of each toolbar and position it wherever you want to put it. By placing some toolbars side by side, you can save vertical space and still have access to the controls you want. **Note:** For Windows 95, this tip requires Internet Explorer 4's Desktop Update.



Page (in Windows 98) or Active Desktop•Show Desktop Icons (in Windows 2000 and Me).

All Roads Lead to the Desktop

ALL VERSIONS If you've hidden your desktop icons using the previous tip, or just want another way to get to the desktop, try these tricks:

FIGURE 4:
DOCK YOUR
DESKTOP
icons where
you like via
the taskbar.

type **desktop**, and press **<Enter>**.

■ Create a shortcut to the Desktop folder: Right-click in a folder or on the desktop and choose **New•Shortcut**. Type **Explorer /root**, (including the comma at the end). This method works in Windows 95 and 98, but not in Windows 2000 or Windows Me.

■ For Windows 2000 and Me, make a shortcut to the Desktop folder

■ Launch Windows Explorer and use the tree pane or Address bar drop-down list to scroll up to the top (Desktop) level. Or click in the Address bar field of any folder window,

(choose **Start•Search•For Files or Folders** to locate the right Desktop folder for your user profile). The window it opens won't include the built-in system icons (like My Computer and Recycle Bin), but you'll have access to everything else.

■ Right-click an empty part of the taskbar and choose **Toolbars•Desktop**. You can keep this toolbar docked within the taskbar, let it float on the screen, or dock it against an edge of the screen (see **FIGURE 4**). Customize the toolbar by right-clicking an empty area of the toolbar and choosing **Show Text** or **Show Title** to toggle between these items. Choose an icon size from the View menu, and then choose **Always on Top** if the toolbar is not in the taskbar and you don't want any windows to cover it. Even if you decide to hide the icons' text labels, you can still see what each icon is by positioning the pointer over it (don't click) to see its info tip. (See "Look Before You Double-Click" on page 121.)

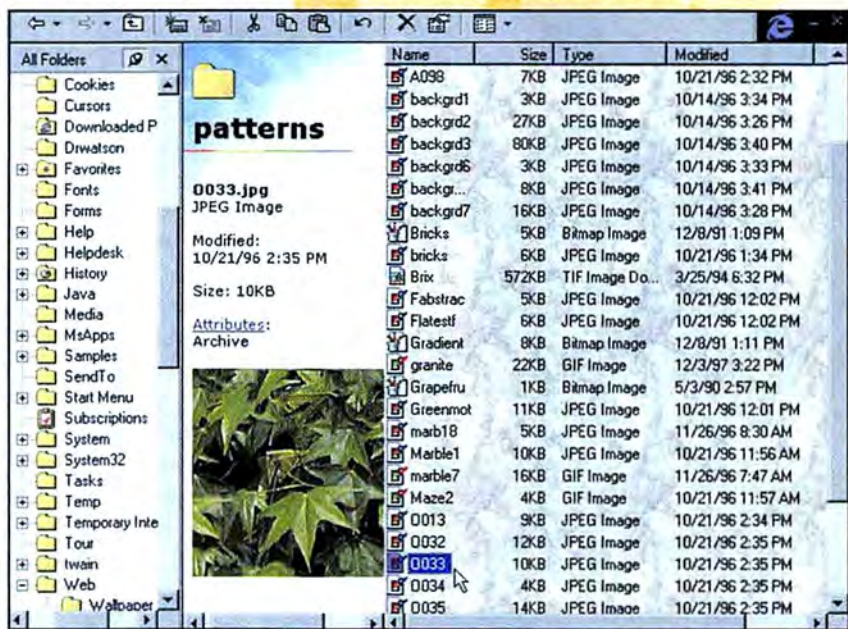
Get the Biggest View Possible


ALL VERSIONS To get the most spacious, capacious view of your folder or Explorer window, press **<F11>** to enter kiosk mode. This view makes the file pane fill the whole screen. It hides all toolbars next to the menu bar (see "Clean Up Toolbars Fast" above), and makes the file pane even bigger than maximized size (see **FIG-**

FIGURE 5: INCREASE YOUR SCREEN'S viewable area beyond maximized size by choosing the kiosk mode.

Now Clean Up Your Desktop

WIN 95, 98 SE, 2000, ME If your desktop is cluttered with icons, you could spend hours getting more organized, or you could take the easy way out: Hide all your desktop icons and open a folder window that shows your desktop items. Doing so makes them much easier to sort. Hiding icons requires the Active Desktop feature (the mode for showing Web content on the desktop): In Windows 98, right-click the desktop and choose **Properties**. Click the **Effects** tab and check **Hide icons when the desktop is viewed as a Web page**. In Windows 2000 and Me, right-click the desktop and choose **Active Desktop•Show Web Content**. Now you can toggle your icons on and off by simply right-clicking the desktop and choosing **Active Desktop•View As Web**



URE 5). Even Windows' taskbar is covered by this mode. To pop it back into view, move your pointer to the taskbar's last location. To make your screen even bigger, right-click a toolbar at the top and choose *Auto-Hide*. This slides the toolbar out of sight when not in use, but it pops back when you move your pointer to the top of the screen. If you have an Explorer bar showing on the left, you can hide it by clicking the Auto-hide pushpin button  at the top of that panel (in some Windows 9x systems you have to slide the pointer

away from the Explorer bar). The bar pops back when you move the pointer to the left side of the screen. Click the Auto-Hide button again to make that panel stay in place. To exit kiosk mode, hit <F11> again.

Note: For Windows 95, this tip requires Internet Explorer 4's Desktop Update.

Preview Sound and Video Files in Web View
WINDOWS 9X Windows 2000's Web View lets you preview Web video and sound formats as well as images. Windows 98, 98 SE, and 95 with Internet

Explorer 4's Desktop Update already have this feature, but you need to turn it on first. In a folder window, choose *View•Customize this Folder*. Make sure 'Create or edit an HTML document' is selected and click *Next* twice. In Notepad, search for 'var wantMedia' and change '=false' to '=true'. Save the file, exit Notepad, and click *Finish* in the Customize this Folder wizard. You should now be able to select .wav, .avi, .mov, and .mpg files in the folder and use the controls in the left panel to see them in miniature or hear them. ►

An Open Letter to Mr. Gates

Dear Bill,

Even with all its wonderful hidden tools, it seems every release of Windows lacks features that should have been part of the original. And things don't appear to be getting better. Exhibit A: Windows Me's bizarrely bloated Media Player (no "skin" in the world can make this monstrosity attractive, although <Ctrl>-2 helps). Exhibit B: its lame attempt at video editing. Here's my wish list of tools Windows has needed from Day One.

■ **Renaming:** What could be more basic for an operating system than to provide a way to globally rename large numbers of files and folders without having to use shareware or a DOS command line? Those of us who upgraded from older versions of Windows had all our old eight-letter file and folder names converted to ALL CAPS. A Microsoft rep told me this wasn't a problem because I can just rename each one. Oh, sure, rename each of my 20,000 files and folders one at a time. Right.

■ **Folder creation:** Every version of Windows since 95 has gone out of

its way to provide context-driven shortcut menus and buttons for letting users map network drives—as if this is something we all do 20 times a day. We need an easier way to create new folders. Windows 2000 and Me finally let us customize the Explorer toolbar, but—incredibly—they don't provide a button for folder creation. Hello? Bill?

■ **More keyboard shortcuts:** In recent versions of Windows, you can add an 'Explorer Bar' panel that includes Search, Favorites, History, or a folder tree to the left side of a folder window. Most of these panels can be toggled with keyboard shortcuts. In fact, the Search panel actually has two: <Ctrl>-F and <Ctrl>-E. Yet the most useful panel of all—Folders—has no keyboard shortcut. It's time to fix this.

And while you're at it, how about keystrokes for minimizing and maximizing the current window? Windows 2 had these, but they seem to have gotten lost in the upgrade shuffle. Bring them back! Finally, probably no keyboard shortcut would be used more often than a simple way to mute the system's sound. Every remote control in my house has a mute key—why not my computer? And I should be able to get this function without having to buy a keyboard with built-in multimedia controls.

■ **Better management of start-up applications:** The Start•Programs•Startup menu deceptively lulls users into thinking that as long as they remove icons from the Startup folder, they can keep applications from launching when Windows starts. In reality, Windows must have a half-dozen places in which apps can hide their start-up commands, including multiple Registry locations and even win.ini. The System Configuration Utility in Win 98, 98 SE, and Me is a good start for tracking down and dealing with these settings, but it's intended only for short-term diagnostic purposes and isn't available in Windows 2000.

■ **More automation:** Finally, a personal request. Not everyone likes macros. I know I'm a geek that way, but I loved the way Windows 3.x's Recorder utility let me record a series of repetitive behaviors and reduce them to a single keystroke—without having to learn Visual Basic or purchase its associated software. Today's shareware far surpasses Recorder (my favorite is Macro Magic from www.iolo.com), and Windows' Scheduled Task Wizard provides some automation. But with all of Windows' utilities, why can't macro recording be one of them?

Sincerely,
 Scott Dunn



Painless File Management

MANAGING FILES IS THE KEY to organizing all your work and play materials—but such chores can be a pain. Here are some easy ways to make your Windows file-management housekeeping simpler and faster.

Size It Up, Part 1

ALL VERSIONS Wondering how big a file or group of files is? Or how many items are in a folder? The secret is in the status bar, which usually runs along the bottom of your screen (if you don't see it in your Explorer or folder windows, choose **View•Status Bar**). Click inside an empty area of the folder to make sure nothing is selected. The status bar shows the total number of objects in the folder and the amount of space they use (minus the contents of any subfolders). Select one or more items in a folder to have the status bar provide information just on those items (again, the size and number of items in subfolders isn't included).

Size It Up, Part 2

ALL VERSIONS The Explorer status bar won't tell you the number of files in one or more selected folders, or tally the disk space those folders consume, but that information is still close at hand. Select one or more folders or files and press **<Alt>•<Enter>**, or right-click the selection and choose **Properties**. Look on the General tab of the Properties sheet. If you have only a single item selected, **<Alt>**-double-click it to display the Properties sheet.

Size It Up, Part 3

ALL VERSIONS To see how much space remains on your hard drive, double-click **My Computer**. Make sure the folder is using Web View and then select a drive icon (see **FIGURE 6**). In Windows 2000 and Me, you see the same information if the folder window is showing the root of a drive, and no items in the folder are selected (click inside an empty area to deselect everything). The diagram showing your disk space and capacity rounds figures to the nearest tenth of a megabyte. If you want to know the truth down to the last byte, employ the techniques used in the previous tip to open the Properties sheet for any drive. This is the only method that works in Windows 95.

Do Do the Undo That You Do So Well

ALL VERSIONS Copying, moving, renaming, deleting, and other file opera-

tions can be undone. You can often use the **Edit•Undo** command in Windows Explorer to reverse file operations performed by other apps. How do you know what choosing Undo will do? Check the status bar (if it isn't visible, choose **View•Status Bar**). Move your pointer over **Edit•Undo**, **Edit•Undo Copy**, **Edit•Undo Delete**, or another undo command, but don't click; the status bar will show what file or files will be affected (see **FIGURE 7**).

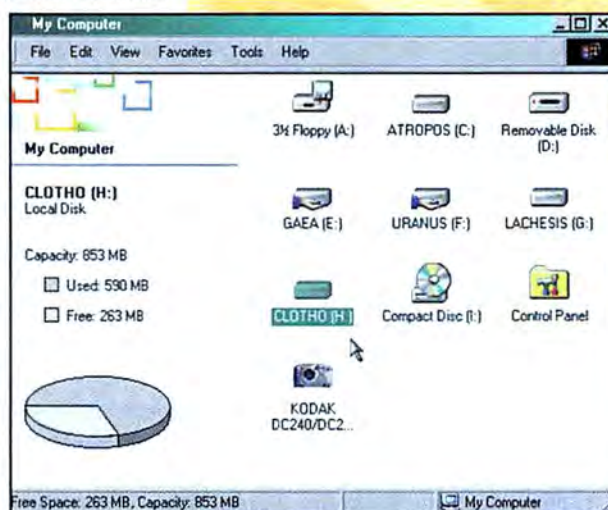


FIGURE 6: VIEW THE STORAGE space available on a hard drive via My Computer.

Create Folders in a Flash

ALL VERSIONS Windows lacks a quick-and-easy way to make a new folder, (see "An Open Letter to Mr. Gates" on page 123). But you still have these folder-making tools at your disposal:

- Windows doesn't have a keyboard shortcut for making a folder, but pressing **<Alt>•F-W-F** is the next best thing. This only works in Explorer or a folder window with nothing selected—not on the desktop.

- On the desktop or in any folder, right-click and choose **New•Folder**.

- Or use **<Shift>•<F10>•W-F**; that'll work in a folder, in Explorer, or on the desktop.

- Many file dialog boxes (such as Open and Save As) have a little button at the top that will make a new folder within the current folder (). Just click it.

Copy, Move, or Shortcut?

ALL VERSIONS When you drag a file to another location, Windows sometimes moves the file and other times copies ►

Quick Tricks for Mouse and Keyboard

ALL VERSIONS YOU CAN OFTEN GET FROM PLACE to place in Windows faster by using key combinations and mouse moves that aren't apparent from looking at the screen. For a basic list of these techniques, choose **Start•Help**, click the Index tab, and browse the topics listed under 'keyboard shortcuts'. For even more power, try these often-overlooked tricks.

FEATURE	Mouse or keystrokes
Prevent a CD from starting	Hold down <Shift> while you insert the CD
Enlarge/shrink the font size in Internet Explorer, Windows Help, Word, and Excel	Hold down <Ctrl> as you spin the mouse wheel (requires a wheel mouse)
Maximize/restore a window	Double-click the window's title bar
Close an active Internet Explorer, Explorer, or folder window, or Excel or Word document	<Ctrl>•W
In an Explorer or folder window, get the optimum column width for Details view	<Ctrl>•<NumPad +> (Note: File pane must be active)
Select (highlight) the Address bar entry in Windows Explorer	<Alt>•D

1.7GHz.
my friends
are envious.
my enemies
are scared.



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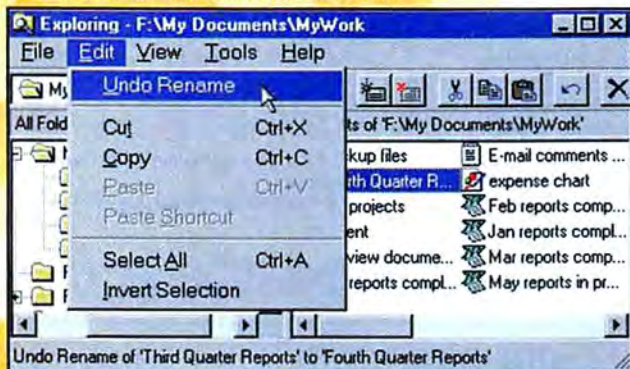
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it. And when you drag an application, Windows only makes a shortcut. Why? There's a method in this madness. Dragging moves a file if it's dropped to a point within a single disk, but copies if it's dragged to a different disk. Dragging an application usually creates a shortcut, because moving an application out of its installed folder may cause it not to function. If you need to move an app, hold down <Shift> as you drag to force a move, and hold down <Ctrl> to force a copy. You can press these keys anytime during the drag as long as you haven't released the mouse button. It may be simpler just to get in the habit of dragging with the right mouse button. When you drop the file, you'll see a pop-up menu that lets you choose to copy, move, or make a shortcut.

Uncover Thumbnail View

ALL VERSIONS Windows 2000 and Me let you display the contents of any folder as thumbnails—miniature representations of common graphics and Web formats. (For all other file types, you see a large icon in a box.) Just open a folder and select *View•Thumbnails* (the command doesn't appear for certain system folders, such as My Computer and My Network Places). This feature is also found in Windows 95, 98, and 98 SE, but it's hidden. To enable thumbnail view, right-click a folder icon and choose *Properties*. Select the *General* tab, check *Enable thumbnail view*, and click *OK*. Now double-click the folder to open it. You should see a Thumbnails command on the View menu where none existed before. **Note:** For Windows 95, this tip requires Internet Explorer 4's Desktop Update.

FIGURE 7: TO SEE WHAT will be undone before you click an undo command, check the status bar.



Supersonic App Launches

NOW THAT YOU'VE SET UP your document system, you'll also want to make it easier to work with your applications. Getting a program up and running, for example, should be no more trouble than grabbing a pencil (with only occasional sharpening required). Here are some ways to make such tasks as launching your programs just that simple.

Open a Document in the Application of Your Choice, Part 1

ALL VERSIONS Double-clicking a file opens it in the application associated with its file type. But what if you don't always open a file in the same application? To customize the shortcut menu that appears when you right-click a file so that it includes multiple applications for each file type, open Explorer, and choose either *View•Options* or *View•Folder Options* in Windows 9x, or *Tools•Folder Options* in Windows 2000 and Me. Click the *File Types* tab and select your file type from the list. Click

Edit (Windows 9x) or *Advanced* (Windows 2000 and Me). Select the *New* button below the Actions list and type a name for your new menu item, such as 'Open with Foobar.' In the next box, type the path to your application; or click *Browse*, navigate to the folder where you installed the alternate application, select its program file, and click *Open*. Click *OK* and close the remaining dialog boxes. The next time you right-click that type of file, you can choose *Open* to get the default application, or use your new custom command to open the file in another program.

only need to right-click a file and choose *Open With*. Select an application from the list, or click *Other* to browse for the right application. Then click *OK*. Now the file will open in the designated program, but

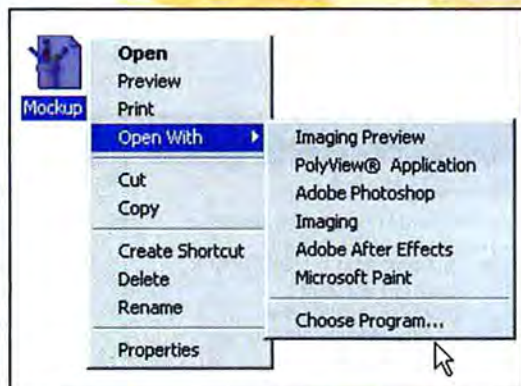


FIGURE 8: RIGHT-CLICK A FILE to get a choice of applications to open it in.

the next time you do this and choose a different program, both programs will appear on a submenu of the context (right-click) menu. Right-click a document, select *Open With*, and choose one of your applications from the menu—or click *Choose Program* to add yet another app to this submenu (see **FIGURE 8**).

Open a Document, Part 3

ALL VERSIONS If all you want to do is change the application that opens when you double-click a document icon, just hold down <Shift> as you right-click the document and then choose *Open With* (in Windows 95, 98, and 98 SE). In Windows 2000, you may need to choose *Open With•Choose Program* (see the previous tip). Then you either select an application from the list, or click *Other* to browse for the right one. Now click *Open*. In the *Open With* dialog box, be sure to check *Always use this program to open this type of file* and click *OK*.

Open a Document, Part 2

WINDOWS 2000, ME The tip above works fine in Windows 2000 and Me, but these versions of Windows also offer an easier way to add a choice of applications to a file type's shortcut menu. You

Launch Shortcuts From Your Keyboard

ALL VERSIONS If you have applications, files, or folders that you open and close frequently, make life easier by creating keyboard shortcuts for each. First, check "The Windows Key: A Fast Worker" below to see if the keyboard shortcut you want already exists. If it doesn't, right-click the *Start* button and choose *Open*. Now open the *Programs* folder and click *File•New•Folder*. Name the new folder **Keyboard Shortcuts**. You don't have to put all the shortcut icons that have keyboard shortcuts in one place, but doing so makes it easier to change or delete them later. You can also make the keystrokes part of the shortcut name to serve as a reminder (see **FIGURE 9**). In any case, you must put these shortcuts either on the desktop or in a folder within the *Start* Menu folder hierarchy. Drag the desired apps, files, or folders to the selected folder one at a time using the right mouse button, then choose *Create Shortcut(s) Here*. Right-click a shortcut icon and choose *Properties*. Choose the *Shortcut* tab and click inside the 'Shortcut key' box. Press your desired key combo, and click *OK*.

Make One-Key Keyboard Shortcuts

ALL VERSIONS If you tried the previous tip, you may have discovered that

Windows forces you to employ at least two modifier keys (<Ctrl>, <Alt>, <Shift>) for many key combinations. To save on keystrokes, use a function key—one of the keys in the top row of your keyboard, numbered <F1> through <F12>. You can use a function key alone or in combination with one or more modifier keys. Any combination you create will launch your shortcut and nothing else—even if another application tries to use those keys. You can also use the keys on your numeric keypad.



FIGURE 9: YOUR KEYBOARD shortcut names will be easier to remember when you include the keystrokes in the names.

Show Windows Who's Boss

YOUR APPLICATION IS RUNNING, your documents are open, but your work area still could use a little sprucing up. Windows can help simplify the daily chores of dealing with multiple applications, and saving and printing files. Here are some of the operating system's less-than-obvious tricks.

Make Printing a Real Drag

ALL VERSIONS If you occasionally print files without reading them or making changes, you can save a few steps.

Choose *Start•Settings•Printers*. Use the right mouse button to drag your default printer to your desktop and choose *Create Shortcut(s) Here*. Now the next time you need to print a document, just drag the document icon from its folder and drop it onto the printer icon. In most cases, the associated application will open, print the document, and exit.

The Windows Key: A Fast Worker

ALL VERSIONS MOST KEYBOARDS MADE in the last several years come with a <Windows> key (⊞), and sometimes also with an <Application> key (⊞). Try these keyboard shortcuts for extra speed and productivity. Warning: The Surgeon General has determined that these keystrokes may be habit forming.

FEATURE	Keystrokes
Display the Start menu	<Windows>
Open the Run dialog box	<Windows>-R
Minimize all	<Windows>-M
Undo minimize all, tile horizontally, tile vertically, or cascade	<Shift>-<Windows>-M
Open Help	<Windows>-<F1>
Open Windows Explorer	<Windows>-E
Open Find/Search Files or Folders	<Windows>-F
Minimize all and undo minimize all	<Windows>-D
Open Find/Search Computer	<Ctrl>-<Windows>-F
Cycle through taskbar buttons	<Windows>-<Tab> (<Enter> opens task; <Tab> moves focus to system tray, desktop, Start button, and Quick Launch and other toolbars)
Open System Properties sheet	<Windows>-<Break>
Display the shortcut menu for selected item	<Application>

Take Charge of Hidden Applications

ALL VERSIONS You can usually exit a running application by closing its main window or by right-clicking its taskbar button or icon in the system tray (the taskbar area with the clock), then choosing *Close* or *Exit*. Sometimes, though, applications may be running invisibly. How can you find out? And how can you shut them down? Press <Ctrl>-<Alt>-<Delete> (just once!) to see a list of running applications (see **FIGURE 10**). (After doing this in Windows 2000, you must also click the *Task Manager* button in the Windows Security dialog box.) Select an application you want to exit and click *End Task*. **Note:** The *Close Program* dialog box doesn't show all hidden running programs or ▶

tasks; see System Configuration Utility in "Closet Applications" on page 121. Some background programs must run continually and should not be shut down.

Choose Your File's Extension

ALL VERSIONS When you save a file in an application, the application automatically adds its own unique extension (.doc, .txt, .gif, and so on) to the end of the file name. You usually don't see it because, by default, Windows hides these extensions. You may not want the application to use the normal extension, however. For example, you may want to use Notepad to save a file with a .bat, .htm, or other extension.

Type the file name

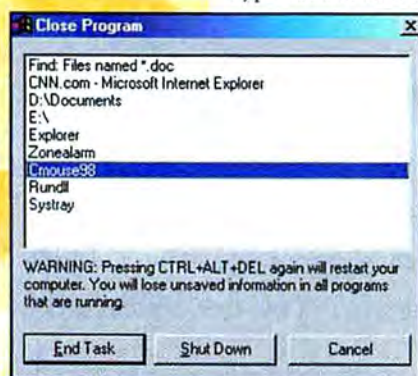


FIGURE 10: <Ctrl>-<Alt>-<Delete> lists your background applications.

in quotation marks in the Save As dialog box, as in "MyPage.html". The quotation marks force your

application to accept the extension you type without adding one of its own.

Manage Your Application Windows

ALL VERSIONS To see the contents of two application windows at once, don't waste time dragging the edge of each window until they're side by side. Just right-click an empty area of the taskbar and choose *Tile Windows Horizontally* to make your open windows appear in rows on your screen, or *Tile Windows Vertically* to make them appear in columns. Choose *Cascade Windows* to create a stack of windows with their edges offset to facilitate navigating between them with a mouse. These commands don't affect minimized windows. If you change your mind, right-click the taskbar again and choose *Undo Tile* or *Undo Cascade*. **Note:** Some utilities (especially those in the system tray) temporarily disable these functions.

Well-Accessorized Windows

WINDOWS COMES WITH SEVERAL handy tricks and utilities to help you keep your computer in shape and to perform certain routine tasks. Here are undocumented power tricks for Windows' Disk Cleanup and System Tools, plus a way to customize your shortcut info tips.

Quick Cleanup for a Single Disk

WINDOWS 98, 2000, AND ME Windows' Disk Cleanup utility can delete unneeded files on a disk (select *Start>Programs>Accessories>System Tools>Scheduled Tasks*, launch *Disk Cleanup*, and then choose the right drive). But it's faster to <Alt>-double-click a drive icon in My Computer or Explorer (use the right pane, not the folder tree), or right-click the drive icon and choose *Properties*. Then click the *Disk Cleanup* button on the General tab.

Check Your Housekeeping Habits

ALL VERSIONS Windows comes with a number of system tools for maintaining your computer. Windows 98 and later versions let you use the Maintenance Wizard to automate these tasks. Select *Start>Programs>Accessories>System Tools>Maintenance Wizard* to deselect apps that start automatically when you start Windows and to set the schedule for Disk Defragmenter, ScanDisk, and Disk Cleanup.

You can also schedule any installed program to run (Backup, for example): Select *Start>Programs>Accessories>System Tools>Scheduled Tasks* to open the Scheduled Tasks folder, launch the Add Scheduled Task icon, and follow the instructions in the Scheduled Task Wizard. Note that the Scheduled Tasks folder shows when tasks are scheduled and when they last ran, and that you can run any of them on the fly by right-clicking the task and selecting Run.

Windows also keeps track of when you scan your disk for errors, make a backup, and defragment your hard disk in another place: Double-click *My Computer*, right-click a hard disk, and choose *Properties* to access this information. Click the *Tools* tab to see how long it's been since you used ScanDisk, Backup (if installed), or Disk Defragmenter (see **FIGURE 11**). If it has been a while since you've used

these tools, just click one of the buttons to do the chore on the spot. This is also a handy way to start these accessories without digging through the Start menu. **Note:** Windows 2000 doesn't track when you last used these utilities, but you can still launch them from this dialog box.

Create Your Own Shortcut Info Tips

WINDOWS 2000 AND ME Icon info tips are helpful, but you don't need to settle for the info tips that Windows gives you. If you have Windows 2000 or Me, you can make the info tip for a shortcut say anything you want. To do this, right-click the icon and choose *Properties*. Select the *Shortcut* tab and type any descriptive text that you wish in the Comment box. The text in the box scrolls, allowing you to add as much as a small paragraph of information. When you have finished adding your text, click OK.

PC World Contributing Editor Scott Dunn has written the Windows Tips column for more than ten years.

FIGURE 11: WHEN DID YOU last run that utility? Check My Computer's Properties.



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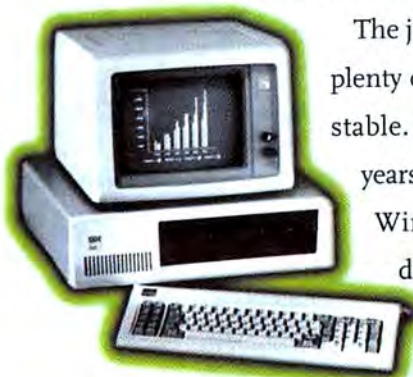
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>The PC at 20<

> The road from 1981's IBM PC
> to today's systems—and
> all the revolutions,
> evolutions, and fumbles
> in between.

Q: How do you crash Microsoft Windows?

A: Start Microsoft Windows.



The joke has been around for years. There are plenty of reasons why Windows PCs are so unstable. And one of the biggest is history—20 years of it, now. Today's Wintel (shorthand for Windows on an Intel processor) systems descend directly from the original IBM PC. Announced in August 1981, it was a product that IBM rushed to mar-

ket with no inkling that it was setting a worldwide standard that would prevail for decades to come.

Of course, all that history has its good side. IBM's machine was extremely versatile, infinitely upgradable, and well documented—strengths that led to the PC's initial success and enduring ubiquity. But those same virtues led to a haphazard evolution that piled one problem on top of another. With their beautiful graphics, multitasking applications, and networking talents, ►

BY LINCOLN SPECTOR

today's gigahertz-plus systems seem a far cry from the PCs of two decades ago. Still, at the heart of every 21st century Windows-based computer lies an IBM PC. "What's amazing," says Dan Bricklin, whose Visicalc was the first PC spreadsheet, "is that you can take software for the original PC and run it on today's Windows [systems]."

Since 1981, PC technology has seen remarkable advances—and more than a few false starts and outright blunders. So let's look back and see how today's systems got the way they are. Return with us now to the dawn of PC history....

BEFORE BIG BLUE

IF YOU WERE in the market for a personal computer back in 1980, you had plenty of choices. Many popular models of the day ran an operating system from Digital Research called CP/M. Commodore's PET and Tandy/Radio Shack's TRS-80 were also established players. And two guys named Steve had a big business selling the Apple II.

Those systems were aimed at hobbyists

who liked to write programs in the BASIC programming language. The major supplier of BASIC was Microsoft, a little company in Bellevue, Washington, headed by a Harvard dropout named Bill Gates.

"I didn't have time to do it right, so I did it quick and dirty."

—QDOS creator Tim Paterson, on the birth of the operating system that became MS-DOS

IBM, the biggest name in serious—that is to say, large and business-oriented—computers, took notice of the nascent personal computer industry in 1980 and assigned a veteran manager/engineer named Don Estridge to get an IBM PC to market. Under strict deadline pressure, IBM engineers in Boca Raton, Florida, made decisions that are still with us today.

For instance, David Bradley, who was a member of Estridge's engineering team, recalls, "The system would hang, and the only way you could fix it was to turn it off. So I built a warm reboot into the keyboard code. I invented <Ctrl>-<Alt>-<Delete>,"

but Bill Gates made it famous."

The tight deadline meant that the system had to be built with existing technology. Its central processing unit was Intel's 8088. The 8088 was a 16-bit chip—a zipper, more powerful CPU than the 8-bit CPUs used by most early microcomputers. But to keep costs down, the 8088 talked to other components via an 8-bit bus.

Why didn't IBM stick with the popular CP/M operating system? Legend has it that Digital Research president Gary Kildall skipped a meeting with IBM execs to go flying or hang gliding. A more likely story is that Digital Research refused to sign IBM's nondisclosure agreement.

MICROSOFT'S BIG DEAL

ONE FACT IS undeniable: Digital Research had yet to deliver a version of CP/M for Intel's 16-bit CPUs. So Tim Paterson, an employee of a small hardware vendor called Seattle Computer, wrote a CP/M-like operating system for that company's computer, which used Intel's 8086 processor (basically an 8088

MAJOR EVENTS that have shaped the PC platform—plus some famous flops.

1981

- 1. ENTER THE PC** Okay, it isn't the first personal computer by a long shot. But the IBM PC is the first from a company that's respected by corporate America.



1983

- 2. NUMBERS EASY AS 1-2-3** Lotus 1-2-3 becomes the PC's first killer app. What makes it a big success? Revolutionary concepts like menus and on-screen help.



- 3. CLONE WARS** Compaq's luggable PC work-alike makes the PC a standard independent of IBM.

- 4. FREEDOM FROM THE FLOPPY**

SHUFFLE IBM releases the PC/XT. For the first time, a personal computer comes with a hard drive as standard equipment.



- 5. JINXED JUNIOR** Big Blue tries to enter the home market with the PCjr. With

a high price, minimal expandability, and a famously lousy keyboard, the system flops.

1984

- 6. THE MAC LEADS THE PACK** Apple's Macintosh arrives. PC loyalists sneer at its mouse and graphical interface, but future PCs will grow increasingly Mac-like.



- 7. ARCHITECTURE OVERHAUL** The IBM PC gets redone as the PC AT. The first PC to use Intel's 286 chip, the AT also sports a 16-bit bus and a built-in clock.



1985

- 8. IF AT FIRST YOU DON'T SUCCEED** Windows 1.0 appears—and is widely pronounced a dud. The first version of the operating system is ugly, it can't multitask properly, and it moves like a Jello-encased snail.



1986

- 9. TWO REVOLUTIONS IN ONE** IBM's

control of the PC market falters as Compaq beats Big Blue to market with a PC based on Intel's cutting-edge 386 chip.

1987

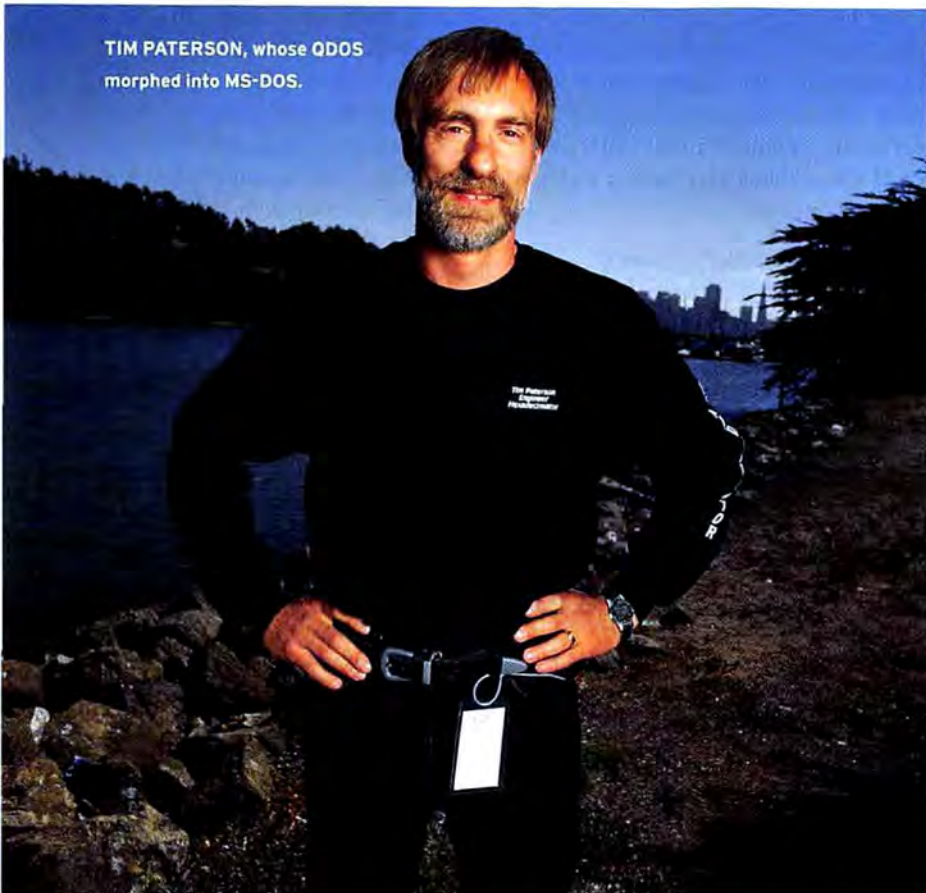
- 10. THE DOS REPLACEMENTS THAT WEREN'T** IBM introduces would-be DOS replacement OS/2 and the PS/2, a PC based on a new architecture called Micro Channel. Neither product makes much of a long-term impact.



1990

- 11. IBM AND MICROSOFT DIVORCE** The two giants go their separate ways. IBM sticks with OS/2, and Microsoft puts everything behind Windows.
- 12. THIRD TIME'S A CHARM** Windows finally catches on, thanks to version 3.0's improved look and better multitasking. Windows 3.1 (1991) and Windows for Workgroups 3.11 (1993) continue the trend.
- 13. OFFICE IN A BOX** Microsoft's bundle of Word, Excel, and PowerPoint changes the way apps are sold, and slowly reduces rivals such as 1-2-3 to irrelevancy.

TIM PATERSON, whose QDOS morphed into MS-DOS.



with a 16-bit bus). "I didn't have time to do it right," he recalls, "so I did it quick and dirty." In fact, his creation, officially called 86-DOS, was nicknamed QDOS—Quick and Dirty Operating System.

When IBM told Bill Gates about its problems with Digital Research, Gates had a solution. Microsoft acquired a license for, and later bought, QDOS from Seattle Computer, then licensed it to IBM. It was renamed IBM Personal Computer DOS (or PC-DOS) when sold by IBM, and MS-DOS if sold by anybody else.

But when the PC hit the market, PC-DOS was one of *three* operating systems that IBM offered. The others were existing ones with lots of apps: CP/M (Digital Research had come up with an 8088-compatible version) and Softech's UCSD p-System. How did an upstart like PC-DOS get any traction? Price played a big part: PC-DOS cost \$40, while CP/M was \$450 and UCSD p-System was \$550.

Nobody was prepared for the IBM PC's instant, explosive success. And that clamor was for a machine whose \$1265 base model didn't include a monitor, a video card, a parallel or serial port, an oper-

1991

14. AMERICA GOES ONLINE An obscure online service called AOL arrives for the PC, and you no longer need technical expertise to read your e-mail.

15. COLLEGE KID MAKES GOOD Helsinki student Linus Torvalds develops a Unix-like OS, names it after himself, and gives it away. Geeky types worldwide embrace Linux as their own.



1992

16. BREAKING THE SOUND BARRIER With Creative's Sound Blaster 16, PC sound no longer means a tinny 2-inch speaker. Add the increasingly popular CD-ROM drive, and multimedia is born.

1993

17. A 586 BY ANY OTHER NAME Stung by a judicial decision that competitors can call their chips 386s, Intel names its powerful new CPU the Pentium.

18. NEW TECHNOLOGY OR NICE TRY? Windows NT, the first DOS-free Windows, ships. But it's big and won't run many



1994

19. POINT, CLICK, SURF The Internet gains mass appeal when Netscape releases its Navigator browser as a free beta.

20. FUZZY MATH The Pentium gives wrong answers in rare instances; Intel gives free replacements only to folks who prove they need them. Later, it extends the offer to all comers.

1995

21. LIKE A ROLLING STONE Windows 95's big rollout uses the Rolling Stones song *Start Me Up*, although it avoids the line, "She makes a grown man cry." Hype aside, Win 95 pushes the platform forward.



1998

22. BUILT-IN BROWSER With Windows 98, Internet Explorer becomes part of the operating system. In fact, Microsoft says

Windows applications, and Microsoft recommends the OS only for networks and professionals.

that it's impossible to remove the browser.

1999

23. FULL-COURT PRESS Presiding over a federal antitrust lawsuit, Judge Thomas Penfield Jackson says that Microsoft "has demonstrated that it will use its prodigious market power and immense profits" to damage competitors. Jackson decides against Microsoft in 2000; at press time, the case is being appealed.

24. BRASS RING AT LAST AMD, known for slower, cheaper clones of Intel CPUs, ships its Athlon chip, which outpaces the Pentium III at the same clock speed.



2000

25. TORN BETWEEN TWO WINDOWS After years of promising consumers an NT-based version of Windows, Microsoft releases two programs that aren't it. Windows 2000 is still a business OS. And Windows Me is still Windows 95 at heart.

ating system, or a floppy drive. According to Bradley, IBM hoped to sell 241,683 PCs over five years. Before those five years were up, the company was selling nearly that many units a month.

And certainly no one expected the standard to last for decades. The PC industry "wasn't seen as having a present, much less a future," remembers Mitch Kapor, creator of Lotus's 1-2-3 spreadsheet.

Why was the PC a hit? For starters, it was a well-designed, well-built machine from a name that businesses knew. Clever ads, with an actor imitating comedy legend Charlie Chaplin, also helped.

And the PC was quickly supported by a raft of third-party applications, such as word processors (MicroPro's WordStar, SSI's WordPerfect, and others) and Ashton-Tate's dBase database manager. Peter Norton developed the first version of Norton Utilities to restore a file that he'd accidentally deleted on his own system. And Andrew Fluegelman invented shareware with PC-Talk, a program that made it relatively easy for modem users to dial in to services such as CompuServe and the Source. (Later, Fluegelman helped start a magazine you may know: *PC World*.)

But it was Kapor's 1-2-3 that cemented the IBM PC's reputation as a business machine when the program debuted in early 1983. By taking advantage of the personal computer's 16-bit CPU, 1-2-3 could offer revolutionary features such as on-screen menus.

SEND IN THE CLONES

IBM'S ESTRIDGE—who was to die in a plane crash in 1985—and his team wanted other companies to supply a broad

In 1981, the PC industry "wasn't seen as having a present, much less a future."

—Mitch Kapor, creator of 1-2-3

selection of peripherals, so they designed the PC as an open, well-documented system. They got the peripherals, but they also got something else: clones. In 1982, a start-up called Compaq released a "portable," sewing machine-size computer that worked with software and add-in cards that were designed for IBM's PC. This was possible not only because the PC was an open system, but also because IBM had used off-the-shelf parts. Any

company could buy an Intel CPU and a Microsoft operating system.

By 1984, numerous companies were competing in the IBM-compatible market, including Compaq-like start-ups (Columbia, Eagle, Leading Edge) and established manufacturers (ITT, Tandy). But IBM still led the pack. In 1983, Big Blue released the PC/XT, introducing the hard drive as basic equipment (a configuration with a mammoth 10MB disk went for a cool \$4995). And in 1984, it upped the ante with the PC AT, the first PC built around Intel's 80286 processor, running at a blazing 6 MHz.

IBM's lead slipped in 1986, when Compaq shipped the first PC based on Intel's 32-bit 80386 (or 386 for short). As a chip, the 386 was a landmark that made today's windowing, multitasking environments possible. Overall, though, Compaq's system was little more than an AT clone with a better CPU and faster RAM access. Still, it was the latest, greatest PC of the time—and it wasn't from IBM.

Big Blue's dominance faded further in 1987, when the market failed to accept its much-hyped PS/2, the machine designed to replace the AT. Suddenly, the term *IBM compatible* no longer seemed appropriate. From then on, they were just PCs.

DOS CAPITAL

AND THEY STILL ran MS-DOS. In fact, most of them are still running MS-DOS; it's just not visible. And that's one reason for Windows' notorious instability: Windows 95, 98, and Me are complex, multitasking, 32-bit operating systems whose underpinnings descend from the little OS Tim Paterson knocked together in 1980. It's as if someone replaced an old shack with a grand mansion—built upon the shack's foundation.

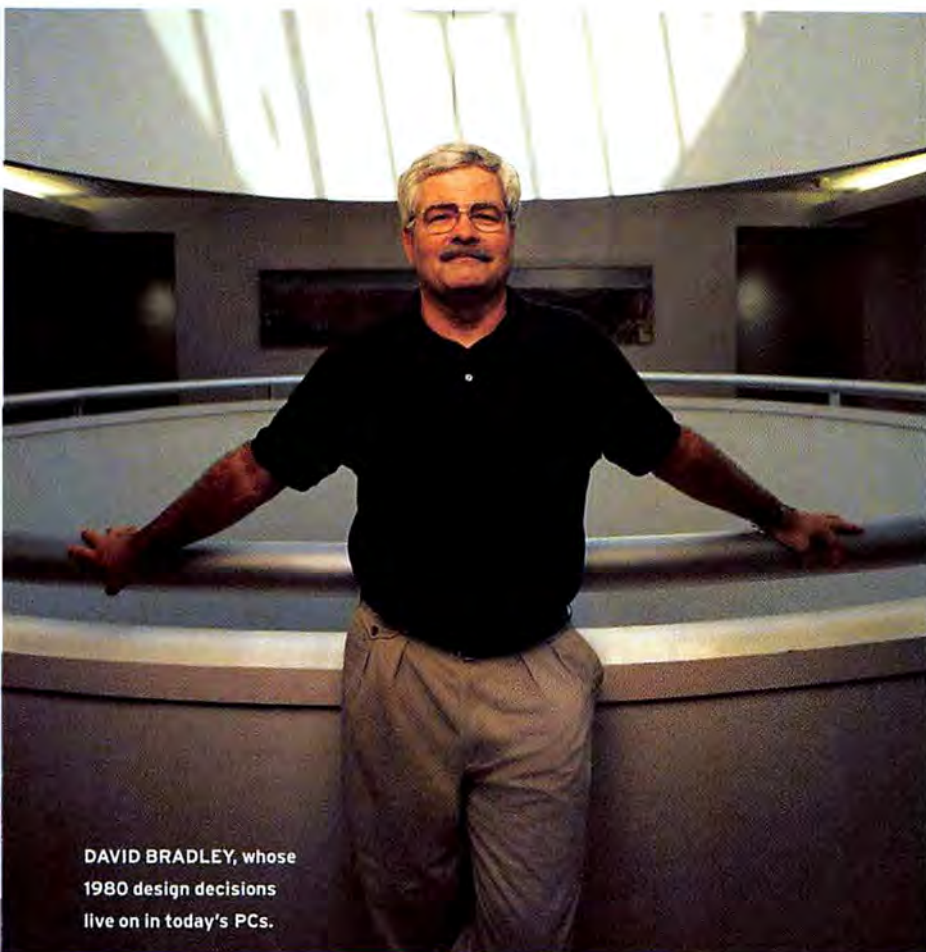
Not that anyone would have compared Windows 1.0—which was announced in 1983 and shipped in 1985—to a mansion. In fact, this rudimentary graphical front end for DOS was widely derided as clunky. Besides, Microsoft and IBM were soon drumming up enthusiasm for a would-be DOS successor known as OS/2. But when OS/2 finally shipped in 1987, it was tough to configure and slow, and it

The PC Gets Cheaper, Faster...and Slower?

FOR TWO DECADES, THE PC HAS GROWN ever more capable—and prices have tumbled. Yet a typical PC of today takes three times as long to boot as a 1981 model. Why? Blame it on the behemoth of an operating system that Windows has become.

VITAL STATISTIC	1981 IBM Personal Computer	2001 Dell OptiPlex GX150
Price ¹	\$3045	\$1447
CPU	4.77-MHz 8088	933-MHz Pentium III
RAM	64KB ² (.0625MB)	128MB ³
Storage	160KB floppy drive	20GB hard drive, CD-RW and 1.44MB floppy drives
Display	11.5-inch monochrome text monitor	17-inch, 16.7 million color graphics monitor ⁴
Other features	Parallel port, tape cassette port, 2-inch internal speaker	Parallel port, 2 serial ports, 4 USB ports, ethernet, wavetable sound and speakers, microphone jack
Operating system	IBM PC-DOS 1.0	Windows 2000
OS RAM requirements	16KB (.0156MB)	32MB ⁵
Boot-up time ⁶	16 seconds	51 seconds

¹ Price dependent on configuration; not adjusted for inflation; IBM PC 1981 price in current dollars would be approximately \$6125. Dell OptiPlex GX150 price is as of 5/4/01. ² Base configuration was 16KB; maximum on motherboard was 64KB. ³ Maximum on motherboard is 512MB. ⁴ 24-bit color. ⁵ 64MB recommended. ⁶ IBM PC tested by vintage PC collector Fred Cisin; Dell tested by PC World Test Center.



DAVID BRADLEY, whose
1980 design decisions
live on in today's PCs.

attracted only a cult following.

In 1990, IBM and Microsoft went their separate ways. IBM continued to improve and sell OS/2, and Microsoft bet the farm on Windows. And that same year, Windows 3.0 changed everything. A huge advance over earlier Windows versions, it became the first environment other than DOS to come pre-installed on most PCs.

Like the original IBM PC, Windows benefited from a wide range of apps. According to Jeff Tarter, editor and publisher of the industry newsletter *Sofletter*, "Gates was willing to stand up in front of an audience and say 'I'm betting my company on this.' No one at IBM was willing to say he was betting his career on OS/2."

No company entered the Windows application market as aggressively as Microsoft itself. As the folks in Redmond (Microsoft's home since 1986) introduced one product after another, they seemed to leave less and less room for others. It didn't help matters that 1-2-3, Word-

Perfect, Harvard Graphics, and other key DOS programs moved to Windows only after counterparts from Microsoft had gained a toehold.

"In the mid-1990s, it was very difficult to compete with Microsoft," contends

"I invented <Ctrl><Alt><Delete>, but Bill Gates made it famous."

**—David Bradley, member of the
IBM PC design team**

Philippe Kahn, whose Borland International was a major force in software in the 1980s and early 1990s. "As a consequence, competitors have disappeared and products haven't evolved as much as they did in the 1980s."

WINDOWS MARCHES ON

IN 1993, Microsoft released Windows NT, a 32-bit version that was truly an operating system of its own—it didn't require

DOS at all. Meant for networks and high-end users, NT traded ease of use for administrator controls and security. Stiff hardware requirements and compatibility issues kept it out of the mainstream.

Two years later, Windows 95 shipped to far greater fanfare. It too was a 32-bit environment that made full use of the latest processors. But DOS was still there, loading before Windows. Microsoft has kept that same basic setup for Windows 98 and Me; when Windows XP arrives, probably this year, home users will get their first DOS-free version of Windows.

With or without DOS, Windows may simply be too complex to be perfectly reliable, with too much old code on top of new code. "Twice as many lines of code probably means four times as many bugs," warns Kahn.

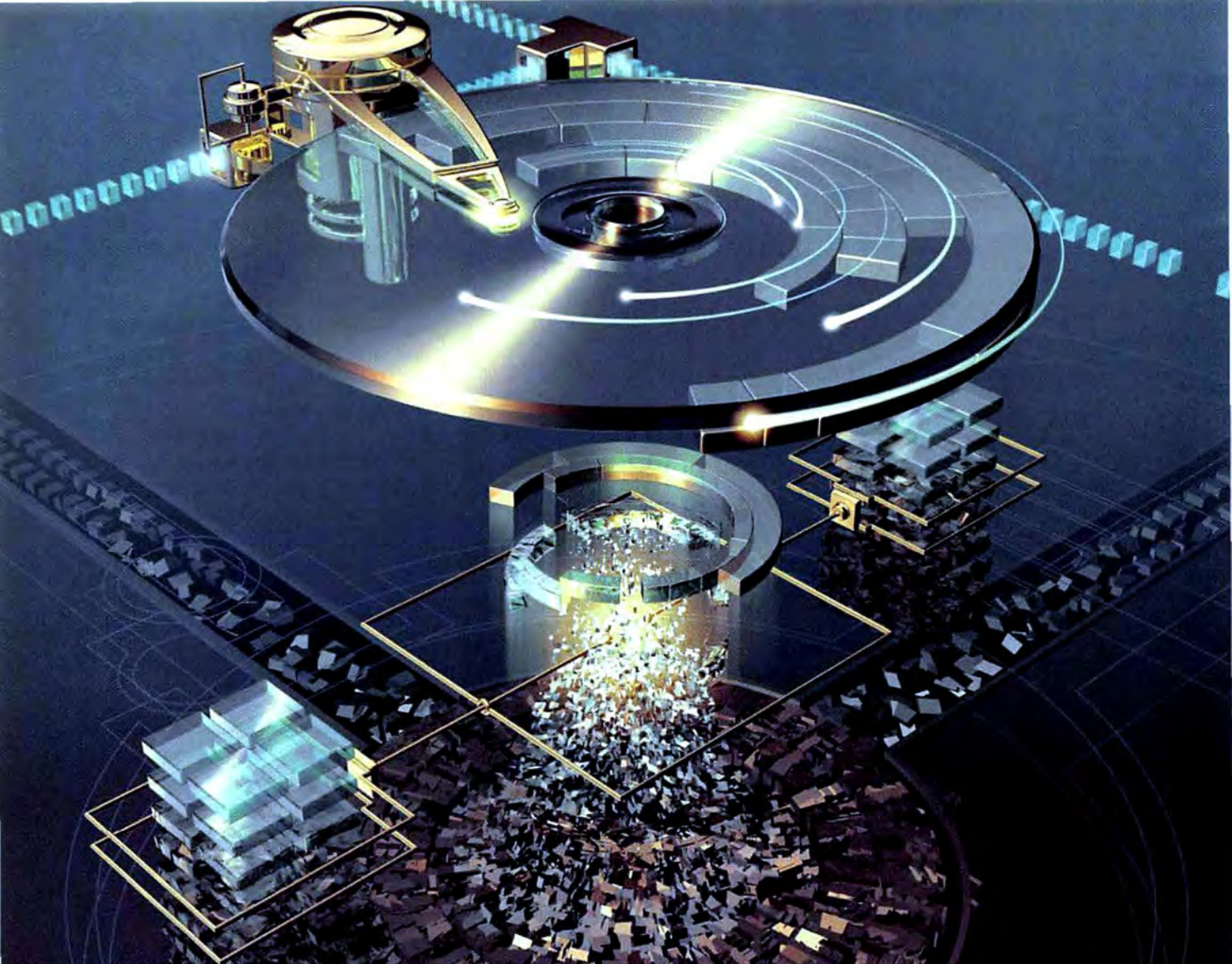
The sheer versatility of the PC and Windows is another source of trouble: The huge number of apps, peripherals, add-ins, and configurations makes thorough debugging impossible. Other platforms such as Linux and the Macintosh, which are often praised for superior stability, don't offer anywhere near the flexibility of a Windows PC. And they have not had anywhere near its success. According to Bricklin, "People voted with their pocketbooks"—and the PC won because it was capable of doing so many things.

So will Windows and PCs be around forever? Already, it's almost a cliché to say that the standard will dwindle as the Internet comes to dominate our computing experience.

Low-cost devices like PDAs and Internet appliances could indeed eventually edge out the PC for taking care of simple tasks such as Web browsing and e-mail.

For the foreseeable future, though, if you want one device that can handle everything from managing a business to playing the latest games, you'll probably still need the flexibility of a personal computer. And even as PCs continue to morph, the basic value of backward compatibility should ensure that IBM's 20-year-old standard will live on. The soul of the new machine, it appears, will remain the brains of an old one.

Lincoln Spector is a contributing editor for PC World.



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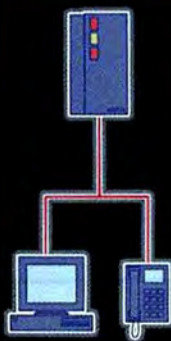
PC WORLD'S ENTERPRISE TECHNOLOGY



Like many a good idea before it, IP telephony has proved to be a late bloomer. For years, merging voice and data networks has promised an array of benefits, ranging from cheaper calls to simpler phones. So what's kept most companies from ditching their traditional phone switches and services? Cold, hard reality—in the form of today's already-overloaded networks. In this month's *Enterprise Technology*, we look at why that situation is changing, especially for internal calls in far-flung organizations. Here's the inside story on how to make a voice-over-IP phone system work for your business—from managers who've made the leap.

We'd like you to tell us what you think of this *Enterprise Technology* special report. Please e-mail your suggestions and feedback to enterprise@pcworld.com.

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IP Telephony Goes

CRAY'S TOM STEPHENS, shown with a Cray supercomputer, built a voice and data network to link disparate offices.

A LOT OF THINGS have changed in the office over the past 25 years. Fax machines transformed document transmission, PCs turned managers and administrators into "knowledge workers," and wireless technology is ushering in a new era of mobility. We've even seen cappuccino makers replace coffee machines.

Yet the telephones gracing the desks of most workers have changed remarkably little. Voice mail is an enduring scourge of the workplace, with cryptic forwarding and conferencing features that flummox even savvy employees. Now Internet Protocol-based data networks—ranging from small local area networks to the Internet—offer a solution: Replace dedicated voice-based systems with phones that connect directly to data networks.

It's an appealing vision. Calls within the business, even among offices at different locations, ride the local or wide area network to bypass phone company fees. Outbound calls pass through a gateway and onto the public switched telephone network (PSTN), ensuring that IP phones can complete calls to any destination.

IP telephony can deliver big-ticket features even to cash-strapped businesses. Voice mail can flow into the same in-box where e-mail and faxes reside, making it easy to track, sort, play, and forward messages. Conference calls and call-forwarding can be set up using intuitive PC-based interfaces. Mobile workers can make calls over the Internet, sidestepping the premiums charged by cell phone service providers and calling cards.

The list of potential benefits is long, but companies haven't rushed to place voice communications on their data networks. Executives have balked at the risk of shifting crucial, established phone operations to failure-prone networks. IP telephony

to Work

Net-based phone systems are finally catching on for business use. Here's the good, the bad, and the future. **By Michael Desmond**

also requires voice-aware network gear such as switches, routers, and gateways that can recognize voice traffic and move it along without delay. Often, companies simply haven't been able to justify expensive upgrades to recently acquired network hardware and software.

BALLISTIC GROWTH

THOSE OBJECTIONS fall by the wayside as network reliability improves and voice-capable network gear proliferates. Market research firm International Data Corpo-

ration projects that paid IP-based call minutes from businesses will skyrocket to nearly 230 billion minutes in 2005, up from 328 million in 2000 (see the "IP Telephony Use" chart on page 142).

Much of the growth is likely to come from enterprises with more than 500 employees. IDC expects IP call-minutes for large businesses to leap to almost 128 billion in 2005 from just 13 million in 2000. In the past, says IDC analyst Elizabeth Farrand, almost all call-minutes came from consumers and small offices. Farrand identifies Net2Phone, an early

provider of consumer-oriented voice-over-IP services, as a key player in the consumer and small-business market.

High hopes are hardly new to IP telephony. A 1998 IDC report projected that it would be "widely deployed" in businesses by 2001. But Erin Thompson, an analyst for telecommunications industry think tank Allied Business Intelligence, believes the logjam is on the verge of breaking. "It's definitely taking a little bit longer than some people had expected," she says. "A lot of the activity has just happened in the last six months." ▶

IP Telephony Tips From Experts

Lessons Learned: Secrets of IP Telephony Success

SO YOU'RE CONSIDERING a switch to IP telephony. Before you make the leap, learn a thing or two from the people who make the gear and have survived the process.

Stay staff savvy: Companies should not jettison their telephony staff. IT personnel may know IP, but they won't have mastery of call-related issues like setting up dial plans. Companies will also need a plan to merge their IT and telephony staffs.

Avoid chitchat: IP phones aren't passive devices. They talk to the network and trade information frequently. The result is a lot of overhead that can make network management a chore. Putting your voice operations on a virtual local area network is an easy way to prevent your data network operations from bogging down.

Know your integrator: The most important party in an IP deployment is the systems integrator. Make sure that you're comfortable with your integrator and that the project manager on the job is ready and willing to communicate with your company regarding project undertakings and issues.

Train, train, train: From telephony and IT staff to end users, everyone in the company will need training on the new IP phones and systems. If you don't get end users up to speed quickly, you could face an ugly backlash as users blame the equipment for problems. Cray set up a teaching lab with 20 IP phones, where an instructor could step employees through the new system.

Don't take chances:

Unless you have the benefit of a clean-slate start, consider deploying an IP telephony trial before committing your business to the system. Lucent is taking this approach by deploying IP phones to all 2500 employees at a newly opened building. The company is acquiring valuable experience with the technology that it can later transfer to the rest of the business.

Tighten up IT: People simply won't tolerate problems in their phone system. Make

sure that your IT department has the tools, skills, and discipline needed to finely control bandwidth prioritization, voice quality, service levels, and overall network health. Conducting an in-depth review of network traffic patterns before deployment will help IT identify staffing and equipment needs.

Respect the culture: Is your business ready for IP telephony,

and does it need to make the switch? Review your business's IT skill sets and try to gauge whether your employees need a more advanced phone setup.

Be smart: Seek the insight of people in your IT and phone organizations who understand the IP technology and its implications. Look beyond immediate cost issues, and listen to your IT and telephone staffs. Your business and technical staffs will have to work together to develop a realistic vision for the new system.



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While most IP growth today is concentrated in smaller, more nimble organizations, some large deployments are under way. Dow Chemical is in the process of rolling out 40,000 IP telephones, and Lucent has begun a trial installation of 2500 phones at its facility in northern Illinois. Cisco Systems, a leading IP telephony vendor, has more than 25,000 IP phones on its desks worldwide. After all these years, IP telephony appears to be poised for success. But why now?

Ken Camp, a senior member of the technical staff at telecommunications training firm Hill Associates, is a specialist in IP telephony. Camp says that enormous growth in available bandwidth has set the stage for adoption. At the same time, big and small companies alike are assessing the potentially large cost savings of moving phones onto the IP network.

HIGH PRICE, NO DICE

FOR GROWING small businesses—200 users or more—the affordability of an IP system over a personal branch exchange (PBX) phone system is the key issue, according to Camp. “Cisco makes [an IP] gateway that’s about \$25,000. But when you look at an investment into a PBX, it’s typically \$150,000 to \$200,000 for comparable hardware,” he says.

Past and Projected IP Telephony Use

BUSINESS TYPE	Time (millions of minutes)	
	In 2000	In 2005
Large enterprise (500+ employees)	13	127,574
Small or medium-size company	315	102,094
Total	328	229,668

Source: IDC, 2001

Tom Stephens, network group leader for supercomputer manufacturer Cray, cites cost as a main reason the company rolled out 650 IP phones at its offices in Chippewa Falls, Wisconsin, and Mendota Heights, Minnesota. Cray had split from its parent company—Silicon Graphics—in April 2000, and was deploying a new data network and replacing an existing PBX system in the process. When Stephens compared costs between a PBX upgrade and an IP telephony deployment, the numbers weren’t even close.

“We got a traditional PBX quote, and since we had to put in an all-data network too, we put them together,” recalls Stephens. “The cost of going with a traditional PBX was about equal to the cost of a whole data and voice network. So basically, we got the data network for free.”

Of course, your current phones aren’t

going to cut it on an ethernet network. IT departments should plan for sticker shock when it comes to outfitting employees with IP phones equipped with ethernet jacks and network components. 3Com’s SIP Phone, for instance, retails for \$395, which is about twice the cost of a high-end traditional desktop phone.

RELIABILITY RULES

DESPITE TECHNOLOGICAL advances, migrating to IP telephony is not a move to be taken lightly. Performance lags that would go unnoticed on a data network can significantly degrade IP voice quality. Bill Erdman, director of product management in Cisco’s Enterprise Voice and Video Business Unit, says that the onus falls on IT departments to keep their networks in top working condition.

“You need to run a tight ship in the IT organization,” Erdman emphasizes. “[IT departments] have to have a consistent policy on how they will prioritize applications and telephony.”

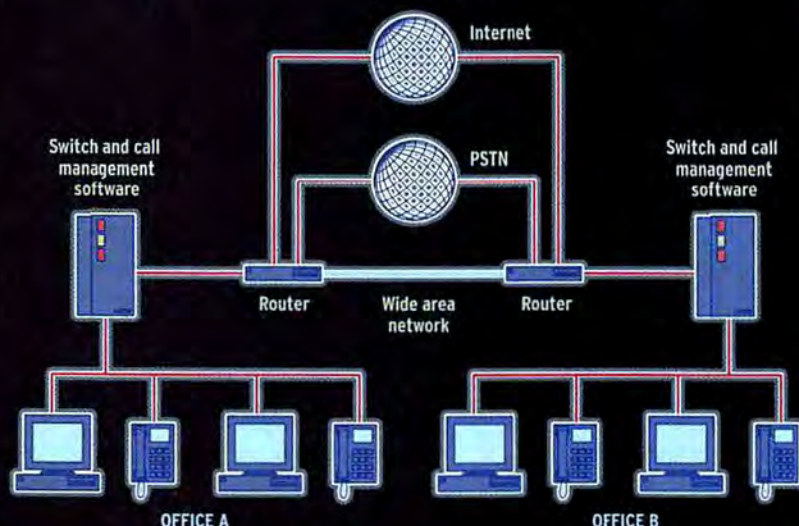
In fact, the lack of traffic prioritization on the public Internet is a key reason why IP telephony exists primarily within private networks. IT organizations can deploy equipment and software to ensure a satisfactory level of service on their managed networks, but no such capability exists on the Internet.

Camp believes that IP coverage and service quality on public networks is too spotty for businesses to tolerate. “If I’ve got six offices and they are all on Sprint’s backbone and Sprint will offer 50- or 60-millisecond delivery, then okay,” he says. “But if you pass from AT&T to UUNet to Genuity, all bets are off.”

Despite these problems, an emerging standard known as multiprotocol label switching (MPLS) promises to deliver high-quality voice capability over the public Internet. In essence, MPLS lets systems create virtual switches over the network, creating a stable pathway that eliminates delay. The sticking point, says Camp, is that support for MPLS must be designed into Internet routers. “From a technical perspective, MPLS sounds like a wonderful solution. From a reality perspective, how many routers have to be replaced to

How Voice Over IP Puts Phone Calls and Data Traffic on One Network

Converged networks use switches and routers to send internal calls over the same data network used by PCs, transmit external calls out over the public switched telephone network (PSTN), and allow remote callers to make calls over an Internet link. Here’s how a setup for a company with two offices might look.



make this [system] fairly ubiquitous?"

That is not to say that you can't make IP telephony work for you on the PSTN. Using advanced equipment and software, an employee working in Atlanta can call a vendor in Seattle and have that call routed through a corporate gateway in Bellevue, Washington. A coast-to-coast connection becomes a local call.

Cray's Stephens says that his company is saving \$1000 to \$2000 per month by routing calls from the Wisconsin office through Cray's Mendota Heights, Minnesota, facility. Not only are interoffice calls handled by the wide area network, but calls made to other companies in the Twin Cities region hop off the WAN and become local calls as well.

Camp also urges companies to carefully consider equipment choices. "Think about a call to 911," he says. "Okay, I've got an IP address. How does that tie into the 911 database so the emergency crews can find us? How do you do caller ID if it's gatewayed through an IP network?"

ORDER OUT


ANY MOVE to IP telephony raises the age-old dilemma of buying versus building. Do you bring in your own staff and telephony gear and manage the systems yourself, or do you buy IP telephony as a service from an outside provider? For many companies, the answer is to outsource.

"There are powerful arguments for the whole concept of hosted voice," observes IDC's Farrand. "Enterprises can focus on their core competencies. This is the case for the ASP [application service provider] model as a whole. They don't have to be responsible for upgrades on an ongoing basis. They don't have to lay out dollars up front for equipment."

Nor is outsourcing phone services unheard of. Regional Bell companies have marketed the Centrex telephony service to small and medium-size businesses for years. Businesses pay a monthly fee for phones, service, and Centrex phone lines. The provider handles call and line management at its central office, eliminating the need for an expensive PBX.

Service providers are now bringing this model to IP telephony. Companies like

BOB MUSOR, vice president of worldwide sales for Internet security start-up **Viaquo**.



"We had a small PBX that we'd outgrown. We'd have had to pay \$40,000 for an upgrade. [With GoBeam's service] I'd say our savings are at least two-to-one."

GoBeam and Shoreline Communications host servers and gateways that process and route client calls. Besides maintaining all the hardware and software, the provider works with third-party integrators to establish dedicated network connections between customers and its facilities.

The cost advantages can be dramatic, according to Bob Musor, vice president of worldwide sales for Viaquo, a 50-person Internet security start-up that uses the GoBeam service. "We had a small PBX that we'd outgrown," says Musor. "We'd have had to pay \$40,000 for an upgrade. Taking into account the cost of the equipment and amortizing it over a period of time, I'd say our savings are at least two-to-one."

Of course, any outsource decision carries risk. Rocky economic times have seen many ASPs go under or sell out to other companies, sometimes resulting in ser-

vice disruptions. Customers may also find themselves at the mercy of their provider's upgrade and service maintenance schedules, sometimes leaving glaring shortcomings unaddressed.

Ultimately, outsourcing offers many companies a way to move into IP telephony incrementally. "There's nothing to say, when a company chooses an outsourcing solution, that they can't choose later on to do an internal solution," says Farrand.

BUSINESS CLASS

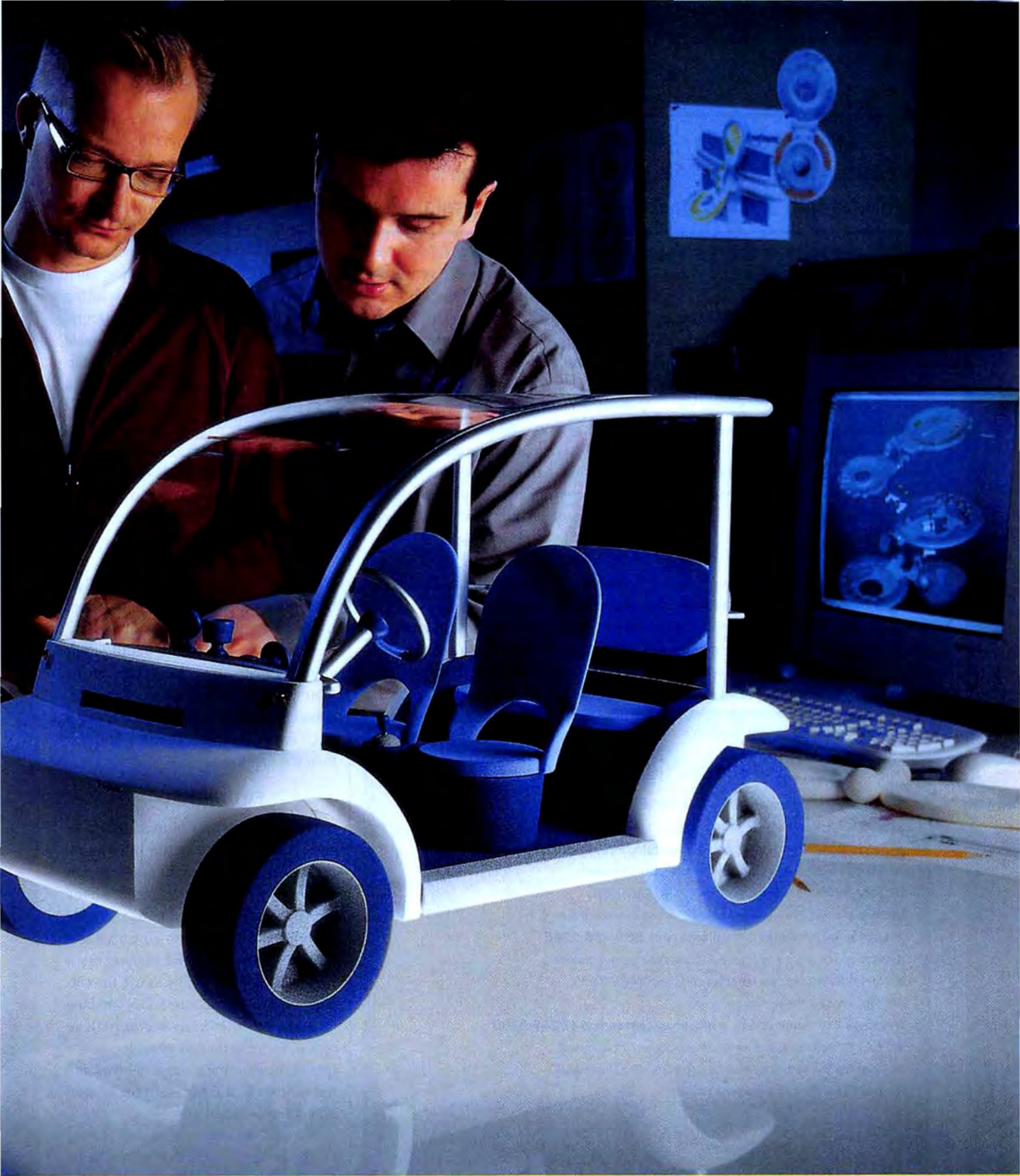
IP TELEPHONY is by no means a one-size-fits-all solution. In fact, it should particularly appeal to small businesses, which typically have more-flexible infrastructures and lower capital migration costs than their larger counterparts. Small companies can tap into outsourced services as a way to jump over to IP-based tele- ►

A woman with dark hair, wearing a light-colored button-down shirt over a dark top, is focused on sketching a car interior on a piece of paper. She is holding a pencil. The background is dimly lit with blue light, showing various design sketches and a computer monitor.

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For larger firms, **IP telephony** is likely to be a **build-your-own proposition**. But few observers believe that the **transition** to consolidated **data and voice networks** will happen **overnight**.

phony. Camp points to providers like NeTrue, GoBeam, and Shoreline Communications as key players.

"Companies like [those] are making pretty significant inroads into what we call the Unfortunate Five Million. Everyone concentrates on the Fortune 500, and the rest are on their own," Camp says.

Outsourcing is also an option available to larger companies that want to test IP telephony in a remote office. But limited service areas are likely to frustrate plans to link offices spread over wide distances, Farrand warns.

For larger firms, IP telephony is likely to be a build-your-own proposition. Larger firms can benefit from consolidated data and voice network operations, but few observers believe that the transition will happen overnight. In fact, according to Kurt Jacobs, director of marketing for

telephony equipment provider Sphere Communications, many enterprises will wait as long as they can afford to.

"For the biggest companies, [IP telephony] is probably five to seven years off. They really have to go through a long process," says Jacobs. "One of two things will change them: First, the midlevel companies that are fast growing will have this technology and will have applications that give them a competitive advantage. Second, they may get a true visionary with political clout in the organization. But those types of people are pretty few and far between."

In the meantime, the technical and cost obstacles to IP telephony are falling fast. As voice capabilities are built into contemporary network routers and switches, companies find that more of their network infrastructure is ready to carry voice communications. Still, Jacobs expects that most large networks will need updating

to make them universally voice-aware.

Not surprisingly, many companies find that a move to IP telephony makes the most sense on brand-new networks. Lucent, for example, undertook its 2500-seat trial when the company occupied a newly built office building outside Chicago.

Similarly, Cray launched its effort when it moved into new offices after splitting from its parent company. Stephens found that his IT organization had little trouble getting the phones to work, despite unforgiving deadlines and an initially difficult learning curve. In fact, IP telephony has improved Cray's data operations.

"It actually makes your data network better," Stephens says. "If a data network is slow, people are tolerant of that. But they are not tolerant of problems on a voice network. So problems get cleaned up faster than before."

Farrand says that most enterprise-class businesses will take Lucent's approach of trying out the technology in a single business unit or locale before betting their entire company on it. "Most corporations aren't going into this thing wholesale, although some have. But they are trying it out," says Farrand. "That's a familiar theme across the board."

IP Telephony Names to Know

Equipment Providers

- **3Com**, www.3com.com, 800/638-3266
Network and telephony gear for businesses; IP phones
- **Avaya Communications**, www.avaya.com, 908/953-6000
Telephony hardware and solutions for enterprise customers
- **Cisco Systems**, www.cisco.com, 408/526-7208
Network and telephony gear for businesses and service providers
- **Lucent Technologies**, www.lucent.com, 888/458-2368
Network and telephony gear for businesses and service providers
- **Nortel Networks**, www.nortel.com, 800/466-7835
IP telephony gear for service providers
- **Sphere Communications**, www.spherecom.com, 847/247-8200
IP PBX, PBX extension, and integrated solutions for businesses
- **Sylantro Systems**, www.sylantro.com, 408/626-2300
Hardware and software for service providers

Service Providers

- **GoBeam**, www.gobeam.com, 866/462-3269
- **Net2Phone**, www.net2phone.com, 973/412-2800
- **NeTrue Communications**, www.netrue.com, 714/870-0861
- **SBC Communications**, www.sbc.com, 800/562-8000
- **Shoreline Communications**, www.shoretel.com, 408/331-3300

FUTURE PROOF

WHILE THE REALITY of making end-to-end IP-based calls over the Internet remains years removed, businesses can achieve big gains by converging phone networks with managed local and wide area networks. Access to advanced features, intuitive user and management interfaces, and the ability to use the corporate WAN to bypass the PSTN combine to make IP telephony a compelling option. Factor in the considerable cost savings of maintaining a single network and network staff, and the math for IP telephony seems to add up.

"We sold the system to our executives on the futures," says Cray's Stephens. "The potential is so big...that if you're thinking about a PBX upgrade you really need to think about this."

Michael Desmond is a frequent contributor to PC World.

New Web Accelerators Speed E-Business

THERE WAS a time when America Online had performance issues—serious performance issues. AOL couldn't buy its way out of the cellar when it came to serving up Web pages quickly and reliably. Or maybe it could.

By the fall of 1998, the Internet giant had bought and deployed Inktomi Traffic Server software for its entire network, and performance picked up. Recent benchmark tests conducted by Visual Net-

works rated AOL among the top Internet service providers at downloading Web pages. Such results have sparked greater interest in Web caching appliances—devices that store frequently visited Web sites to help accelerate access.

In May, IBM announced that it would roll out a line of EServer XSeries Internet caching appliances based on Excelsior software developed by Volera, a subsidiary of Novell. Similar products from Compaq and Hewlett-Packard based on technology from Inktomi are on the way as well. (Compaq also has appliances based on Novell software.) These new devices will compete with products from companies like Dell, Network Appliance, and CacheFlow. With so much activity, it's no wonder that research firm IDC sees appliance server revenues growing at an annual rate of 56 percent between now and 2005.

Speed gains aside, appliance servers also "address ease-of-use and deployment [issues]...to deliver a solution that reduces the demands being placed on IT personnel," says Mark Melenovsky, IDC's manager of enterprise server research.

ACCELERATORS IN ACTION

CACHING APPLIANCES are designed to be easy to set up and manage. All the necessary parts—hardware, software, and operating system—come bundled and ready to operate. The appliances typically sit in a couple of places along the network (see figure)—between the Web site and the

Internet, or between ISPs and Web users.

That lets them speed a Web site's response to end users by storing content close to the user and eliminating the need to send requests over the Internet. By

Downloads such as large media files are good caching candidates, while data that changes constantly may not be.

Like other servers, caching appliances are available in various configurations and

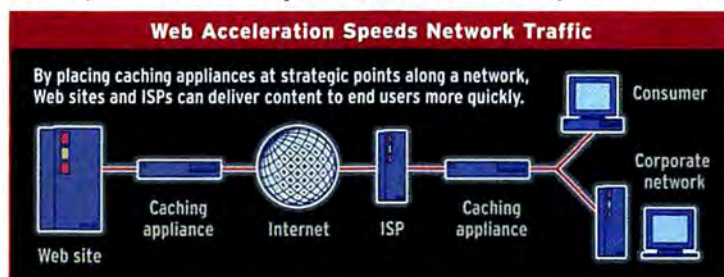
prices, depending on how much power you need. For instance, Compaq's TaskSmart C600 starts at \$5170 for a unit with a 667-MHz processor and 256MB of memory that can handle roughly 250 requests per second. At

the high end, the TaskSmart C2500 starts at \$39,950 for a model with an 866-MHz processor and 4GB of memory that handles about 2400 requests per second.

But you don't need to buy caching appliances to realize some of their benefits. Many sites outsource caching to content delivery networks like Akamai and Digital Island. These service providers deploy armies of cache servers throughout the world. A number of large sites such as CNet.com, CNN Interactive, and Yahoo use Akamai, while others (like Reuters and MSN) use Digital Island. For maximum acceleration, you could use caching appliances in front of your Web servers along with a content delivery network.

The more global your reach, the more likely you are to need a content delivery network, but for intranets and smaller-scale Web infrastructures, caching appliances make sense. Ultimately, any enterprise can benefit from Web caching.

—Brad Grimes ►



most estimates, caching appliances handle 35 to 60 percent of user requests for data at sites where they're installed. They also protect a site from surges in network traffic that might overwhelm it.

In addition, caching appliances can cover a site's backside in the event that a server goes down. If the Web site itself is inoperable, caching devices will continue serving up data until the central server is repaired. And any caching appliance worth considering should have built-in failover capabilities so that if one malfunctions, another will pick up the load.

CACHE QUESTIONS

WHEN NAVIGATING the crowded field of caching appliances, look for products that can handle the traffic you expect your Web site to draw and that can grow to meet future demands. Ask vendors about such issues as the number of requests per second that their products can accommodate. And consider your site's content:

Where to Get Information About Caching Appliances

- CacheFlow, www.cacheflow.com/products
- Caching 101, www.caching.com/caching101.htm
- Compaq, www.compaq.com/tasksmart/cseries
- Dell, www.dell.com/us/en/biz/products/model_pwrap_1_pwrap_cache.htm
- IBM, www.ibm.com/servers
- Inktomi, www.inktomi.com/products/cns/products
- Network Appliance, www.networkappliance.com/products/netcache
- Volera, www.volera.com/products/excelerator

Videoconferencing Gets the Picture

YOU STILL DON'T have a videoconferencing system at your company? No surprise, really. Serious videoconferencing systems used to run to five figures, were hard to set up, and had limited functionality. But with its latest release, PictureTel (www.picturetel.com, 800/716-6000) may cause companies to reconsider videoconferencing as a way to enable workers in remote offices to collaborate.

Bud Parer, IS manager for the Computer Division of Parker Hannifin in Rohnert Park, California, says his group used to spend a lot of time flying to meetings with a related group in Milford, Ohio. "Now we've set up a virtual hallway using a couple of PictureTel 600 units," he says.

Codeveloped by Sharp Electronics, the PictureTel 600 Series, which starts at \$6995, is a compact (15 by 12.7 inches) and lightweight (11.5 pounds) videocon-

ferencing system and PC in one. Tight integration of its functions lets you share slide shows and other documents on screen during your conference. The unit comes with a 566-MHz Celeron processor, 128MB of RAM, a 10GB hard drive, an ethernet 10/100 port, two USB ports, and Windows 2000.

You transfer data to the PictureTel 600 either by hooking your notebook to the base unit or by using a LAN connection. There is no CD-ROM or floppy drive, which makes loading software tricky, but if you have apps like PowerPoint on your notebook, you can share data with the group. "Our people are comfortable plugging their notebooks into projectors, so plugging into the PictureTel unit is a no-brainer," explains Parer.

The device is easy to shuttle from room to room, and if you have a flat-panel LCD on your wall, you can detach the camera/microphone and rest it on top of your thin display. You can also operate the system with its bundled remote control or wireless keyboard. All in all, the PictureTel 600 offers an economical and versatile way to delve into videoconferencing.

—Brad Grimes



PictureTel 600 Series

Dell Rolls Out Enterprise Services

ANY IT MANAGER will tell you that deploying new enterprise applications and servers can be a labor-intensive, time-consuming process. Before Dell popularized its build-to-order model, the same could have been said for rolling out new PCs. So it makes sense that Dell is pushing further into enterprise services with its Infrastructure Accelerators program (www.dell.com/accelerators), in which the company builds and deploys custom solutions based on software from I2, Microsoft, Oracle, SAP, and others.

For companies that need the quickest implementation, Dell offers off-the-shelf Infrastructure Accelerator solutions. For example, data centers in need of a database setup yesterday can order Dell's Oracle 8i Database Appliance. It's built around the Dell PowerEdge 6450, a rack-optimized server with one, two, or four Xeon processors running at 700 MHz. The server is validated by Dell, and a Dell technician can install it.

Once the boxes are in place, Dell will offer companies a new line of high-level Premier Enterprise Services (www.dell.com/enterpriseservices). Although the company has



long provided enterprise services, including standard problem resolution and software support, Dell's Premier Enterprise Services division promises the kind of attention that large data centers need. At the Gold level, for example, Dell assigns a technical team to your account. Bump up

to the Platinum service level, and you get a dedicated technical account manager. The basic Bronze and Silver packages—and the Gold package—are sold in three-year contracts based on the server. Dell's Platinum service is based on a one-year, custom-bid contract.

Recently the Cornell Theory Center, a research center at Cornell University's Ithaca, New York, campus, moved to Dell servers running Microsoft Windows 2000 Advanced Server. Installation—from cutting the purchase order to flipping the switch—took just seven days. And Dell is instrumental in keeping the network running.

"Our [Dell] technical account manager knows us completely," says David Lifka, CTC systems director. "He understands what we're talking about, and is able to pull in the appropriate Dell and Microsoft contacts when required. He truly knows our environment as well as we do."

—Brad Grimes ■



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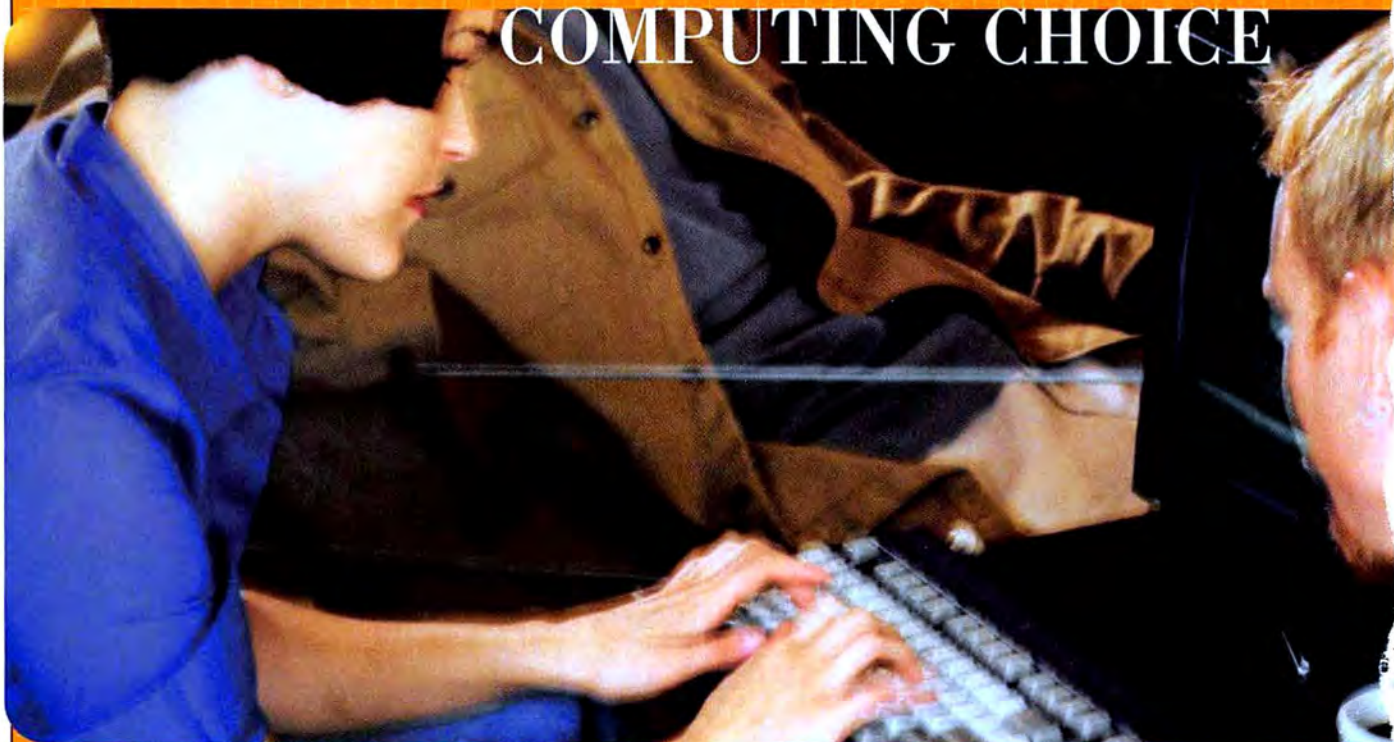
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Have you taken a look at your home PC lately? Your kids are abandoning it because it can't support their favorite games. And if you're using a broadband Internet connection, you may have noticed by now that your old 56K modem wasn't the only thing slowing you down. Indeed, yesterday's screamer is today's dinosaur: new PCs blaze at Gigahertz speeds, and even notebooks are reaching the 1-GHz performance mark.

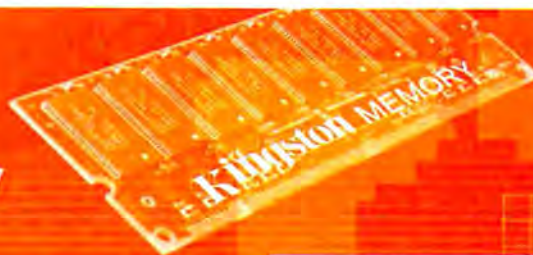


Dinosaurs can still become multimedia and gaming dynamos, when you buy the same memory upgrades used by professional designers, video editors, and other high-performance users. "Adding memory is the fastest, smartest, and least expensive way to boost your system's performance," says Jason Jacobi, a spokesman at Kingston Technology Company Inc., the world's largest independent memory manufacturer. "Press reports have already shown the risks of overclocking [pushing CPUs past their approved limits] and the high costs of swapping in a new processor. Memory upgrades for PCs, notebooks, and other devices have proven to be reliable and the most effective route."

Professional PC users have counted for years on Kingston's memory products to keep their systems up to date. (Top-tier system manufacturers build Kingston memory into their new systems.) Each month, Kingston builds and tests more than two million customized modules for desktops, notebooks, printers, handheld devices, graphic cards, and digital cameras.

Business or Pleasure

Now consumers can get that same memory, factory-direct, through Kingston's new Web site, www.Shop.Kingston.com. The site helps all users find memory that is perfectly compatible with their systems. "You don't have to know the difference between EDO and PC100 modules to find the



right memory on our site," Jacobi says. Shop.Kingston's product search tool, The Kingston Memory Configurator, eliminates any worries about compatibility by allowing shoppers to sort memory by system model, memory specification, or Kingston part number. And users of PDAs, digital cameras, and MP3 players can search for memory according to the types of devices they're using.

Shop.Kingston also makes upgrades easier by providing shortcuts for most PCs and handheld devices. And if users still have questions about their memory requirements, they can always call Shop.Kingston, toll-free and 24/7, at 800-435-0057.

Shop.Kingston's customers don't have to wait long for their upgrades. All orders ship same-day, and overnight delivery is available. The site also provides easy-to-follow upgrade guides, and free, around-the-clock telephone technical support for each module.

Shop.Kingston can also offer competitive pricing to its customers. The site regularly features value pricing on high-performance modules, and rebates for new products. By selling Kingston memory directly to consumers, the site can deliver memory of unparalleled quality at a low price. Individual users receive the same lifetime warranties as Kingston's business customers, and each module undergoes the same rigorous testing at the manufacturer's facilities.

Spokesman Jacobi says Shop.Kingston will help make Web surfing, gaming, and multimedia exciting on more kinds of systems than ever before. "With Shop.Kingston.com," he says, "consumers now have the same opportunity as our business customers to get the best memory on the market, at a great price, for their high-performance needs."



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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 Single or Multiuser

All PC America Software requires Microsoft Windows. The software was written in Visual Basic using Microsoft Access Files. The source code is available.

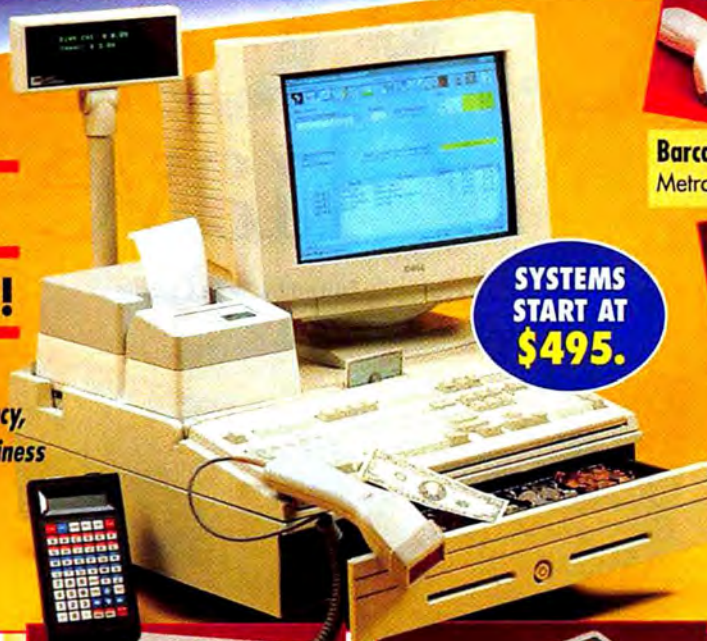
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Credit Card Readers \$189*

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TOP 100

the eyes have it

Edited by Seán Captain

158 Power PCs



162 Value PCs



166 Notebook PCs



168 Home PCs



171 Printers



173 Monitors



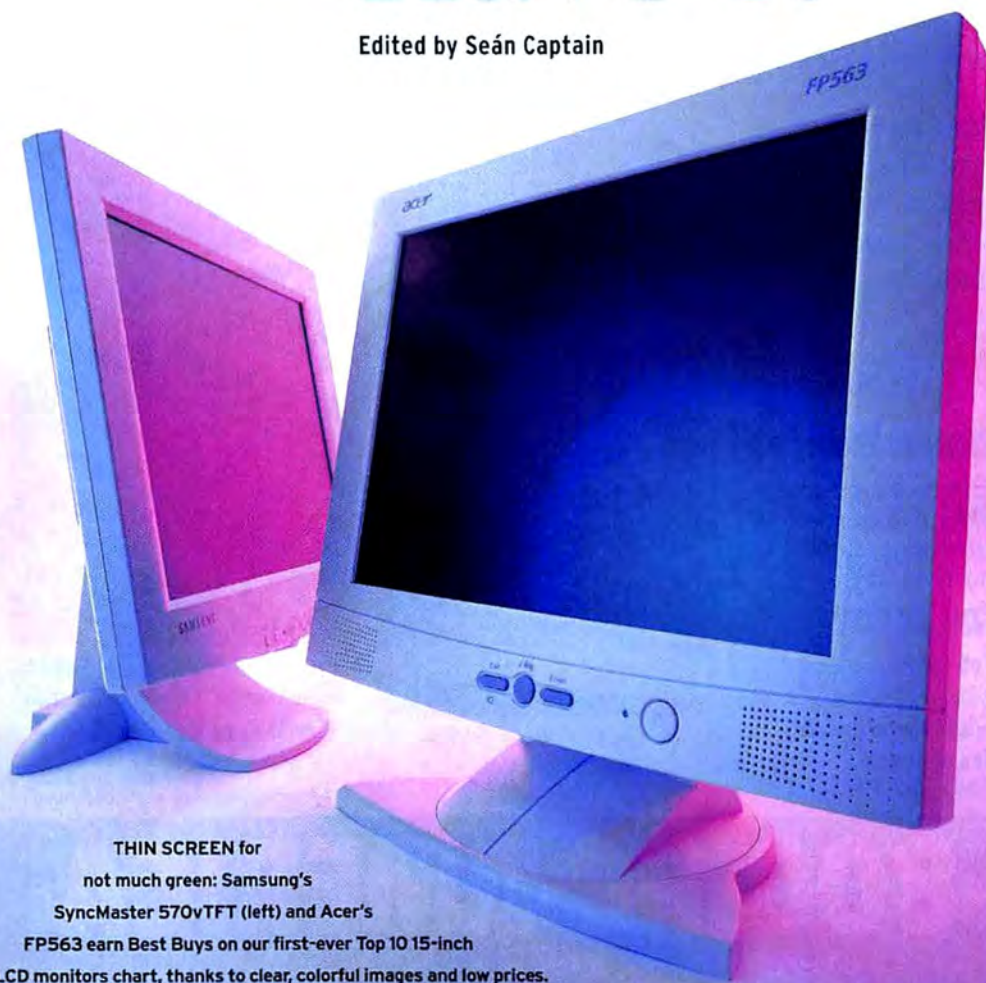
175 Graphics Boards



177 CD-RW Drives



179 Digital Cameras



THIN SCREEN for
not much green: Samsung's
SyncMaster 570vTFT (left) and Acer's
FP563 earn Best Buys on our first-ever Top 10 15-inch
LCD monitors chart, thanks to clear, colorful images and low prices.

IMAGE IS EVERYTHING THIS MONTH—with new products ranging from low-cost LCD monitors to high-end digital cameras, home video-editing workstations, and NVIDIA's latest graphics chip set.

Sleek, flicker-free LCD monitors are desirable beauties, but high prices have made them too expensive for most buyers—until recently. Our first *Top 10 Monitors* chart dedicated to flat panels ranks 15-inch models that

carry affordable prices (from \$499 to \$899) and deliver the sharp text and bright graphics LCDs are known for.

Looking for pretty pictures to display on your LCD? Why not take them yourself? Our Top 10 list of digital cameras priced over \$500 ranks new entries from some of the biggest names in digital photography—including Canon, Fujifilm, and Nikon—plus a big name from the automobile world. Fujifilm's FinePix 6800 Zoom, number four on our chart, is en-

cased in a handsome alloy shell created by F. A. Porsche, a design firm that was founded by the grandson of the famous automaker. Another sports coupe of the photo world, Nikon's new Coolpix 995, captures a Best Buy, thanks to some of the most impressive

digital images we've seen, a rechargeable lithium-ion battery, and a gaggle of advanced features for photo fanatics.

The PC can now handle not only snapshots but also motion pictures. HP's Pavilion 9800 and Gateway's Performance 1700, newcomers to our power home PCs chart, pack IEEE 1394 cards for importing video from a digital camcorder, massive hard drives for storing the footage, and video-editing software for creating your

own Academy Award winner. The Gateway carries a TV-tuner card, too, so you can watch the Oscars on your monitor.

LITTLE ZIP FROM NEW CHIP

BUT GATEWAY'S latest entry—the first 1.7-GHz Pentium 4 system in our home PCs lineup—won't win any awards for speed. The Performance 1700 finished well behind 1.2- and 1.33-GHz Athlon PCs on our PC WorldBench 2000 tests of Windows Me systems. Meanwhile, our

new power home Best Buy, the Athlon-1330-equipped MicronPC Millennia Max XP2, set a new speed record for home systems.

Our Top 10 power chart for business PCs welcomes its first 1.7-GHz P4 systems: the Sys Performance 1700 and the Dell Dimen-

sion 8100. Like their Windows Me-based kin, these Windows 2000 systems trail their Athlon-powered rivals, though the Sys narrows the performance gap.

Another new chip debuts on our *Top 10 Graphics Boards* chart. After much fanfare, cards with NVIDIA's latest graphics chip set, the GeForce3, are appearing on store shelves. But our tests of the VisionTek GeForce3 card were somewhat disappointing: Its performance numbers were about equal to those produced by cards with NVIDIA's previous-generation GeForce2 Ultra chip—except at the highest resolutions and color depths.

The GeForce3 may yet live up to its billing, though, because it provides full support for DirectX 8, Microsoft's latest application programming interface for

graphics. Few DirectX 8 games have been released so far, but NVIDIA promises they will have near-cinematic-quality effects.

Freelance writers Richard Jantz, Dan Littman, Joel Strauch, and Carla Thornton, and PC World editors Lisa Cekan, Rebecca Freed, Alexandra Krasne, Heather Morra, Kalai Murugesan, Kalpana Narayanamurthi, Melissa J. Perenson, and Alan Stafford contributed to this month's Top 100 section. Ulrike Diehlmann, Matt Halloran, Robert James, Elliott Kirschling, Jeff Kuta, Danny W. Lam, and Thomas Luong of the PC World Test Center performed testing, with support from Julio Giannobile and Julian Weatherby. ▶

YOUR GUIDE TO THE TOP 100

QUESTIONS ABOUT OUR CHARTS? The following information should answer them.

How do the charts work? Each month we test a large number of PCs, printers, monitors, graphics boards, CD-RW drives, scanners, and digital cameras and compare them with previously reviewed products. Only the best products land on the charts, which are refreshed monthly. System configurations are shown as tested. Vendors may have since changed components.

What does the overall rating mean? This 100-point scale reflects results from our hands-on evaluations and performance tests. A score in the 90s is exceptional, while one in the 70s is above average.

What does the PC WorldBench 2000 score mean? It's a measure of how fast a PC can run a mix of common business applications as compared with our baseline machine, an HP Pavilion 8380 with a PII-400 CPU, 96MB of RAM, and an 8GB hard drive. For example, a PC that scores 200 is twice as fast as the baseline system.

Where do the scores for reliability, support quality, and support policies come from? Reliability and support quality scores are based on surveys of *PC World* readers and on anonymous support calls made by *PC World* staff. The policies score is based on vendor support policies.






NIKON'S COOLPIX 995 wowed us with its beautiful images and advanced controls.



POINT YOUR browser to www.pcworld.com/reviews/topcharts for late-breaking reviews of desktop computers and other products covered in the Top 100. You can find details about the PC WorldBench 2000 test suite and how we run it at www.pcworld.com/benchmark.

TOP 10 POWER PCs

	POWER SYSTEM	Month tested	★ Overall rating	Street price (5/4/01)	PC WorldBench 2000 performance score ¹	Faster	Base configuration
1	 Dell OptiPlex GX400 800/388-8542 www.dell.com	July 01	85	Expensive: \$2605	Good 203		Very good: Pentium 4-1400, 256MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
2	 MicronPC Millennia Max XP2 800/642-7667 www.micronpc.com	June 01	83	Average: \$2414	Very good 210		Good: Athlon-1200, 128MB of DDR SDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
3	Polywell Poly 880KR-1300 800/999-1278 www.polywell.com	July 01	83	Expensive: \$2799	Outstanding 224		Outstanding: Athlon-1333, 256MB of DDR SDRAM, 256KB L2 cache, two 30GB hard drives, 19-inch monitor, Windows 2000
4	Micro Express MicroFlex 1333A 800/989-9900 www.microexpress.net	July 01	83	Inexpensive: \$1799	Outstanding 231		Good: Athlon-1333, 256MB of DDR SDRAM, 256KB L2 cache, 40GB hard drive, 15-inch LCD monitor, Windows 2000
5	Gateway Professional S1500 800/428-3929 www.gateway.com	May 01	83	Average: \$1997	Good 200		Good: Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
6	Sys Performance 1700 800/613-9963 www.sys.com	NEW	82	Average: \$2325	Very good 215		Very good: Pentium 4-1700, 256MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
7	NuTrend Athlon Mega 2 888/482-6678 www.nutrend.com	NEW	81	Very inexpensive: \$1299	Outstanding 178		Good: Athlon-1333, 128MB of DDR SDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows Millennium Edition
8	Dell Dimension 8100 800/388-8542 www.dell.com	NEW	81	Expensive: \$2366	Good 198		Good: Pentium 4-1700, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, 19-inch monitor, Windows 2000
9	Xi Computer 1333 DDR MTower SP 800/432-0486 www.xicomputer.com	July 01	81	Expensive: \$2599	Very good 216		Outstanding: Athlon-1333, 256MB of DDR SDRAM, 256KB L2 cache, two 30GB hard drives, 19-inch monitor, Windows 2000
10	HP Vectra VL800 800/752-0900 www.hp.com/desktops	Apr 01	79	Very expensive: \$3659	Good 208		Outstanding: Pentium 4-1500, 256MB of RDRAM, 256KB L2 cache, 40GB hard drive, 21-inch monitor, Windows 2000
 Best Buy		Percent of overall rating ▶		Price: 10 percent	Performance: 25 percent	Base configuration: 10 percent	

¹ A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 157.

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).



DELL AND MICRONPC remain atop our chart, but three newcomers enter the lower half. The Sys Performance 1700, at number six, boasts the highest PC WorldBench 2000 score yet for a Pentium 4 system. NuTrend's Athlon Mega 2 lands in seventh place, and Dell's Dimension 8100 takes number eight.

1 DELL OPTIPLEX GX400



WHAT'S HOT: The 19-inch Dell P991 monitor delivered deep, rich colors and sharp text with only slight blurring at the maximum resolution of 1600 by 1200. The black, midsize tower case offers chassis-intrusion detection, a double-loop case lock, and four rear-mounted USB ports. Dell's OpenManage software permits remote upgrades, diagnoses, and maintenance. Expansion options abound, with five open slots and four open drive bays.

WHAT'S NOT: Only a basic information guide ships with this OptiPlex, though the

Resource CD-ROM contains detailed documentation. The system's reliance on RDRAM makes memory upgrades pricey. **WHAT ELSE:** Armed with a P4-1400 CPU, 256MB of RDRAM, and Windows 2000, the GX400 earned a PC WorldBench 2000 score of 203—average for a system of its configuration. The combination 8X/4X/32X CD-RW and 8X DVD-ROM drive saves space but doesn't match the performance of the best individual units. **BEST USE:** With speed, a beautiful monitor, and high-end management features, the OptiPlex GX400 will suit corporations that demand desktops with extra kick.

2 MICRONPC MILLENNIA MAX XP2



WHAT'S HOT: The system's 19-inch MicronPC 910EX monitor displays deep, rich colors, and text remains sharp even at our maximum test resolution of 1600 by 1200. Three open PCI slots and three open drive bays provide tool-less expansion options. Two of the Millennia Max XP2's four USB ports are conveniently mounted in front.

WHAT'S NOT: Though typing is smooth on the basic MicronPC keyboard, the keys clack loudly and feel loose.

WHAT ELSE: With a 1.2-GHz Athlon CPU, 128MB of DDR SDRAM, and Windows 2000, the Millennia Max XP2 achieved a score of 210 on PC WorldBench 2000—about what we'd expect from a machine equipped like this one. MicronPC recently reduced the Millennia line's warranties for all parts and labor to one year each. Microsoft's Office 2000 Small Business

Extra features	Design and expandability ²	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Very good: Dell GeForce2 GTS graphics card (32MB DDR SDRAM), 8X DVD-ROM and 8X/4X/32X CD-RW combo drive, network adapter, Wake-on-LAN, Dell LegacySelect, OpenManage software	Good: case is a bit difficult to open; midsize tower; 4 open drive bays, 5 open slots	Outstanding	Good/Outstanding	24/7, toll-free	3/3
Outstanding: Creative Labs NVidia GeForce2 Ultra graphics card (64MB DDR SDRAM), 8X/4X/32X CD-RW drive, V.90 modem, Microsoft Office 2000 Small Business Edition	Good: front-mounted USB ports; midsize tower; 3 open drive bays, 3 open slots	Good	Good/Good	24/7, toll-free	1/1
Outstanding: Leadtek WinFast GeForce2 Ultra graphics card (64MB DDR SDRAM), 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, V.90 modem, network adapter, Lotus SmartSuite Millennium Ed.	Good: tool-less access to slots; midsize tower; 5 open drive bays, 1 open slot	Good	Fair */ Good	24/7, toll-free	3/5
Outstanding: Gainward CardExpert GeForce2 Ultra graphics card (64MB DDR SDRAM), 12X DVD-ROM drive, 8X/4X/32X CD-RW drive, V.90 modem, network adapter	Good: large, neat interior; midsize tower; 3 open drive bays, 3 open slots	Good	Fair */ Outstanding	24/7, toll-free	4/4
Outstanding: ATI Radeon graphics card (32MB SDRAM), 12X/8X/32X CD-RW drive, V.90 modem, network adapter, Microsoft Office XP SBE, Norton AntiVirus 2001, Wake-on-LAN	Good: tool-less access to slots; midsize tower; 4 open drive bays, 2 open slots	Good	Fair/Outstanding	24/7, toll-free	3/3
Very good: Gigabyte GA-GF1280T-32 graphics card (32MB SDRAM), 16X DVD-ROM drive, 12X/10X/32X CD-RW drive, network adapter	Very good: spacious interior; midsize tower; 4 open drive bays, 4 open slots	Good	Fair */ Good	24/7,* toll-free	Varies */5
Very good: Leadtek WinFast GeForce2 MX graphics card (32MB SDRAM), 16X DVD-ROM drive, V.90 modem, network adapter, Corel WordPerfect Office 2000	Good: well-organized interior; midsize tower; 4 open drive bays, 1 open slot	Good	Fair */ Fair	9/5, toll-free	3/lifetime
Very good: ATI Radeon graphics card (32MB DDR SDRAM), 12X/8X/32X CD-RW drive, 22X-48X CD-ROM drive, network adapter, Microsoft Office XP SBE	Satisfactory: well-organized interior; midsize tower; 2 open drive bays, 4 open slots	Outstanding	Good/Fair	24/7,* toll-free	1/1
Good: Leadtek WinFast GeForce2 Ultra graphics card (64MB DDR SDRAM), 16X/10X/40X CD-RW drive, V.90 modem, Microsoft Office 2000 Professional	Good: floppy drive hard to reach; midsize tower; 3 open drive bays, 2 open slots	Good	Fair */ Outstanding	24/7, toll-free	3/3
Good: HP NVidia GeForce2 GTS graphics card (32MB SGRAM), 12X DVD-ROM drive, network adapter, HP's E-DiagTools, ProtectTools 2000, TopTools management software	Satisfactory: top panel difficult to replace; desktop; 2 open drive bays, 4 open slots	Good	Fair/Good	24/7, toll call	3/3
Extra features: 10 percent	Design and expandability: 15 percent	Reliability: 15 percent	Support and warranty: 15 percent		

² Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

³ Support drops to 9 hours Monday-Friday after one year.

⁵ Six years on CPU and main RAM, three years on other parts.

⁴ Free tech support is limited to one year for the Dimension line.

Edition comes bundled with the system.

BEST USE: With easy upgradability, fine speed, and an excellent display, the XP2 has the chops for any small office.

New on the Chart

6 SYS PERFORMANCE 1700

NEW WHAT'S HOT: Carrying a 1.7-GHz P4 processor and 256MB of RDRAM, this Performance 1700 blasted to a 215 score on PC WorldBench 2000—the highest we've seen from an Intel-powered Windows 2000 PC. The 19-inch ViewSonic PF790 monitor produced vibrant colors and sharp text that blurred only slightly at the maximum 1600 by 1200 resolution. **WHAT'S NOT:** Sys doesn't supply an overall system manual, but you get thorough documentation for individual components. In our last two sets of anonymous tech support calls, Sys representatives had trouble answering some of our questions.

WHAT ELSE: The 12X/10X/32X CD-RW drive is handy for data backups or for burning music CDs. A vast interior provides four open PCI slots and four open drive bays (two of them externally accessible), and a loop-style case lock affords some protection against tampering. The Microsoft Internet Keyboard—with a detachable wrist rest and ten hot-keys for Internet and multimedia shortcuts—allows smooth, quiet typing. The Gigabyte GA-GF1280T-32 graphics board has S-Video and composite-video ports for attaching a compatible television, and an integrated Creative Labs audio chip drives a basic three-piece set of Altec Lansing ACS 33 speakers.

BEST USE: The Performance 1700 offers a powerful foundation with plenty of room to expand in the future.



THE SPEEDY SYS PERFORMANCE 1700 narrows the gap between Pentium 4-based systems and their Athlon rivals.

7 NUTREND ATHLON MEGA 2

NEW WHAT'S HOT: Equipped with a 1.33-GHz Athlon processor and 128MB of DDR SDRAM, this system raced to a creditable score of 178 on our PC WorldBench 2000 tests. An IEEE 1394 (aka FireWire or i.Link) card provides three high-speed ports for connecting digital video ▶

MORE REVIEWS ONLINE



THE FOLLOWING system didn't score high enough to earn a place on the *Top 10 Power PCs* chart. For a write-up, visit www.pcworld.com/t10pcs.

◆ Polywell Poly 850GB-1400

cameras, scanners, or storage devices.

WHAT'S NOT: Though the 19-inch ViewSonic Optquest Z90 monitor displayed vibrant colors and crisp text at 1024 by 768 resolution, we noticed that 12-point text became blurry beginning at a resolution of 1280 by 1024. In our anonymous tech support calls, NuTrend has earned an undistinguished rating of Fair—due in part to vague responses that we received from its representatives.

WHAT ELSE: The unit's one open PCI slot and four open drive bays (three of which are externally accessible) provide room for expansion in the spacious, well-kept interior. Modem and network interface cards furnish connectivity options, and the Leadtek WinFast GeForce2 MX graphics card provides a TV-out port. A Microsoft Internet Keyboard, with ten Internet and multimedia hot-keys, allows smooth and quiet typing. Corel's WordPerfect Office 2000 suite comes bundled.

BEST USE: This speedy small-business system can pinch-hit as a multimedia workstation for tasks such as video editing.

8 DELL DIMENSION 8100

NEW WHAT'S HOT: The Dell M991 monitor (a Best Buy in our last 19-inch monitor review) delivered deep, rich colors, and text blurred only slightly at the highest resolution of 1600 by 1200. Dell bundles Microsoft Office XP Small Business Edition.

WHAT'S NOT: Equipped with Intel's new 1.7-GHz Pentium 4 processor, 128MB of RDRAM, and Windows 2000, the Dimension 8100 earned a 198 on PC WorldBench 2000. Though plenty fast, that's three points below the average for similarly configured 1.5-GHz P4 systems.

WHAT ELSE: The cramped interior offers four free PCI slots and two open drive bays (one externally accessible) that you can reach without tools. The back of the case holds four USB ports, a sturdy double-loop case lock, and a network adapter.

The Dimension 8100 we looked at includes both a 12X/8X/32X CD-RW drive and a 22X-48X CD-ROM drive for easier disc-to-disc copying. The Dell Enhanced



THE DELL DIMENSION 8100, with a 1.7-GHz Pentium 4 CPU, dazzled us with its monitor, but not with its speed.

QuietKey keyboard has four hot-keys for multimedia access and—as you'd expect from its name—allows quiet typing, but the keys respond sluggishly.

Dell recently dropped the standard warranty on its Dimension line from three years to one year for both parts and labor, and it limited free tech support to one year. Buyers can elect to pay extra, however, to extend their coverage.

BEST USE: Its beautiful monitor makes the Dimension 8100 a good choice for business users who spend long hours in front of their screens, but this system doesn't deliver the peak performance its price and processor might suggest. ▶

PHOTOGRAPH ABOVE: RICK RIZNER; PHOTOGRAPH BELOW: MARC SIMON

Are Two Hard Drives Better Than One?

TECH TREND AS PROCESSOR and memory speeds continue to soar, some vendors are using RAID to help hard drives keep pace. A Redundant Array of Independent Disks enables a computer to see two or more hard drives as a single, contiguous disk, increasing the speed at which the system can move data to and from the drives. Traditionally, RAID has been the province of high-speed (and high-cost) hard drives using the SCSI interface. But some systems now use RAID cards to link two of the less-expensive IDE hard drives found in standard desktop PCs—either to increase data throughput or to permit the user to make duplicate copies of data in case one drive fails.

In theory, IDE RAID offers a considerable performance boost. The current IDE interface, ATA/100, can move data to and from the hard drives at up to 100MB per second in small bursts. But even the fastest IDE hard drives can sustain transfer speeds of only 20MB to 40MB per second. Consequently, running two hard drives simultaneously

via RAID lets you squeeze up to twice as much data through the pipe.

Roger Cox, chief analyst with Gartner Dataquest, explains that you



XI COMPUTER'S 1333 DDR MTower SP comes with an IDE RAID card and dual hard drives.

may not see double the performance with every application in a RAID system, but you should notice a boost with disk-intensive operations such as video editing. "They've been proven to do well in situations where you need high streaming rates," says Cox. "[They work] very, very well with video."

It's less clear whether IDE RAID will speed up office computing. In our PC WorldBench 2000 tests, RAID-equipped systems like the number three Polywell Poly 880KR-1300 and the number nine Xi Computer 1333 DDR MTower SP did not outperform similarly equipped competitors that were configured without RAID.

If you often work with hard-drive-hogging streaming-media data, IDE RAID may offer an inexpensive way to speed things up. But for regular computing, or even for power tasks that don't constantly access the hard drive, one disk will do.

SleekLine™ 1000 System



SleekLine™ 1000 Features

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- Integrated Hardware Diagnostics
- SleekLine™ All-Steel, USA-Made Case
- Silencer® 150 1U Ultra-Quiet Power Supply
- Black Keyboard and Mouse
- Windows® Millennium Edition
- NEC 15.1" LCD Monitor Option (pictured)
- 3-year Limited Warranty

The Profile of What's to Come.

Just as the 1U rackmount revolutionized the server market, the SleekLine 1000 Mini 1U computer combines compact size, integrated features, uncompromised performance, and exceptional value, to make bulky PCs a thing of the past.

The versatile SleekLine 1000 sits unobtrusively under your monitor or, with its optional bracket, mounts inconspicuously to the bottom of your desktop (see photo). It can be used for sales presentations on the road, or unlike ordinary PCs, stacked in an array to save space.



With its 1GHz Pentium III, built-in fast Ethernet, high-resolution graphics, and low-profile case, the handsome SleekLine 1000 is the perfect Internet machine, office workstation, or home entertainment computer.




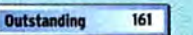

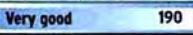




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TOP 10 VALUE PCs

	VALUE SYSTEM	Month tested	★ Overall rating	Street price (5/4/01)	PC WorldBench 2000 performance score ¹ 	Base configuration
1	 Dell OptiPlex GX150 800/388-8542 www.dell.com	June 01	84	Average: \$1447	 190	Good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 2000
2	 ABS Conquest GL 800/876-8088 www.abspc.com	Apr 01	84	Inexpensive: \$1199	 160	Very good: Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Millennium Edition
3	Polywell Poly 830K7-1000 800/999-1278 www.polywell.com		83	Inexpensive: \$1195	 161	Good: Athlon-1000, 256MB of SDRAM, 256KB L2 cache, 40GB removable hard drive, 17-inch monitor, Windows Me
4	NuTrend Athlon Mega 2 888/482-6678 www.nutrend.com	Apr 01	82	Inexpensive: \$1109	 154	Very good: Athlon-950, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, 19-inch monitor, Windows Me
5	MicronPC ClientPro CN 800/642-7667 www.micronpc.com	Oct 00	82	Average: \$1303	 158	Good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 98 SE
6	Tangent Valera 800/342-9388 www.tangent.com	May 01	82	Average: \$1449	 216	Outstanding: Athlon-1200, 256MB of SDRAM, 256KB L2 cache, 30GB hard drive, 17-inch monitor, Windows 2000
7	Gateway E-3400 XL Deluxe 800/428-3929 www.gateway.com	Mar 01	80	Average: \$1686	 190	Good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, 17-inch monitor, Windows 2000
8	Sys Taskmaster 8500 800/613-9963 www.sys.com	May 01	79	Inexpensive: \$1156	 175	Very good: Duron-850, 128MB of SDRAM, 64KB L2 cache, 30GB hard drive, 19-inch monitor, Windows 2000
9	Gateway E-1600 XL 800/428-3929 www.gateway.com	June 01	79	Inexpensive: \$1170	 179	Good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 2000
10	Acer Veriton 3200 800/733-2237 www.acer.com		79	Inexpensive: \$1045	 193	Good: Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, 17-inch monitor, Windows 2000
 Best Buy		Percent of overall rating ▶		Price: 20 percent	Performance: 20 percent	Base configuration: 10 percent

¹ A system's performance word score is relative to the scores earned by other PCs running the same operating system. For more details, see "Your Guide to the Top 100" on page 157.

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).



DELL'S OPTIPLEX GX150 leads off this month, replacing its now-retired teammate, the Dimension 4100, at the top of an all-star lineup. Polywell's zippy Poly 830K7-1000 takes over the third slot, and Acer's Veriton 3200 slips in at number ten. Two other rookies, from Premio and Toshiba, miss the starting squad.

1 DELL OPTIPLEX GX150

WHAT'S HOT: Upgrading or performing maintenance on Dell's OptiPlex GX150 is easy. Pressing a button on either side of the curvy, gray-and-black desktop case releases the lid, which swings up to reveal a small but well-arranged interior. You can remove cards, drives, the power supply, or the motherboard, simply by flipping the appropriate green lever. No slowpoke, the GX150 earned a score of 190 on our PC WorldBench 2000 tests, 11 points above the average for similar 933-MHz Pentium III systems running Windows 2000.

WHAT'S NOT: The system's rear wall—which supports the PCI slot cage—is a bit flimsy. Printed documentation consists of a monitor manual, an OS manual, and a system guide with only basic setup information. (You can get additional documentation on the included OptiPlex Resource CD-ROM or on Dell's Web site.) **WHAT ELSE:** This system holds a number of corporate extras: remote Wake-on-LAN, Dell's OpenManage software, a sturdy twin-loop case lock, and chassis-intrusion detection. It also gives security-conscious administrators remote control over user access to various ports and drives. The

monitor rendered our test images in vibrant colors, and text was clear and legible at 1024 by 768 pixels, though it blurred a bit at the maximum resolution of 1280 by 1024. A basic 8X/4X/32X CD-RW drive, though not a top performer, lets you copy CDs and burn data backups. Two of the system's four USB ports are within easy reach on the front of the case.

BEST USE: This \$1447 feature-rich system offers something for everyone in your company—from system administrators to cost accountants to end users.

2 ABS CONQUEST GL

WHAT'S HOT: Colors on the 19-inch ADI E66 monitor looked rich, while text appeared clean, blurring only slightly at the top resolution of 1600 by 1200. Multimedia accessories include a strong three-speaker Cambridge SoundWorks Digital set and a 16X DVD-ROM drive. In case anything goes wrong,

Extra features	Design and expandability ¹	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: Dell NVIDIA TNT2 Pro graphics card (16MB SGRAM), 8X/4X/32X CD-RW drive, network adapter, Wake-on-LAN, Dell LegacySelect, OpenManage software	Satisfactory: easy-to-open case; desktop; 0 open drive bays, 2 open slots	Outstanding	Good/Outstanding	24/7, toll-free	3/3
Very good: Gigabyte NVIDIA TNT2 M64 graphics card (32MB SDRAM), 16X DVD-ROM drive, V.90 modem, network adapter, Corel WordPerfect Office 2000	Very good: spacious interior; midsize tower; 4 open drive bays, 2 open slots	²	Fair ³/Fair	9/5, toll-free	3/lifetime
Outstanding: MicroStar MS-8818 graphics card (32MB SDRAM), 16X DVD-ROM drive, 12X/10X/32X CD-RW drive, V.90 modem, network adapter	Good: large interior; midsize tower; 3 open drive bays, 4 open slots	²	Fair ³/Good	24/7, toll-free	3/5
Very good: Leadtek WinFast GeForce2 MX graphics card (32MB SDRAM), 16X DVD-ROM drive, V.90 modem, network adapter, Corel WordPerfect Office 2000	Very good: roomy but messy interior; minitower; 4 open drive bays, 2 open slots	²	Fair ³/Fair	9/5, toll-free	3/lifetime
Good: VisionTek TNT2 M64 graphics card (32MB SDRAM), 40X-52X CD-ROM drive, network adapter, Microsoft Office 2000 SBE, Norton AntiVirus 2001, LANDesk Client Manager	Very good: tool-less case removal; midsize tower; 5 open drive bays, 5 open slots	Good	Good/Outstanding	24/7, toll-free	Varies ⁴ /3
Satisfactory: EVGA E-GeForce2 MX graphics card (32MB SDRAM), 12X-40X CD-ROM drive, network adapter, Corel WordPerfect Office 2000	Good: drive bays difficult to access; midsize tower; 4 open drive bays, 4 open slots	²	Fair ³/Good	16/7, ⁵ toll-free	3/3
Very good: ATI Rage 128 Pro GL graphics card (16MB SDRAM), 12X/8X/32X CD-RW drive, Zip 250 drive, network adapter, Intel LANDesk Client Manager	Satisfactory: tool-less hard drive removal; desktop; 0 open drive bays, 3 open slots	Good	Fair/Outstanding	24/7, toll-free	3/3
Good: Gigabyte GA-GF1280T graphics card (32MB SDRAM), 22X-50X CD-ROM drive, network adapter	Good: small but neat interior; minitower; 2 open drive bays, 2 open slots	²	Fair ³/Good	24/7, ⁶ toll-free	Varies ⁷ /5
Satisfactory: integrated Intel 810 graphics (UMA), 20X-48X CD-ROM drive, network adapter, Norton AntiVirus 2001, Intel LANDesk Client Manager, Wake-on-LAN	Satisfactory: neat but tiny interior; compact; 1 open drive bay, 2 open slots	Good	Fair/Outstanding	24/7, toll-free	3/3
Satisfactory: integrated Intel 815E graphics (UMA), 12X DVD-ROM drive, network adapter, PC-cillin 2000 AntiVirus, Intel LANDesk Client Manager	Satisfactory: tool-less drive removal; compact; 0 open drive bays, 3 open slots	²	Fair ³/Good	24/7, toll-free	3/3
Extra features: 10 percent	Design and expandability: 10 percent	Reliability: 15 percent	Support and warranty: 15 percent		

¹ Insufficient data to give a rating, or the rating is derived from the vendor's Reliability and Service survey scores for its home PCs. For tech support quality, this rating may also depend on our anonymous support-quality calls.

² Five years on CPU and main RAM, three years on other parts.

³ Support drops to 9 hours Monday-Friday after one year.

⁴ Support drops to 9 hours Monday-Friday after one year.

⁵ Six years on CPU and main RAM, three years on other parts.

ABS offers a lifetime labor warranty to complement its three-year parts coverage. **WHAT'S NOT:** Customer support is not stellar: ABS's tech support quality rates only Fair in our anonymous service calls. **WHAT ELSE:** Running Windows Me, the \$1199 Conquest GL earned a score of 160 on PC WorldBench 2000—about equal to the average performance of similarly equipped Athlon-1000 systems. Microsoft's Internet Keyboard allows smooth, quiet typing and provides ten hot-keys for multimedia and Internet access. Corel's WordPerfect Office 2000 and a thorough system manual come bundled. Color-coded ports and a color instruction poster make setup a snap. Two open PCI slots and four open drive bays (three externally accessible) are available for expansion, with some wires cluttering the otherwise spacious interior. The system has both a modem and a network adapter. **BEST USE:** An impressive PC for the

money, this ABS would make a solid small-office system for buyers on a tight budget.

New on the Chart

3 POLYWELL POLY 830K7-1000

NEW **WHAT'S HOT:** With a 1-GHz Athlon processor, 256MB of SDRAM, and Windows Me, the \$1195 Poly 830K7-1000 posted an impressive 161 on PC WorldBench 2000—about equal to the average performance of Pentium 4-1500 systems with the same amount of RAM. The 40GB hard drive rests in a caddy that slides out of the front of the case for easy removal. It is not hot-swappable, however. **WHAT'S NOT:** Though the 17-inch ViewSonic Optiquest Q71 monitor displayed vibrant colors, 12-point text became blur-



CHEAP AND FAST: Polywell's budget-priced 830K7-1000, with a 1-GHz Athlon processor, rivals 1.5-GHz P4 systems.

ry at 1024 by 768 resolution and remained so at the maximum resolution of 1280 by 1024. In our most recent anonymous calls to tech support, Polywell's representatives were friendly but sometimes had difficulty troubleshooting our problems. The system includes only a generic computer user's manual. ►

MORE REVIEWS ONLINE



THE FOLLOWING systems didn't score high enough to earn places on the *Top 100 Value PCs* chart. For write-ups, visit www.pcworld.com/t100pcs.

- ◆ Premio Aries M133
- ◆ Toshiba Equium 8000S

WHAT ELSE: The interior offers ample expansion room, with four open PCI slots and three open drive bays (two externally accessible). A 12X/10X/32X CD-RW drive lets you burn data discs relatively quickly. The standard keyboard rattles and has a diminutive <Backspace> key. A modem and a network adapter let you connect to an ethernet network, broadband modem, or dial-up Internet account. The Micro-Star MS-8818 graphics board contains S-Video and composite ports for sending a signal to a compatible TV.

BEST USE: With impressive performance and a removable hard drive, this Poly will suit users who shuttle large amounts of data, as well as small businesses that need to store sensitive information off-site.

10 ACER VERITON 3200

NEW WHAT'S HOT: Packing a powerful 1-GHz Pentium III CPU under its hood, the Veriton 3200 earned a score of 193 on our PC WorldBench 2000 tests—11 points (or about 6 percent) above the average mark for similarly configured Windows 2000 systems. A double-loop case lock and a chassis-intrusion detector help protect the PC's internal components, while Intel's LANDesk Client Manager software allows remote diagnosis, troubleshooting, and software upgrades. The front of the blue-and-beige compact case provides headphone and microphone jacks and two USB ports (which are supplemented by two USB ports on the back).

WHAT'S NOT: Colors on the 17-inch Acer V771 monitor looked good in our image tests, but 12-point text appeared slightly fuzzy at 1024 by 768 resolution and blurred more at the maximum resolution of 1280 by 1024. All the drive bays are full, and the three open PCI slots can accept only low-profile expansion cards.



LITTLE PC FOR BIG COMPANIES: Acer's Veriton 3200 offers speed and management features for a low price.

WHAT ELSE: You don't need any tools to remove the floppy and 12X DVD-ROM drives. The Veriton Keyboard—with a detachable wrist rest, a volume control knob, and 12 programmable shortcut keys—permits smooth typing, but the small <Backspace> key is easy to miss.

BEST USE: Admirable performance, management features, and a reasonable price of \$1045 make the Veriton 3200 a nice fit for cost-conscious corporations. ▶

Notebook Graphics Reach the Third Dimension

TECH TREND RUNNING HIGH-PERFORMANCE graphics applications, such as video games, has never been a forte of notebook PCs—their graphics technologies have historically trailed those of desktops by several generations. But notebooks are catching up, thanks to new chips from ATI and NVIDIA.

Laptops remain about a half-generation behind, says Reuven Soraya, director of mobile marketing at ATI, "but with every new generation, we have come up with a [mobile] product that [narrows] the gap." A couple of years ago, for instance, few notebooks had more than 1 or 2 megabytes of graphics memory—far too little to match the fast frame rates and 3D rendering delivered by desktop graphics boards. Today, ATI's Mobility Radeon graphics processor (expected in laptops in June) and NVIDIA's GeForce2 Go mobile processor can support up to 64MB of dedicated video RAM, just as their desktop counterparts can.

The biggest constraint on mobile graphics remains the challenge of squeezing a high-performance processor into the tight quarters of a notebook. Heat will always be an issue, according to Bryan Del Rizzo, spokesperson for mobile graphics at NVIDIA. Thanks to the smaller die size of the latest chips, however, it's now possible to fit more transistors onto cooler-running graphics pro-

cessing units for mobile PCs. Desktop GPUs still have more power, however: The desktop GeForce2 Ultra processes 1 billion pixels per second, versus 286 million pixels per second for the GeForce2 Go.

Buyers are drawn to the perceived advantages of notebooks with 3D graphics, says Peter Glaskowsky, senior analyst for 3D and multimedia technology at research firm MicroDesign Resources. But most people aren't fully using those 3D capabilities. "You'll see people playing [games] on airplanes," he says, "but most of them are happy with solitaire. I haven't seen anyone playing Quake on a notebook."

Glaskowsky believes that 3D operating systems will create the first widespread use for 3D acceleration in notebooks. But for notebooks and desktops, that application is three to five years away, due to the as-yet prohibitively high screen resolutions needed to display text on 3D texture maps.

In the meantime, operating systems like Mac OS X and the upcoming Windows XP will use what

Glaskowsky calls "2.5D" interfaces containing features such as buttons or folders that have a 3D appearance. Glaskowsky says that 3D accelerators can handle these effects easily, whether they are on a desktop, a laptop, or a palmtop. In fact, both ATI and NVIDIA are considering extending 3D graphics acceleration to handheld computers.



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www.minolta-qms.com

TOP 15 NOTEBOOK PCs

POWER NOTEBOOK: \$2700 AND OVER		Month tested	★ Overall rating	Street price (5/11/01)	PC WorldBench 2000 performance score ¹	Faster	Base configuration
1	Dell Inspiron 8000 800/388-8542 www.dell.com	July 01	89	Inexpensive: \$2739	Good 141		Good: Pentium III-900/700, 15-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 20GB hard drive, Windows Me
2	Gateway Solo 9500 800/846-2000 www.gateway.com	July 01	85	Average: \$3428	Outstanding 191		Good: Pentium III-1000/700, 15.7-inch active screen, touchpad, 256MB of SDRAM, 32GB hard drive, Windows 2000
3	WinBook Z1 800/965-9349 www.winbook.com	(NEW)	84	Expensive: \$3539	Outstanding 195		Very good: Pentium III-1000/700, 15-inch active screen, touchpad, 256MB of SDRAM, 30GB hard drive, Windows 2000
4	Dell Latitude C800 800/388-8542 www.dell.com	June 01	84	Expensive: \$3643	Good 166		Very good: Pentium III-850/700, 15-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 32GB hard drive, Windows 2000
5	Acer TravelMate 739TLV 800/733-2237 www.acer.com/aac	Apr 01	84	Inexpensive: \$2799	Satisfactory 157		Good: Pentium III-850/700, 15-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
MIDRANGE NOTEBOOK: \$2000 TO \$2699		Percent of overall rating ▶		Price: 14 percent	Performance: 20 percent	Base configuration: 5 percent	
1	Dell Inspiron 4000 800/388-8542 www.dell.com	July 01	89	Inexpensive: \$2091	Good 142		Good: Pentium III-900/700, 14.1-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 10GB hard drive, Windows Me
2	Dell Latitude C600 800/388-8542 www.dell.com	June 01	85	Expensive: \$2635	Very good 164		Good: Pentium III-750/600, 14.1-inch active screen, touchpad, eraserhead, 128MB of SDRAM, 10GB hard drive, Windows 2000
3	Fujitsu LifeBook E Series 877/372-3473 www.fujitsu.com	(NEW)	85	Average: \$2299	Very good 149		Very good: Pentium III-850/700, 14.1-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 98 SE
4	HP Omnibook 500 800/752-0900 www.hp.com	Mar 01	84	Average: \$2294	Satisfactory 149		Good: Pentium III-600/500, 12.1-inch active screen, eraserhead, 128MB of SDRAM, 20GB hard drive, Windows 2000
5	MicronPC Transport LT 800/642-7667 www.micronpc.com	May 01	83	Average: \$2327	Good 154		Good: Pentium III-700/550, 13.3-inch active screen, touchpad, 128MB of SDRAM, 20GB hard drive, Windows 2000
BUDGET NOTEBOOK: UNDER \$2000		Percent of overall rating ▶		Price: 17 percent	Performance: 17 percent	Base configuration: 5 percent	
1	Gateway Solo 5300 800/846-2000 www.gateway.com	Feb 01	87	Average: \$1684	Good 147		Very good: Pentium III-650/500, 14.1-inch active screen, touchpad, 128MB of SDRAM, 10GB hard drive, Windows 2000
2	Dell Inspiron 2500 800/388-8542 www.dell.com	June 01	84	Inexpensive: \$1199	Poor 105		Satisfactory: Celeron-700, 14.1-inch active screen, touchpad, 64MB of SDRAM, 5GB hard drive, Windows Me
3	Toshiba Satellite 2805-S202 800/867-4422 www.csd.toshiba.com	May 01	83	Average: \$1699	Good 135		Good: Pentium III-700/550, 14.1-inch active screen, eraserhead, 128MB of SDRAM, 10GB hard drive, Windows Me
4	WinBook J1 800/965-9349 www.winbook.com	July 01	82	Average: \$1697	Outstanding 147		Good: Pentium III-1000, 13.3-inch active screen, touchpad, 192MB of SDRAM, 10GB hard drive, Windows Me
5	Compaq Presario 17XL460 800/345-1518 www.compaq.com	(NEW)	82	Expensive: \$1899	Good 131		Very good: Pentium III-700/550, 14.1-inch active screen, touchpad, 128MB of SDRAM, 15GB hard drive, Windows Me
Best Buy		Percent of overall rating ▶		Price: 20 percent	Performance: 14 percent	Base configuration: 5 percent	

¹ Performance word scores reflect comparisons of PCs in the same price category running the same operating system. For more details, see "Your Guide to the Top 100" on page 157.

² Unless otherwise noted, all notebooks come with a lithium ion battery.

³ Includes computer; adapter; power cord; and floppy, DVD-ROM, or CD-ROM drive.



THREE NEWCOMERS SHAKE UP the *Top 15 Notebook* PCs lineup, but not enough to topple two returning Best Buys from Dell and Gateway. Dell earns another Best Buy on the power chart, as IBM has discontinued the ThinkPad A21p.

WinBook's latest version of its Z1, equipped with a 1-GHz processor, snags third place on the power chart with an astoundingly high PC WorldBench 2000 score of 195—the best performance we've seen from

a notebook. Shorter-than-average support hours and a \$3539 price tag prevented the WinBook Z1 from moving up any higher.

On the midrange side, the \$2299 Fujitsu LifeBook E Series lands in third place. E Series laptops have two unique features: shortcut buttons that can double as a password security system, and an infrared port conveniently designed especially for use with a wireless mouse.

Extra features ²	Design and ease of use	Battery life (hours:min)	Travel weight (pounds) ³	Vendor's system reliability	Tech support quality/policies	Tech support (hours/days, charge)	Warranty for parts/labor (years)
Good: multipurpose bay, 8X DVD-ROM drive, built-in modem and network adapter, Microsoft Works 2001	Excellent: S/PDIF connection, high-res screen; could have better audio shortcut button design	Satisfactory/ 2:54	Heavy/ 9.2	Good	Good/ Good	24/7, toll-free	1/1
Good: 8X DVD-ROM drive, LS-120 drive, built-in modem and network adapter	Very good: large laptop has giant screen and multimedia connections; noisy keyboard, fans	Good/ 3:05	Heavy/ 9.0	Fair	Fair/ Good	24/7, toll-free	3/3
Good: two multipurpose bays, combination 8X DVD-ROM and 24X/4X/4X CD-RW drive, built-in modem	Very good: easy to upgrade but lacks network connection, and screen overlaps front edge	Good/ 3:06	Heavy/ 8.5	Fair	Good */ Fair	13/6, toll-free	3/3
Very good: multipurpose bay, 8X/4X/24X CD-RW drive, 8X DVD-ROM drive, PC Card modem and network adapter	Very good: beefy big-screen desktop replacement comes with built-in wireless networking	Good/ 3:00	Very heavy/ 9.4	Good	Good/ Good	24/7, toll-free	3/3
Good: single multipurpose bay, 8X DVD-ROM drive, built-in modem and network adapter, Microsoft Works 2000	Very good: bulky all-in-one; fingerprint reader helps foil data thieves	Very good/ 4:23	Heavy/ 8.1	Good	Good */ Fair	24/7, toll-free	1/1
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		
Good: two multipurpose bays, 8X DVD-ROM drive, built-in modem and network adapter, Microsoft Works 2001	Very good: lots of add-ins, dual pointing devices, optional color palm rests and screen back	Good/ 3:14	Average/ 8.0	Good	Good/ Good	24/7, toll-free	1/1
Satisfactory: multipurpose bay, 10X-24X CD-ROM drive, PC Card network adapter	Excellent: wireless-ready, dual pointing devices, accommodates raft of extra-cost add-ins	Good/ 3:45	Average/ 7.8	Good	Good/ Good	24/7, toll-free	3/3
Satisfactory: multipurpose bay, 8X DVD-ROM drive, built-in modem and network adapter	Very good: wireless mouse; dual-purpose buttons for shortcuts, security system	Satisfactory/ 2:50	Average/ 7.8	Fair	Poor/ Fair	24/7, toll-free	1/1
Satisfactory: two multipurpose bays, 12X-24X CD-ROM drive, built-in modem and network adapter	Excellent: legacy-light ultraportable with steady keyboard and full-featured media slice	Good/ 3:09	Average/ 7.5	Good	Fair */ Fair	24/7, toll call	1/1
Good: multipurpose bay, 8X DVD-ROM drive, built-in modem and network adapter, Microsoft Office 2000 SBE	Very good: lightweight one-bay portable can use optional \$19 USB floppy drive	Satisfactory/ 2:40	Average/ 7.1	Fair	Fair/ Good	24/7, toll-free	3/3
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		
Satisfactory: multipurpose bay, 10X-24X CD-ROM drive, built-in modem and network adapter	Very good: removable hard drive, handsome black-and-silver case, but wobbly keys	Good/ 3:07	Average/ 7.1	Fair	Fair/ Fair	24/7, toll-free	3/3
Satisfactory: multipurpose bay, 10X-24X CD-ROM drive, built-in modem, Microsoft Works 2001	Average: colorful palm rests can be swapped out; dual-purpose buttons inconvenient to use	Poor/ 1:29	Average/ 7.7	Good	Good/ Good	24/7, toll-free	1/1
Satisfactory: 8X DVD-ROM drive, built-in modem and network adapter, Lotus SmartSuite	Average: no docking connection; conveniently located CD player buttons, good stereo sound	Satisfactory/ 2:59	Heavy/ 8.5	Fair	Fair/ Good	24/7, toll-free	1/1
Satisfactory: 8X DVD-ROM drive, built-in modem and network adapter	Average: no PS/2 port or second PC Card slot; uses desktop CPU	Satisfactory/ 2:23	Average/ 7.1	Fair	Good */ Fair	13/6, toll-free	3/3
Satisfactory: multipurpose bay, 8X DVD-ROM drive, built-in modem and network adapter, Microsoft Works 2000	Very good: slim and light with lots of shortcut buttons and distinctive black-and-silver case	Good/ 3:19	Average/ 7.0	Fair	Fair/ Fair	24/7, toll-free	1/1
Extra features: 5 percent	Design and ease of use: 10 percent	Battery life: 8 percent	Weight: 8 percent	Reliability: 20 percent	Support and warranty: 10 percent		

* Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

The least expensive of the chart newcomers, Compaq's stylish \$1899 Presario 17XL460 climbs aboard the budget chart in the number five spot. This laptop offers

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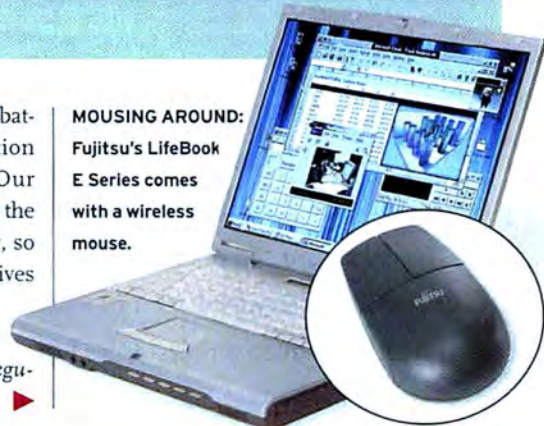


FOR DETAILED write-ups of all the new notebooks that we tested this month, visit PCWorld.com (www.pcworld.com/t15notebooks).

a black-and-silver case, above-average battery life, and extensive documentation geared toward computer novices. Our only beef: Neither the floppy drive nor the DVD-ROM drive connects externally, so you're reduced to juggling the two drives in the notebook's single internal bay.

Contributing Editor Carla Thornton regularly covers notebooks for PC World. ▶

MOUSING AROUND: Fujitsu's LifeBook E Series comes with a wireless mouse.



TOP 15 HOME PCs

	POWER SYSTEM: \$2000 AND OVER	Month tested	★ Overall rating	Street price (5/4/01)	PC WorldBench 2000 performance score ¹	Base configuration ²
1	 MicronPC Millennia Max XP2 800/642-7667 www.micronpc.com	NEW	90	Average: \$2599	Outstanding 189	Very good: Athlon-1333, 256MB of SDRAM, 256KB L2 cache, 60GB hard drive, midsize tower, 19-inch monitor, Windows Millennium Ed.
2	Dell Dimension 8100 800/388-8542 www.dell.com	Mar 01	89	Average: \$2570	Satisfactory 157	Good: Pentium 4-1500, 128MB of RDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Me
3	HP Pavilion 9800 800/752-0900 www.hp-at-home.com	NEW	87	Inexpensive: \$2499	Very good 177	Very good: Athlon-1333, 256MB of SDRAM, 256KB L2 cache, 75GB hard drive, midsize tower, 19-inch monitor, Windows Me
4	Compaq Presario 7000Z 800/345-1518 www.compaq.com	July 01	86	Very inexpensive: \$2216	Very good 176	Very good: Athlon-1200, 256MB of SDRAM, 256KB L2 cache, 75GB hard drive, midsize tower, 19-inch monitor, Windows Me
5	Gateway Performance 1700 800/846-2000 www.gateway.com	NEW	83	Average: \$2699	Good 162	Very good: Pentium 4-1700, 128MB of RDRAM, 256KB L2 cache, 76GB hard drive, midsize tower, 19-inch monitor, Windows Me
MIDRANGE SYSTEM: \$1200 TO \$1999		Percent of overall rating ▶		Price: 10 percent	Performance: 20 percent	Base configuration: 10 percent
1	 HP Pavilion 9820 800/752-0900 www.hp-at-home.com	May 01	86	Inexpensive: \$1326	Good 153	Good: Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 60GB hard drive, tower, 17-inch monitor, Windows Me
2	IBM NetVista A40i 888/746-7426 www.ibm.com/products	Apr 01	83	Expensive: \$1848	Very good 160	Satisfactory: Athlon-1000, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, minitower, 17-inch monitor, Windows Me
3	HP Pavilion 7875 800/752-0900 www.hp-at-home.com	June 01	83	Expensive: \$1998	Outstanding 166	Good: Athlon-1300, 128MB of SDRAM, 256KB L2 cache, 80GB hard drive, minitower, 17-inch monitor, Windows Me
4	ABS Multimedia System XP 800/876-8088 www.abspc.com	July 01	79	Expensive: \$1999	Outstanding 166	Very good: Athlon-1200, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Me
5	ABS All-U-Can 800/876-8088 www.abspc.com	March 01	76	Expensive: \$1899	Good 153	Good: Pentium III-933, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 19-inch monitor, Windows Me
BUDGET SYSTEM: UNDER \$1200		Percent of overall rating ▶		Price: 15 percent	Performance: 15 percent	Base configuration: 10 percent
1	 NuTrend Athlon Force 2 888/482-6678 www.nutrend.com	Feb 01	79	Inexpensive: \$879	Very good 161	Good: Athlon-900, 128MB of SDRAM, 256KB L2 cache, 20GB hard drive, midsize tower, 17-inch monitor, Windows Me
2	ABS Multimedia System 2 800/876-8088 www.abspc.com	Apr 01	78	Expensive: \$1129	Very good 161	Outstanding: Athlon-1100, 128MB of SDRAM, 256KB L2 cache, 30GB hard drive, midsize tower, 19-inch monitor, Windows Me
3	Dell Dimension L800CX 800/388-8542 www.dell.com	July 01	78	Average: \$929	Satisfactory 130	Satisfactory: Celeron-800, 128MB of SDRAM, 128KB L2 cache, 20GB hard drive, minitower, 17-inch monitor, Windows Me
4	Polywell Poly KLX-850D 800/999-1278 www.polywell.com	June 01	77	Average: \$999	Satisfactory 141	Good: Duron-850, 128MB of SDRAM, 64KB L2 cache, 30GB hard drive, midsize tower, 17-inch monitor, Windows Me
5	HP Pavilion 7800 800/752-0900 www.hp-at-home.com	July 01	74	Average: \$999	Good 147	Very good: Pentium III-1000, 128MB of SDRAM, 256KB L2 cache, 40GB hard drive, midsize tower, 17-inch monitor, Windows Me
 Best Buy		Percent of overall rating ▶		Price: 20 percent	Performance: 10 percent	Base configuration: 10 percent

¹ Performance word scores reflect comparisons of PCs in the same price category running the same operating system. For more details, see "Your Guide to the Top 100" on page 157.

² Vertical cases are towers (over 20 inches), midsize 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).



NEW SYSTEMS WITH THE LATEST processors from AMD and Intel go head-to-head this month. AMD's new CPU raises the performance bar even higher than the Athlon 1.2-GHz processor did in our February 2001 chart. MicronPC's Millennia Max XP2 and Hewlett-Packard's Pavilion 9800, each equipped with a 1.33-GHz AMD Athlon processor, easily outdistanced Gateway's Performance 1700—the only PC on the chart with Intel's 1.7-GHz Pentium 4.

With the highest PC WorldBench score we've recorded on the Home PC chart and a solid list of features, MicronPC's Millennia Max XP2 earns our power Best Buy rating. A fine machine for SOHO users, it includes Microsoft Office Small Business Edition as well as Norton Anti-Virus 2001. For \$100 less, HP's Pavilion 9800 has a less robust software bundle but comes with an IEEE 1394 card—a sig-

Extra features ¹	Setup/ ease of use	Graphics	Reliability/ support	Comments
Very good: VisionTek NVIDIA GeForce2 Ultra graphics board (64MB DDR SDRAM), 16X DVD-ROM drive, 12X/10X/32X CD-RW drive, network adapter	Satisfactory/ Good	Very good	Good/ Good	PRO: Astronomical system performance score; high frame rates on 3D games. CON: Micron's 900Mx monitor produces dull colors overall.
Very good: Dell NVIDIA GeForce2 Ultra graphics board (64MB DDR SDRAM), 12X DVD-ROM drive, 12X/8X/32X CD-RW drive, network adapter	Outstanding/ Good	Very good	Outstanding/ Outstanding	PRO: Loaded with extras; powerful graphics card features DDR memory. CON: Disappointing PC WorldBench 2000 performance, given its P4 processor.
Very good: Asus NVIDIA GeForce2 GTS Pro graphics board (64MB DDR SDRAM), 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, network adapter	Satisfactory/ Good	Very good	Fair/ Fair	PRO: Comes with IEEE 1394 card; backlit keyboard includes Internet and audio controls. CON: Monitor's text and icons lack sharpness at most settings.
Very good: Creative Labs 3D Annihilator 2 Ultra graphics board (32MB SGRAM), 16X DVD-ROM drive, 12X/4X/32X CD-RW drive, network adapter	Good/ Good	Very good	Poor/ Fair	PRO: First-class business and graphics performance, vast hard drive, ample memory, IEEE 1394 port. CON: Poor reliability score.
Very good: VisionTek NVIDIA GeForce2 Ultra graphics board (64MB DDR SDRAM), 16X DVD-ROM drive, 12X/8X/32X CD-RW drive, network adapter	Outstanding/ Satisfactory	Good	Fair/ Fair	PRO: Separate graphics and TV-tuner cards, plus an IEEE 1394 adapter. CON: The latest P4 processor shows an insignificant performance gain.
Extra features: 10 percent	Setup/ease of use: 5 percent	Graphics: 15 percent	R & S: 30 percent	
Very good: Asus NVIDIA GeForce2 GTS graphics board (32MB DDR SDRAM), 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, network adapter	Satisfactory/ Good	Good	Fair/ Fair	PRO: SOHO PC drops by \$173; monitor offers excellent color reproduction. CON: Free tech support limited to one year; sound system lacks depth.
Satisfactory: IBM NVIDIA GeForce2 GTS graphics board (32MB SGRAM), 8X/4X/32X CD-RW drive	Outstanding/ Satisfactory	Good	Good/ Fair	PRO: More-than-capable graphics performer; IBM monitor shows crisp images; sturdy multimedia keyboard. CON: Free tech support limited to three years.
Very good: Asus NVIDIA GeForce2 MX graphics board (32MB SGRAM), 16X DVD-ROM drive, 8X/4X/32X CD-RW drive, network adapter	Satisfactory/ Good	Very good	Fair/ Fair	PRO: Graphite-colored PC offers great performance on business applications and graphics. CON: Cramped case; speakers deliver weak, tinny sound.
Very good: ATI All-in-Wonder Radeon graphics board (32MB SDRAM), 16X DVD-ROM drive, 16X/10X/40X CD-RW drive, network adapter	Satisfactory/ Satisfactory	Good	*/Fair *	PRO: \$100 less; has both a Creative Labs' Platinum 5.1 sound card and a Live-Drive front panel for sound buffs. CON: Confusing (but ample) documentation.
Good: ATI All-in-Wonder Radeon graphics board (32MB SGRAM), 16X DVD-ROM drive, 12X/10X/32X CD-RW drive	Good/ Good	Good	*/Fair *	PRO: Graphics card supports video capture and TV-on-demand; Cambridge speakers supply impressive sound. CON: 3D game playback appeared banded.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	
Good: Gigabyte NVIDIA Riva TNT2 M64 graphics board (32MB SDRAM), 12X DVD-ROM drive, network adapter	Satisfactory/ Satisfactory	Satisfactory	*/Fair *	PRO: Ties for top speed in budget chart; handsome multimedia keyboard; price drops \$80 again this month. CON: Lackluster performance in our gaming tests.
Satisfactory: Leadtek WinFast GeForce2 MX graphics board (32MB SDRAM), 16X DVD-ROM drive	Good/ Satisfactory	Good	*/Fair *	PRO: \$90 price drop; 19-inch monitor displays sharp text; nice-sounding speakers. CON: 3D games looked banded; blurry menu screens on DVD playback.
Satisfactory: integrated Intel 810 graphics (UMA), 8X/4X/32X CD-RW drive	Outstanding/ Very good	Limited	Outstanding/ Outstanding	PRO: Competitive price for PC with CD-RW drive; easy-to-open case. CON: Low WorldBench score; integrated graphics and no AGP slot limit graphics potential.
Good: Leadtek WinFast GeForce2 MX graphics board (32MB of SDRAM), 12X DVD-ROM drive, network adapter	Outstanding/ Satisfactory	Good	*/Fair *	PRO: Good frame rates on our 3D games; sharp DVD playback. CON: Warm tones translated poorly on Optique7 Q71 monitor; text lacked crisp edges.
Satisfactory: integrated Intel 810 graphics (UMA), 12X DVD-ROM drive	Good/ Good	Limited	Fair/ Fair	PRO: Simple setup; keyboard has audio, DVD-ROM, and Internet launching capabilities. CON: Integrated graphics result in low frame rates for 3D games.
Extra features: 10 percent	Setup/ease of use: 10 percent	Graphics: 10 percent	R & S: 30 percent	

¹ Unless otherwise noted, all home PCs come with a V.90 modem.

² At press time, Dell reported it plans to ship this system at the same price with an OEM GeForce3 graphics card.

³ Insufficient data to give a rating.

⁴ Due to insufficient data from survey, score is based on responses to anonymous calls for tech support.

nificant asset for digital video enthusiasts.

Rounding out the bottom of the power list, Gateway's Performance 1700 combines an extensive list of features with the

FULL REVIEWS ONLINE



FOR WRITE-UPS on all the new systems we reviewed this month, visit PCWorld.com (www.pcworld.com/reviews/topcharts).

highest price on the chart. It includes both a TV-tuner card (for watching TV on your monitor) and an IEEE 1394 card.

Price drops reshuffle the midrange and budget charts, and HP's Pavilion 9820 takes control of the midrange field. Trimmed by \$100, the ABS Multimedia System XP moves down to the midrange chart, and \$90 off the ABS Multimedia System 2 pulls it into budget territory. ►



WITH SUPERB performance, MicronPC's Millennia Max XP2 toasts the competition.

HUGHES



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TOP 10 PRINTERS

	COLOR LASER PRINTER	Street price ¹ (5/11/01)	Overall rating	Speed for plain text/full-page graphics (ppm)	Print quality for text/color graphics	Comments
1	 Minolta-QMS Magicolor 2200 GN 800/523-2696 www.minolta-qms.com	\$2000	86	9.8/1.3	Excellent/ Very good	FEATURES: Rated 20 ppm monochrome/5 ppm color. Standard 128MB of RAM, 1200-by-1200-dpi maximum resolution, 650 pages input, 500 output. SUMMARY: Fast text printing, great print quality, and lots of extra features keep the Magicolor 2200 GN in first place, despite a \$105 price increase. Graphics appear especially smooth and rich for a color laser.
2	 Lexmark C720N 888/539-6275 www.lexmark.com	\$2469	86	12.0/2.0	Excellent/ Excellent	FEATURES: Rated 24 ppm monochrome/6 ppm color. Standard 64MB of RAM, 2400-by-1200-dpi maximum resolution, 250 pages input and output. SUMMARY: Lexmark's speedy color laser creates beautiful images. Text appears sharp and fine, and color graphics show rich colors, shadings, and detail. The price is reasonable, but this model lacks the paper-handling features of other color lasers.
3	Oki Data Oki C7200n 800/654-3282 www.okidata.com	\$3222	84	11.9/2.3	Excellent/ Good	FEATURES: Rated 20 ppm monochrome/12 ppm color. Standard 64MB of RAM, 1200-by-600-dpi maximum resolution, 530 pages input, 500 output. SUMMARY: Oki Data's letter-size model ranks among the fastest printers on the chart for text and graphics. Text quality is impressive, too, with thick, dark letters, though colors appear too bright. Oki Data also offers many extras with this model.
4	Minolta-QMS Magicolor 6100 DeskLaser 800/523-2696 www.minolta-qms.com	\$1995	82	5.6/0.9	Very good/ Good	FEATURES: Rated 24 ppm monochrome/6 ppm color. Standard 32MB of RAM, 1200-by-600-dpi maximum resolution, 250 pages input and output. SUMMARY: The entry-level model in Minolta-QMS's Magicolor 6100 series is one of only three printers on our chart that hover at the \$2000 mark. It has sharp print quality, an intuitive design, and top-notch support. Performance is quite slow, however.
5	Lexmark Optra C710N 888/539-6275 www.lexmark.com	\$2199	81	9.5/1.6	Very good/ Excellent	FEATURES: Rated 16 ppm monochrome/3 ppm color. Standard 32MB of RAM, 1200-by-1200-dpi maximum resolution, 300 pages input, 250 output. SUMMARY: The Optra C710N offers outstanding color quality and reasonably fast text and graphics printing speeds for a moderate price. It has an easy-to-understand control panel, but toner cartridges are a bit tricky to install—a minor quibble.
6	Brother HL-2400CeN 800/276-7746 www.brother.com	\$1999	80	9.4/1.1	Very good/ Good	FEATURES: Rated 16 ppm monochrome/4 ppm color. Standard 32MB of RAM, 2400-by-600-dpi maximum resolution, 250 pages input and output. SUMMARY: The HL-2400CeN produces text pages fairly quickly and creates crisp letters and rich, detailed graphics, all for a low price. It churns out graphics rather slowly, however. Its biggest drawback is a confusing control panel.
7	Tektronix Phaser 750N by Xerox 877/362-6567 www.xerox.com/officeprinting	\$2295	80	7.3/1.4	Good/ Very good	FEATURES: Rated 16 ppm monochrome/5 ppm color. Standard 64MB of RAM, 1200-by-600-dpi maximum resolution, 350 pages input, 500 output. SUMMARY: The Phaser 750N offers middle-of-the-road text and graphics speeds and slightly jagged text, but it delivers pleasing color graphics. Added benefits include a user-friendly control panel and a comprehensive on-screen manual.
8	Oki Data Oki C9200n 800/654-3282 www.okidata.com	 \$5469	79	12.8/2.5	Excellent/ Very good	FEATURES: Rated 26 ppm monochrome/21 ppm color. Standard 128MB of RAM, 1200-by-600-dpi maximum resolution, 650 pages input, 600 output. SUMMARY: Oki Data's pricey new laser prints sheets up to 12 by 18 inches. Both text and graphics print extremely quickly, and text appears sharp and black. Narrow lines are distinct and separate; but color images, though detailed, look too orange.
9	Xerox Phaser 860N 877/362-6567 www.xerox.com/officeprinting	 \$2499	76	7.2/2.8	Very good/ Good	FEATURES: Rated 10 ppm monochrome/10 ppm color. Standard 64MB of RAM, 1200-by-600-dpi maximum resolution, 200 pages input, 250 output. SUMMARY: Xerox's new solid-ink printer uses heated wax instead of a laser and toner, and it prints graphics faster than any other model on the chart. Letters are dark, with a hint of jaggedness, and color graphics appear detailed, if somewhat filmy.
10	Brother HL-3400CN 800/276-7746 www.brother.com	\$3499	75	10.4/1.1	Good/ Adequate	FEATURES: Rated 24 ppm monochrome/6 ppm color. Standard 64MB of RAM, 2400-by-600-dpi maximum resolution, 250 pages input and output. SUMMARY: Brother's HL-3400CN handles 13-by-19-inch sheets. Text prints quickly and letters look presentable, but graphics are slow to print and appear dark and grainy. Brother includes a clear and concise on-screen manual.



Best Buy

For reviews of printers we tested this month, visit www.pcworld.com/t10printers.

HOW WE TEST The overall rating for color laser printers is based on print quality (25 percent), price (25 percent), features (15 percent), ease of use (15 percent), speed (10 percent), and service and support (10 percent). For all ratings, higher is better. Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

¹ All street prices include a network card.



BOTH NEW PRINTERS we tested this month make the chart. Oki Data captures eighth place with its versatile Oki C9200n, which can handle 12-by-18-inch sheets. For a whopping \$5469, it prints

superfast and produces clean, sharp letters. At number nine, Xerox's Phaser 860N is a solid-ink printer that uses heated wax instead of a laser and powdered toner. Priced at \$2499, it prints somewhat dotted graphics at a speedy 2.8 pages per minute. ►



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TOP 10 MONITORS

	15-INCH LCD MONITOR	Month tested	Street price (5/18/01)	Overall rating	Quality of text/graphics	Comments ¹
1	 Samsung SyncMaster 570vTFT 800/726-7864 www.samsungmonitor.com	(NEW)	\$499	94	Excellent/Excellent	FEATURES: 15-inch viewable area, 15.2 by 7 by 17 inches, ² 15 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: This model offers an unbeatable combination: the lowest price on the chart, outstanding graphics and text quality, and impeccable support policies—including on-site service and a money-back guarantee.
2	 Acer FP563 408/228-8000 www.acer.com	(NEW)	\$549	93	Excellent/Excellent	FEATURES: 15-inch viewable area, 15.0 by 7.3 by 15.1 inches, ² 11.7 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: The top scorer for graphics quality renders brilliant, saturated hues in photos and dark, sharp text. Backlight warranty is for only one year, and on-screen controls have an inconsistent interface.
3	NEC MultiSync LCD1530V 888/632-6487 www.necmitsubishi.com	(NEW)	\$549	87	Very good/Very good	FEATURES: 15.1-inch viewable area, 14.6 by 6.3 by 14.6 inches, ² 10.4 pounds, active-matrix TFT panel, TCO '95-compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Handles both text and images well, rendering text very legibly and colors with good balance and subtlety. Setup guide is terse, directing users to Web and fax-back documentation for details.
4	Eizo Nanao FlexScan L330 800/800-5202 www.eizo.com	Jan 01	\$570	83	Excellent/Very good	FEATURES: 15-inch viewable area, 15.3 by 6.7 by 14.4 inches, ² 12.3 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 8-hour weekday toll-free support. SUMMARY: The top-scoring Best Buy from January has been surpassed in graphics performance and price but remains a good choice for working with text. Eizo offers stingy support hours.
5	CTX PV520 800/266-1491 www.ctxintl.com	(NEW)	\$629	78	Excellent/Excellent	FEATURES: 15-inch viewable area, 15.1 by 6.7 by 14.8 inches, ² 13.7 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 12-hour weekday toll-free support. SUMMARY: This model earned the second-highest scores for both text and graphics quality. The screen pivots to display in portrait mode. CTX's support hours are on the skimpy side.
6	Eizo Nanao FlexScan L350 800/800-5202 www.eizo.com	(NEW)	\$796	77	Excellent/Very good	FEATURES: 15-inch viewable area, 15.1 by 6.7 by 15.2 inches, ² 12.3 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 8-hour weekday toll-free support. SUMMARY: This model received a higher score for text quality than the number four FlexScan L330 but scored lower on graphics. It offers myriad image controls, but they don't justify the high price.
7	Dell 1503FP 800/388-8542 www.dell.com	(NEW)	\$549	73	Very good/Satisfactory	FEATURES: 15-inch viewable area, 16.6 by 6.9 by 14.5 inches, ² 12.5 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Text has good density, especially in spreadsheets, but images look too bright and contrasty. Has digital and analog interfaces; control buttons aren't intuitive, but on-screen controls are clear.
8	Compaq TFT5010 800/888-9909 www.compaq.com	Jan 01	\$899	71	Good/Good	FEATURES: 15.1-inch viewable area, 15.4 by 8.6 by 15.7 inches, ² 18.7 pounds, active-matrix TFT panel, TCO '95-compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Displays vibrant colors on Web pages and photos; includes touch-screen software. High price is partly offset by both digital and analog interfaces and top-notch support policies.
9	IBM T540 800/746-7426 www.ibm.com/products	(NEW)	\$599	71	Good/Good	FEATURES: 15-inch viewable area, 15.8 by 8 by 14.6 inches, ² 12.1 pounds, active-matrix TFT panel, TCO '99-compliant, three-year warranty, 24-hour daily toll-free support. SUMMARY: Colors appear unnaturally bright in images; text lacks sharpness and density. The T540 is solidly constructed and well designed; swiveling neck and wide base look light but feel stable.
10	Philips Brilliance 150P 877/835-1838 www.pcstuff.philips.com	Jan 01	\$749	70	Good/Good	FEATURES: 15.1-inch viewable area, 15.2 by 6.5 by 15.8 inches, ² 11.9 pounds, active-matrix TFT panel, three-year warranty, 15-hour weekday and 14-hour weekend toll-free support. SUMMARY: Offers both digital and analog inputs and on-screen controls that are especially easy to use; includes speakers, a microphone, and USB ports. Screen pivots to display in portrait mode.



Best Buy

For reviews of the monitors on this chart, visit www.pcworld.com/t10monitors.

TEST HOW WE TEST Ten judges rate a monitor's text and graphics quality. We evaluate each unit on how well it displays typical business letters, a newsletter, spreadsheets, Web pages, and scanned images. The overall rating is based on text and graphics quality (25 percent each), 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. ¹ All monitors tested have analog video interfaces except where dual digital/analog interfaces are noted. All monitors were tested using their analog interfaces. ² Width by depth by height; dimensions provided by vendor.



ONLY SEVEN MONTHS AGO, \$1000 was a pretty good deal for a 15-inch LCD monitor. Today, a bargain is half that amount, and you have plenty of models to choose from. We rounded up eight

of the newest 15-inch LCDs and compared them to the best models from our January review, "Dream Screens" (www.pcworld.com/reviews/jan2001/dreamscreens). Next month, look for our feature-length buyers' guide to monitors of various sizes. ►

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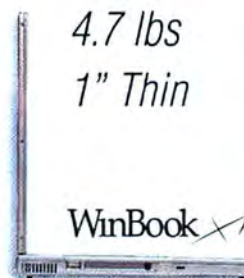
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TOP 10 GRAPHICS BOARDS

	AGP BOARD	Month tested	Street price (4/23/01)	Overall rating	Image quality	Overall speed	Features	Comments
1	 ATI All-in-Wonder Radeon 905/882-2600 www.atl.com	Feb 01	\$279	96	Very good	Good	Excellent	FEATURES: 4X AGP, ATI Radeon chip, 32MB of DDR SDRAM, 350-MHz RAMDAC; DVI-out, TV tuner, hardware DVD support, graphics editing software. SUMMARY: Card retains first place, thanks to DirectX 8 support and ATI's video features and bundled software; great for video-editing mavens. A \$20 cut sweetens the deal.
2	 CardExpert GeForce2 MX 800/539-2273 www.gainward.com	Feb 01	\$99	93	Very good	Good	Very good	FEATURES: 4X AGP, NVIDIA GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video-out, composite-out; DVD, overclocking, and color-calibration software. SUMMARY: Now only \$99, this budget MX delivered respectable performance and includes an excellent software bundle.
3	Hercules 3D Prophet II MX 877/484-5536 www.hercules.com	Mar 01	\$99	92	Excellent	Good	Good	FEATURES: 4X AGP, NVIDIA GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; color-calibration software, five game demos. SUMMARY: Lacks features and software bundles of the top cards, but this reasonably priced board's stellar image quality and performance help it stay in third place.
4	Asus AGP-V7100 Deluxe Combo 510/739-3777 www.asus.com	May 01	\$149	91	Good	Good	Excellent	FEATURES: 4X AGP, NVIDIA GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; 3D glasses, AV adapter, S-Video-in and -out, TV tuner, coaxial output; DVD, image-editing, game, and color-calibration software. SUMMARY: Image offers NVIDIA's TwinView to display simultaneously on a TV and a CRT monitor.
5	ATI Radeon 64MB DDR 905/882-2600 www.atl.com	Apr 01	\$229	90	Very good	Very good	Very good	FEATURES: 4X AGP, 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 ATI card ranks well due to partial DirectX 8 support, solid performance at high resolutions, and 64MB of DDR SDRAM.
6	Hercules 3D Prophet II Ultra 800/484-5536 www.hercules.com	Mar 01	\$409	88	Very good	Excellent	Very good	FEATURES: 4X AGP, NVIDIA GeForce2 Ultra chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; DVI-out, S-Video-out, composite-out, DVD playback and color-calibration software. SUMMARY: This board is one of the fastest we've tested—but it is also one of the priciest, even after a \$90 drop.
7	MSI MS-StarForce 818 GeForce2 MX 510/623-8818 www.msicomputer.com	Jun 01	\$99	87	Very good	Good	Good	FEATURES: 4X AGP, NVIDIA GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; S-Video-out; DVD, overclocking, desktop, and color-calibration utility. SUMMARY: This inexpensive board's speed and image-quality scores nearly matched those of the other MX-based cards on the chart.
8	VisionTek GeForce3 866/883-5411 www.visiontek.com	NEW	\$400	85	Excellent	Very good	Good	FEATURES: 4X AGP, NVIDIA GeForce3 chip, 64MB of DDR SDRAM, 350-MHz RAMDAC; S-Video-out, hardware DVD support; no bundled software. SUMMARY: The first card we've tested with NVIDIA's new chip soared at the highest resolutions in our tests. Full DirectX 8 hardware support will please serious gamers.
9	Matrox Millennium G450 800/361-1408 www.matrox.com/mga	Mar 01	\$135	85	Very good	Poor	Very good	FEATURES: 4X AGP, Matrox G450 chip, 32MB of DDR SDRAM, 360-MHz RAMDAC; TV-out, dual-display support; DVD, 3D modeling and animation, image editing, and business software. SUMMARY: While the Matrox didn't exactly excel in 3D performance, it had good image quality in our tests. Also supports dual display.
10	ELSA Gladiac MX 800/272-3572 www.elsa.com	Apr 01	\$139	84	Very good	Good	Satisfactory	FEATURES: 4X AGP, NVIDIA GeForce2 MX chip, 32MB of SDRAM, 350-MHz RAMDAC; DVD software. SUMMARY: The Gladiac MX turned in stellar speed scores for an MX board, but image quality lacked polish in two test games. Buyers can add three popular PC games at discount prices from the Shopelsa.com site.



Best Buy

For reviews of new graphics boards that we tested this month, visit www.pcworld.com/t10graphics.

TEST 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 MDK2 Demo, Infogrames' Test Drive 6, and the Calligra 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).



THE FIRST CARD WITH NVidia's latest graphics chip to reach our Test Center, VisionTek's powerful GeForce3 lands on the chart at number eight. The card's most notable feature—

full DirectX 8 support in the hardware—is said to permit greater detail and realism in PC games. Unfortunately, that claim is difficult to substantiate, because of the scarcity of DirectX 8 games. We're testing more GeForce3 cards for next month's chart. ►

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TOP 10 CD-RW DRIVES

	CD-RW DRIVE	Street price (5/16/01)	Overall rating	Performance/support policies	CD-R write speed for 650MB/CD-RW write speed for 100MB (min:sec)	Comments
1	 TDK 16/10/40 VeloCD ReWriter 800/835-8273 www.tdk.com/multimedia	\$230	90	Excellent/ Very good	5:17/1:23	FEATURES: 16X/10X/40X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Ahead Nero Burning ROM 5.0.3 and InCD 1.75, one-year warranty, toll-free support for 11.5 hours weekdays and 10 hours Saturdays. SUMMARY: This 16X drive has great performance. A handy video walks novices through the installation process.
2	 AOpen CRW1232A/Pro (NEW) 408/434-3336 www.aopenusa.com	\$145	89	Very good/ Good	6:51/1:25	FEATURES: 12X/10X/32X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Ahead Nero Burning ROM 5.0.3 and InCD 1.76, one-year warranty, toll-free support for 12 hours weekdays. SUMMARY: Affordably priced, this drive has above-average CD-R performance for its speed class; however, it may be difficult to find in stores.
3	Plextor PlexWriter 16/10/40A 800/886-3935 www.plextor.com	\$210	87	Very good/ Good	5:38/1:49	FEATURES: 16X/10X/40X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Adaptec Easy CD Creator 4.03 and DirectCD 3.03, one-year warranty, toll-free support for 10 hours weekdays. SUMMARY: Superb CD-R write performance and drivers for drag-and-drop extraction of CD audio tracks make this an excellent pick.
4	Plextor PlexWriter 12/10/32A 800/886-3935 www.plextor.com	\$185	87	Good/ Good	7:12/1:46	FEATURES: 12X/10X/32X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Adaptec Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, toll-free support for 10 hours weekdays. SUMMARY: This unit stays high on the chart due to above-average CD-RW and CD-ROM performance; its 16X sibling costs just \$25 more.
5	Iomega CD-RW 12x10x32x 800/697-8833 www.iomega.com	\$180	87	Good/ Very good	7:29/1:41	FEATURES: 12X/10X/32X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Adaptec Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, toll-free support for 12 hours weekdays and 7 hours Saturdays. SUMMARY: This drive is a good deal, thanks to its easy software installation and well-rounded software bundle.
6	LG Electronics CED-8120B 800/243-0000 www.lgeus.com	\$150	86	Good/ Very good	7:13/1:54	FEATURES: 12X/8X/32X, IDE, internal, 8MB buffer, Adaptec Easy CD Creator 4.02 and Direct CD 3.01, one-year warranty, toll-free support for 12 hours weekdays. SUMMARY: Bolstered by a large buffer, this drive features good write performance and excellent read performance. It also has a sturdy tray mechanism.
7	Yamaha LightSpeed CRW2100EZ 888/926-2426 www.yamaha.com	\$225	85	Good/ Very good	5:39/2:44	FEATURES: 16X/10X/40X, IDE, internal, 8MB buffer, Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, toll-free support for 12 hours weekdays. SUMMARY: A competitive CD-R performer, this drive is held back by its relatively slow CD-RW write times. A large buffer compensates for its lack of buffer underrun technology.
8	Teac CD-W516E (NEW) 16x10x40 CD-RW 323/726-0303 www.teac.com	\$200	84	Very good/ Satisfactory	6:12/1:32	FEATURES: 16X/10X/40X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Roxio Easy CD Creator 5.0 and DirectCD 5.0, one-year warranty, toll support for 9 hours weekdays. SUMMARY: This reasonably priced drive has excellent CD-RW write performance and is the first we've seen to include the latest version of Easy CD Creator.
9	Imation 12/8/32 CD-Burn R (NEW) 800/888-2700 www.imation.com	\$165	81	Good/ Very good	7:42/1:53	FEATURES: 12X/8X/32X, IDE, internal, 4MB buffer, Adaptec Easy CD Creator 4.02 and DirectCD 3.01, one-year warranty, toll-free support for 12 hours weekdays. SUMMARY: A low price makes this drive a viable option for the budget conscious, though its CD-R/CD-RW write performance is slightly slower than average.
10	TDK 12/10/32 VeloCD ReWriter 800/835-8273 www.tdk.com/multimedia	\$185	80	Very good/ Very good	6:55/1:38	FEATURES: 12X/10X/32X, IDE, internal, 2MB buffer, buffer underrun compensation technology, Ahead Nero Burning ROM 5.0.1 and InCD 1.3, one-year warranty, toll-free support for 11.5 hours weekdays and 10 hours Saturdays. SUMMARY: A solid CD-R writer, this model uses Burn-Proof; TDK's similarly named 12/10/32A uses JustLink instead.



Best Buy

For capsule reviews of this month's new CD-RW drives, visit www.pcworld.com/reviews/cdrw.

TEST 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 650MB of data to CD-R discs from an image file and on the fly. We evaluate digital audio extraction speed by extracting 350MB 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, and 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). * Vendor's speed ratings, listed in order: CD-R write/CD-RW write/CD-ROM read.



OUR LATEST CHART reflects the rapidly changing market for CD-RW drives. Four of the drives on our chart carry speed ratings of 16X/10X/40X—including our number one Best

Buy, the TDK 16/10/40 VeloCD ReWriter. A low price and top-flight performance earn AOpen's CRW1232A/Pro second place. This month's chart also reflects our updated testing methodology (see "How We Test," above, for more details).



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TOP 10 DIGITAL CAMERAS

	CAMERA: \$500 AND OVER	Street price (5/15/01)	Overall rating	Image quality	Ease of use	Battery life/shots	Comments
1	 Nikon Coolpix 880 800/645-6689 www.nikonusa.com	\$689	87	Very good	Adequate	Very good/ 227	FEATURES: 3.34-megapixel resolution, 8MB CompactFlash media, 38mm-95mm focal range; serial, USB, and video output; 11.2 ounces. SUMMARY: Small and light; many exposure and control options, but extensive menus can be confusing; good choice for a serious digital photographer who travels frequently.
2	 Nikon Coolpix 995 NEW 800/645-6689 www.nikonusa.com	\$899	86	Very good	Adequate	Excellent/ 363	FEATURES: 3.34-megapixel resolution, 16MB CompactFlash media, 38mm-152mm focal range; serial, USB, and video output; 16.2 ounces. SUMMARY: Offers a huge, sometimes intimidating list of features. Captures some of the best images we've seen, and offers twice the battery life of its predecessor, the Coolpix 990.
3	Olympus Camedia C-3040 Zoom 800/622-6372 www.olympus.com	\$799	83	Very good	Good	Adequate/ 147	FEATURES: 3.34-megapixel resolution, 16MB SmartMedia card, 35mm-105mm focal range; serial, USB, and video output; 13.7 ounces. SUMMARY: Boxy but stylish; produces great shots; loads of control options, but too many are buried in menus; fast f1.8 zoom lens; supports USB Storage Class standard; \$200 off this month.
4	 Fujifilm FinePix 6800 Zoom NEW 800/800-3854 www.fujifilm.com	\$899	82	Very good	Adequate	Good/ 186	FEATURES: 3.3-megapixel resolution, 16MB SmartMedia card, 36mm-108mm focal range; serial, USB, and video output; 10.3 ounces. SUMMARY: This small, light, Porsche-designed digicam looks technically refined and takes impressive pictures, but the menus are difficult to navigate. Can capture short movies.
5	Sony Cyber-shot DSC-P1 800/222-7669 www.sony.com/di	\$699	82	Good	Excellent	Adequate/ 115	FEATURES: 3.34-megapixel resolution, 8MB Memory Stick media, 39mm-117mm focal range; serial, USB, and video output; 8.8 ounces. SUMMARY: Innovative, pocket-size design; easy-to-use controls and menus; creates MPEG movie clips; ideal for trendy snapshotters. Now costs \$100 less than last month.
6	Olympus Camedia C-2100 Ultra Zoom 800/622-6372 www.olympus.com	\$699	81	Good	Good	Very good/ 231	FEATURES: 2.1-megapixel resolution, 8MB SmartMedia card, 38mm-380mm focal range; serial, USB, and video output; 24 ounces. SUMMARY: 10X optical zoom lens and easy-to-handle SLR-like shape; kit includes rechargeable AA batteries and external charger. Olympus lopped \$100 off the price this month.
7	 Toshiba PDR-M65 NEW 800/288-1354 www.dsc.toshiba.com	\$599	81	Very good	Good	Excellent/ 259	FEATURES: 3.34-megapixel resolution, 8MB SmartMedia card, 38mm-114mm focal range; serial, USB, and video output; 14.3 ounces. SUMMARY: A simple camera with few fancy controls compared with other cameras that have the same resolution. Can capture very sharp, detailed images, but doesn't reproduce color well.
8	Olympus Camedia E-10 800/622-6372 www.olympus.com	\$1999	81	Good	Very good	Limited/ 69	FEATURES: 4-megapixel resolution, 32MB SmartMedia card, 35mm-140mm focal range; serial, USB, and video output; 40.2 ounces. SUMMARY: Ultrahigh resolution, through-the-lens viewing, and a huge number of controls; also accepts CompactFlash media. However, it's relatively heavy and very expensive.
9	HP Photosmart 912 800/752-0900 www.photosmart.com	\$799	80	Good	Very good	Good/ 155	FEATURES: 2.24-megapixel resolution, 16MB CompactFlash media, 34mm-107mm focal range; USB, IRDA, and video output; 21.6 ounces. SUMMARY: This model offers an SLR-like case, extensive and intuitive controls, and solid images. It should interest anyone transitioning from a 35mm camera.
10	 Canon PowerShot S300 Digital Elph NEW 800/652-2666 www.powershot.com	\$599	79	Good	Very good	Adequate/ 98	FEATURES: 2.11-megapixel resolution, 8MB CompactFlash media, 35mm-105mm focal range; serial, USB, and video output; 10 ounces. SUMMARY: Ultracompact size, solid feel, and sophisticated styling make this a jewel of a digital camera. Relatively expensive for a 2.1-megapixel model, but you pay a premium for its diminutive size.



Best Buy

For expanded reviews of this month's digital cameras, visit www.pcworld.com/t10cameras.

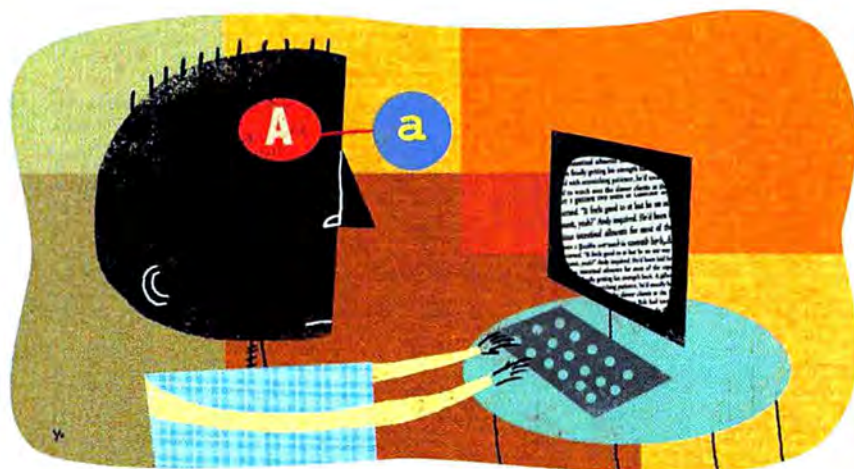
HOW WE TEST Each camera's overall rating is based on price (30 percent), picture quality (20 percent), ease of use (15 percent), features (15 percent), battery life (10 percent), and support (10 percent). For all ratings, higher is better. To gauge picture quality, we take a series of shots, with and 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. * 35mm film equivalent.



CONTROL FREAKS, listen up: Nikon's Coolpix 995, our new number two Best Buy, takes excellent pictures and has tons of controls for sophisticated features like white-balance bracket-

ing. Other new models on the chart are Fujifilm's Porsche-designed FinePix 6800 Zoom, Toshiba's simple, high-resolution PDR-M65, and Canon's wee PowerShot S300 Digital Elph. Olympus's Camedia C-3040 Zoom sheds \$200 to snag third place. ■

HERE'S HOW



WINDOWS TIPS

SCOTT DUNN

Make Desktop Text Easy to Read



YOU STARE AT YOUR COMPUTER screen for hours each day. You owe it to your eyes to make the text on your screen as easy to read as possible, but choosing the right system fonts can be difficult. Windows lets you use TrueType and other scalable fonts of almost any size, but many scalable fonts quickly become illegible when shrunk, and a too-large font can clutter your workspace.

These tips will help you get compact yet readable fonts for your icon labels and other Windows elements.

Basic steps: To change the size of the text labels that Windows uses in your icons, title bars, menus, and other interface items, select *Start•Settings•Control Panel* and open the *Display* applet, or right-click the desktop and choose *Properties*. Click

the *Appearance* tab and choose a screen element, such as *Active Title Bar*, from the Item drop-down list. Now select a typeface from the Font drop-down list and a size from the box to the right. Click *Apply* to see the results, and then click *OK*.

Stick to bitmaps: Most bitmap fonts are designed specifically for on-screen viewing, and they're often easier than Post-

Script, TrueType, and other scalable formats to read on a monitor. The problem is figuring out which fonts listed in *Display Properties* are bitmap fonts. Click *Start•Settings•Control Panel* and open the *Fonts* applet. Make sure you have *Large Icons* selected in the *View* menu. The icons labeled with a red capital A are bitmap fonts, and those with two capital T's are TrueType fonts. Though some dialog boxes show these icons in the drop-down list, *Display Properties* does not.

See all available fonts: If only TrueType fonts are listed when you open your *Fonts* folder, your system is probably configured to hide all other fonts. To change this setting, click *Start•Settings•Control Panel*, open the *Fonts* applet, and then choose *View•Options* or *Tools•Folder Options*, depending on your version of Windows. Click the *TrueType* tab and make sure the box next to *Show only TrueType fonts in the programs on my computer* is unchecked. Now click *OK* and follow the prompts to let Windows restart.

Try an Adobe system font: Many Adobe applications—including Photoshop, In-Design, and recent versions of the free Acrobat Reader—use a special bitmap font for dialog boxes and floating palettes. The small version of this font creates crisp, readable icon labels and maximizes screen real estate. If you have one of these applications, chances are you already have the font. To tell Windows how to use it, choose *Start•Find•Files or Folders* or *Start•Search•For Files or Folders*, depending on your version of Windows. In the top box, type *ad*.fon*. To save time, have the search start in the folder where your Adobe applications are installed—for example, *c:\program files* or *c:\program files\adobe*. Click *Find Now* or *Search Now*. Look for a file named *AdobeUI.FON* or *Admui316.FON* (see **FIGURE 1**)—either of these names will do. Now click *Start•Settings•Control Panel*

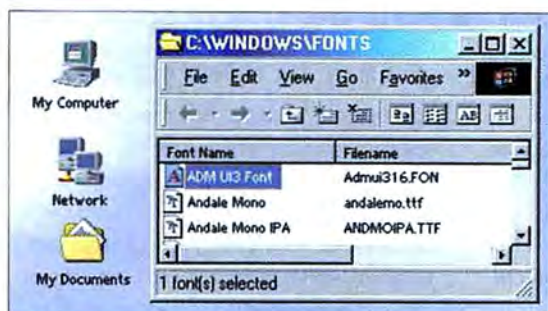


FIGURE 1: FOR A COMPACT YET READABLE icon font, try the system font that comes with many Adobe applications.

and open the *Fonts* applet. Go back to the Search Results or Find Files window, and drag either of the .fon files to the Fonts window to create a copy of the file there. If you see an error message, you've selected a version of the font that doesn't work with Windows. In that case, try using a font from a different Adobe application folder (if you have one).

Once you've found a font that doesn't trigger an error message, close the Search/Find and Fonts windows. When you reopen the Font drop-down list under the Appearance tab in Display Properties, you will see fonts with such names as Adobe-Lg, AdobeSm, ADMUI3LG, and ADMUI3SM. Experiment with these fonts to find one that suits your needs (to do so, select *Icon* in the Item drop-down list).

Fix the width: Once you've customized your icon and folder labels, you may find that the text under the icons is too wide or not wide enough. To fix that, return to the Display Properties dialog box. Select *Icon Spacing (Horizontal)* from the Item drop-down list. Increase or decrease the Size number to the right, and click *Apply* to see the width of the area occupied by the text change. This setting changes the spacing between icons when you right-click the desktop or a folder with large icons and choose either *Line Up Icons* or an option from the *Arrange Icons* menu.

CREATE A 'SHOW DESKTOP' SHORTCUT



IF YOU HAVE Windows Millennium, 2000, 98, or 95 with Internet Explorer's Desktop Update installed, the Quick Launch toolbar on your Windows taskbar probably includes

a Show Desktop icon (with a little blotter, paper, and pencil) that toggles between minimizing and restoring all open windows. But what happens if you or some errant application deletes this icon? To restore it, select *Start•Find•Files or Folders* or *Start•Search•For Files or Folders*. In the Named box, type "Show Desktop.scf" (including the quotation marks). Specify *Local Hard Drives* in the Look In field.

Click *Find Now*, and if you're in luck, the Find utility will locate a copy of this file. When it does, drag the file from the Find window to the Quick Launch bar to place a Show Desktop icon there.

If your search turns up nothing, you can re-create this file yourself. Open Notepad and type the information you see in FIGURE 2, exactly as shown. Then choose *File•Save As*, and navigate to the folder where Quick Launch items are stored. To find this folder, right-click an empty area of the Quick Launch toolbar (or the gripper line that you drag to resize the toolbar) and choose *Open*. The folder name appears in the Address bar. In the 'File name' box, type "Show Desktop.scf". Make sure that you include the quotation marks to prevent Notepad from adding its default .txt extension. The shortcut should reappear on the Quick Launch toolbar.

If you have difficulty finding the Quick Launch folder, you can always save the Show Desktop.scf file on the desktop, and then drag it to the Quick Launch bar. You don't have to keep the Show Desktop icon on that toolbar; you can copy the icon (or a shortcut to it) onto any customizable toolbar or menu (such as the Favorites



FIGURE 2: TYPE THESE LINES in Notepad to re-create the Show Desktop icon.

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WINDOWS TIPS

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ANSWER LINE

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menu). And if you have a Windows keyboard, you can press **<Windows>-D** instead of clicking the Show Desktop icon (see "Windows Toolbox," page 182).

START WORDPAD THE WAY YOU WANT



EVERY TIME I START my WordPad program, it uses the default font setting of point size 10 and I have to change it manually to the size I prefer. How can I change the default font size, style, and other properties?

Sam Cimino, Merrillville, Indiana
THE SHORT ANSWER is, you can't. But you can work around this limitation fairly easily. Start WordPad, and if you have any boilerplate information, such as a logo or a letterhead graphic, type or paste that into a new document. Move the cursor to where you want to start typing your text, and type a space. Select the space you just typed, and apply the desired typeface, size, alignment, and other settings (see FIGURE 3). Now choose *File•Save As*, select a location that is unlikely to be moved or deleted, and give the file a name such as **Template**. Click *Save*. Now choose *File•Save As* again, but this time right-click the file you just saved in the dialog box, and select

Properties. Check the *Read-only* box and click **OK**. This will protect the file from accidental changes. Click **Cancel** in the **Save As** dialog box.

Right-click the **Start** button and choose **Open**. Navigate to the shortcut that you use to launch WordPad, right-click it, and choose **Properties**. Select the **Shortcut** tab, click the **Target** box, and press **<End>** to make sure the cursor is at the end of the command line. Type a space, followed by the path to your template file. If the path contains any spaces or long file names, enclose the entire path in quotation marks. If the program (Wordpad.exe) is already enclosed in quotation marks, you'll end up with two sets of quotation marks. For example, your final **Target** command line might read "C:\Program Files\Accessories\wordpad.exe" "C:\My Documents\Template.doc" (your path may differ). Then click **OK**.

The next time you launch WordPad, it should open your template with the font you prefer. Because you made the file read-only, you won't have to worry about overwriting the template. If you choose **File>Save** instead of **File>Save As**, WordPad will still open the **Save As** dialog box, prompting you to save the file with a new



FIGURE 3: CUSTOMIZE WORDPAD'S default font by selecting and formatting a single space.

file name each time you start a new document. You can extend this tip to create multiple WordPad shortcuts, each opening a template for a different purpose.

MAKE 'MY DOCUMENTS' POINT TO THE FOLDER YOU CHOOSE



WINDOWS WISELY encourages you to keep your work documents separate from your application files and folders by providing a folder called **My Documents**. This folder is located on your **C:** drive by default, but why let Microsoft micromanage your hard

disk? Store your work files wherever you want. To use the **My Documents** icon to access work files stored in the folder of your choice, right-click the icon on the desktop and choose **Properties**. Select the **Target** tab, click inside the **Target** box, and either type the path to the drive and folder you prefer, or click **Browse**, select the folder of your choice, and click **OK**. You can also change the name of the icon by selecting it and then clicking its name or pressing **<F2>**, or you can right-click it and choose **Rename**. Then type a new name and press **<Enter>**.

EXPLORER WINDOW DRESSING



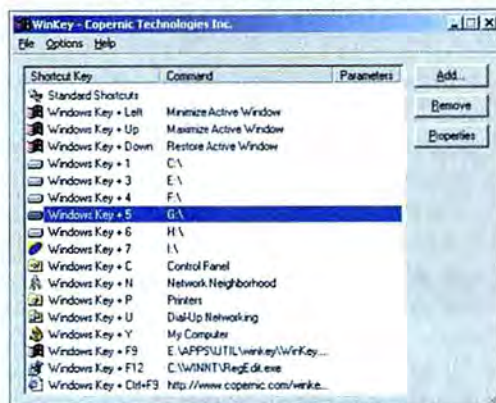
WINDOWS EXPLORER lets you view your files and folders in a single pane (showing only the contents of the drive or folder currently selected), or in two panes (the left showing your drive and folder hierarchy). But too often the first view you see when you open Explorer isn't the one you want. If you usually open your files in a single-pane folder window, you can easily open any folder within that window as a two-pane Explorer window. Just right-click a folder icon and choose **Explore**. You can also select a folder icon and **<Shift>**-double-click it to get the same two-pane view. Be sure to select the desired folder first, though. If another folder is selected, you'll end up opening multiple folder windows.

If you want to view your current single-pane folder window in a two-pane Explorer window, just right-click the **Control** icon (in the upper-left corner on the title bar) and choose **Explore**. But in Windows 98 SE, 2000, and Me, you don't have to open a new window: To change the current window, simply choose **View>Explorer Bar>Folders**. Alternatively, you can use the **Folders** icon on the **Standard Buttons** toolbar (select **View>Toolbars>Standard Buttons** if your **Folders** icon isn't showing).

You have yet another option: If you prefer not to see a single-pane folder window, you can make sure that double-clicking **My Computer** or a folder icon always

Get More Out of Your Windows Key

ALMOST ALL PC keyboards now come with a special key on the bottom row displaying the Windows logo. You can use this **<Windows>** key for many useful shortcuts, but why stop with the ones Microsoft gives you? Copernic Technologies' WinKey utility lets you assign almost any unused combination of the **<Windows>** key and another keyboard key to open a folder,



launch an application, or change the current window. The program is so easy to use, you'll be up and running in just a few minutes. And best of all, WinKey is free. It's available from PCWorld.com's Downloads and at the vendor's site at www.copernic.com/winkey.

opens a two-pane Explorer window. To do this, choose either **View>Options** or **View>Folder Options** (in Windows 9x) or select **Tools>Folder Options** (in Windows 2000 and Me). Click the **File Types** tab, and in the 'Registered file types' box, click the **File Types** column heading; then scroll down and select **Folder** (not **File Folder**).

Now click either **Edit** (in Windows 9x) or **Advanced** (in Windows 2000 and Me), and select **explore** in the **Actions** list. Click **Set Default** and close all dialog boxes. You can still open a single folder when you want to by right-clicking the folder and choosing **Open**. It's nice to have options, as long as you know what they are.



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YOUR QUESTIONS ON: Sharing e-mail address books ♦ Index.dat file deletions

Fix System Files Without Reinstalling Windows



HOW DO I RESTORE a lost or corrupted Windows .dll file? There has to be an easier way than doing a complete reinstallation of Windows.

Tim Swallow, Waverly, Iowa

FIRST, FIND OUT what .cab file the damaged .dll file is stored in on the Windows CD-ROM. A .cab file is like a .zip file—it holds one or more compressed files. I'll show you how to restore the file in both Windows and DOS.

To find the file in Windows, insert your Windows CD or Restoration disc; then double-click *My Computer*, right-click the CD-ROM drive, and select *Find* (or *Search* in Windows Me and 2000). Your CD-ROM drive will be highlighted in the 'Look in' field. Type

*.cab in the top text field, and enter the name of the missing or damaged file in the 'Containing text' field. Click *Find Now* (or *Search Now*, as in **FIGURE 1**).

When the search is done, one .cab file should be listed. The file you want is inside that .cab file. To extract it, double-click the .cab file to open the archive as if it were a folder. Find the desired .dll file, and double-click it. In the resulting dialog box, select the appropriate restoration location, such as 'C:\Windows\System'.

If double-clicking the .cab file doesn't bring up anything, consider using Cab-View, one of the Windows 95 Power Toys. It's available at PCWorld.com's Downloads or directly from Microsoft at www.microsoft.com/windows95/downloads/contents/wutoys/w95pwtoysset.

If a damaged file prevents you from running Windows, or if the OS won't let you overwrite the file, restore the old file via DOS. Use your start-up disk to access the CD-ROM drive from DOS.

What? You don't have a start-up disk?

Create one now! Select *Start>Settings>Control Panel*, and double-click the *Add/Remove Programs* icon. Click first the *Startup Disk* tab and then the *Create Disk* button, and follow the instructions.

Put your start-up disk in your floppy drive, click *Start>Shut Down*, and choose the *Restart* option. As your computer reboots, you'll see a menu. Select *Start computer with CD-ROM support*, and you'll eventually see an A> prompt. Above the prompt will be a message with your CD-ROM's drive letter (probably one letter after its usual one).

At the prompt, type x:, where x is the CD-ROM's new drive letter, and press <Enter>. Type *cd \win98* (for Windows 98) or *cd \win9x* (for Windows Me), and press <Enter>.

The prompt should now read something like 'E:\win98>'. Type *dir *.cab /p* and press <Enter>. When you're prompted to press any key, press <Ctrl>-C.

The next command is a bit more complicated. Type *extract /a /i c:\windows\system topname.cab dllname*, where *topname* is the file name immediately under '.' near the top of your screen, and *dllname* is the name of the file you need to restore.



Whose Outlook Express?

IN APRIL, I suggested one way that two users could share Outlook Express and make it easy to tell at a glance when the program is set for each person's own identity (www.pcworld.com/heres_how/april2001/outlook). Barrett Davidson of Valencia, California, suggests another way that works on some—but not all—versions of Outlook Express 5.x: When you exit the program, be sure to select *File>Exit and Log Off Identity*. That way, every time you relaunch the program, it will demand that you identify yourself.

The command should look something like 'extract /a /i c:\windows\system base4.cab winmm.dll'. When you're sure you've typed it correctly, press <Enter>.

When the prompt returns, remove the floppy and reboot your computer. Your damaged file should be restored.

SHRINK WINDOWS ME INDEX.DAT FILES



YOUR AUGUST 2000 column explained how to shrink index.dat files by exiting Windows and deleting them from the DOS prompt. I'm running Windows Me and can't get to a DOS prompt. How do I get rid of these files now?

Jose M. Veloso, Delton, Michigan
INTERNET EXPLORER puts index.dat files in the C:\Windows\Cookies folder and/or the C:\Windows\Temporary Internet Files folder, depending on your version of



FIGURE 1: NEED TO RESTORE A .DLL? A Windows search will identify where the file is stored on the Windows CD-ROM.

ILLUSTRATIONS: JAMES YANG (LEFT); JEFFREY PELO (RIGHT)

IE. Index.dat files keep growing as you surf the Web, and the only way to shrink them is to delete them (Windows will automatically re-create smaller versions). But Windows always keeps these files open, so they're difficult to delete.


One way to delete your index.dat files is by logging on as a different user. Select **Start•Settings•Control Panel** and launch the **Users** applet (if **Users** isn't visible, click the **view all Control Panel options** link on the left side of Control Panel).

If your system doesn't already have more than one user setting, this approach will bring up the **Enable Multi-user Settings Wizard**. As you walk through the wizard, create the User name **noindex** and don't enter a password. On the **Personalized Items Settings** page, check **Downloaded Web pages**. When you're finished with the wizard, Windows will ask whether you want to restart your system. Answer in the affirmative.

Windows will log you off, and then log you back on as 'noindex'. Once Windows is running, select **Start•Log Off noindex** and log back on as yourself. Windows will tell you that you haven't logged in with this name before—click **Yes**, then log off and back on again with the user name 'noindex'.

Now you can delete all index.dat files except those intended for the user 'noindex'. Since 'noindex' doesn't surf the Web, these index.dat files won't grow. When you're done, log off and then back on again as yourself.

CHANGE WINDOWS ME'S DEFAULT FILE VIEW


 WHEN I OPEN a folder or Windows Explorer in Windows Me, the files are always displayed as large icons, and I have to change the display each time to Details view. Is there any way to make Details view the default on my system?

Ed Schnitzel, Pacheco, California
CHANGE ONE FOLDER to look the way you want it to, by selecting your preferred view (Large Icons, Details, Thumbnails, or what have you) from the **View** menu. Then, to make this view global, select

Tools•Folder Options, click the **View** tab, and click the **Like Current Folder** button.

If you would prefer not to devote such a big chunk of Explorer's real estate to displaying a file's description, simply turn the description off. Choose the **General** tab in the **Folder Options** dialog box, select **Use Windows classic folders** in the **Web View** section, and click **OK**.

SHARE E-MAIL ADDRESS BOOKS

 HOW DO I TRANSFER my address book between Outlook, Outlook Express, and Hotmail?

Navzer D. Engineer, Richardson, Texas
AMAZING, ISN'T IT? Though Microsoft owns Outlook, Outlook Express, and Hot-

to start the **Internet Connection Wizard**. Enter your Hotmail e-mail address in the top text box on the second page.

Once the account is set up, go to Outlook Express's address book and select **Tools•Synchronize Now**. If that option isn't there, select **Tools•Options**, check **Do not share information...**, and click **OK** twice. Exit both the address book and Outlook Express, and then reopen them. Now you can select **Tools•Synchronize Now**.

Between Outlook and Hotmail: Microsoft has made this difficult by not offering a direct link between the two programs, and by not permitting them to use the sharing technique available for both Outlook and Outlook Express. You can't synchronize

Outlook and Hotmail address books directly, but you can use Outlook Express as a go-between. The sharing technique described above won't work to move your addresses from Outlook to Outlook Express, however.

In Outlook, select **File•Import and Export**. On the first page of the **Import and Export Wizard**, select **Export to a file**. On the second, select **Comma Separated Values (Windows)**. The wizard may ask you to install a feature. If so, you'll need your Office CD-ROM. On the third, select **Contacts** (see **FIGURE 2**). On the fourth, name

the file; and on the last page, click **Finish**. Now go into Outlook Express's Address Book, and select **File•Import•Other Address Book**. Select **Text File (Comma Separated Values)**, and click the **Import** button to launch the **CSV Import Wizard**. To import the file you just created into Outlook, enter its name in the text box.

See the preceding 'Between Outlook Express and Hotmail' section for instructions on how to bring your Outlook e-mail addresses into Hotmail.



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FIGURE 2: YOU CAN TRANSFER an address book from Outlook to Hotmail in three steps. First, export the addresses to a text file.

mail, the company doesn't always make it easy to share e-mail addresses between these programs. Here's some help.

Between Outlook and Outlook Express: Tell Outlook Express to use Outlook's address book instead of its own. Select **Tools•Address Book** and then **Tools•Options** in the Address Book dialog box. Check **Share contact information among Microsoft Outlook and other applications**. Click **OK** twice, and exit the Address Book and Outlook Express. The next time you open Outlook or Outlook Express, you'll have access to the address books in both programs.

Between Outlook Express and Hotmail: You can synchronize your local Outlook Express and Hotmail address books on Microsoft's server. First, set up Outlook Express to access your Hotmail account. Select **Tools•Accounts** and click **Add•Mail**

Outlook Express identity crisis ♦ 'Hosts'-based access woes ♦ Sticky AOL Plus

Create a Junk Mail Removal System

TIRED OF THE daily slog through your inbox, trying to separate the spam from the good stuff? Reader Christian Dysthe of Gonzales, Texas, writes in with a simple suggestion: Use an e-mail filter to move messages *not specifically addressed to you* to a folder set aside for suspected spam. Dysthe notes that a spam message's To: field seldom contains your address—or anyone else's for that matter.

It sounds easy enough, but getting filters to work involves trial and error. Your in-box may receive e-mail forwarded from several accounts, and some legitimate messages may not be addressed to you specifically. Private and public mailing lists are likely sources, and e-mail newsletters and messages copied (cc:) or blind-copied (bcc:) to you may not contain your address either. No matter what e-mail program you use, let the filter run for a day or two, and observe the results; then adjust the filter to improve the results by adding exception addresses—e-mail addresses that are automatically approved without having to satisfy the filtering conditions—to your filter's source and destination conditions. Fight the urge to send suspected spam directly to the trash folder. Some messages—bcc's, most notably—will always slip through. Open and peruse the spam folder occasionally to find misplaced legitimate messages, and then delete away.

Here's how to set up a spam filter in each of three popular e-mail programs.

Outlook 2000: Create a folder to hold your spam (*File•New•Folder*), and give it an obvious name, such as **Spam** or **Junk Mail**. Click OK. Now create a rule that looks for spam and moves it to the folder: Choose *Tools•Rules Wizard*, click the *New* button, and select *Next* to check messages as they

arrive in your inbox. In the next screen, choose *where my name is not in the To box*, click *Next*, and check *move it to the specified folder*. Click the resulting *specified* hyperlink in the rule description box (see **FIGURE 1**), navigate to the spam folder you created, click OK, and then click *Next* to move on to the list of exceptions to your rule. Check *except where my name is in the Cc box* and, optionally, *except if from people or distribution list* and *except if sent to people or distribution list*. If you use either

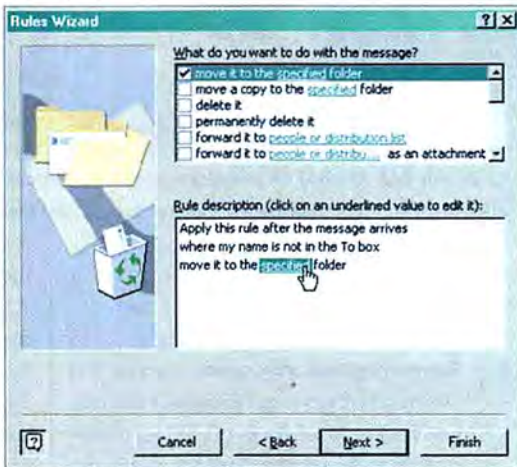


FIGURE 1: FILTER SPAM IN OUTLOOK and other e-mail programs by shunning messages not addressed to you.

of these latter two conditions, click the resulting *people or distribution list* link in the rule description box, and add any addresses that you know aren't spam sources or destinations; then click OK, *Next*, and *Finish* to create the rule.

Outlook Express 5.x: Creating a spam filter in Outlook Express requires fewer steps than in Outlook, but here the process leaves suspected spam in the in-box

Share Outlook Express

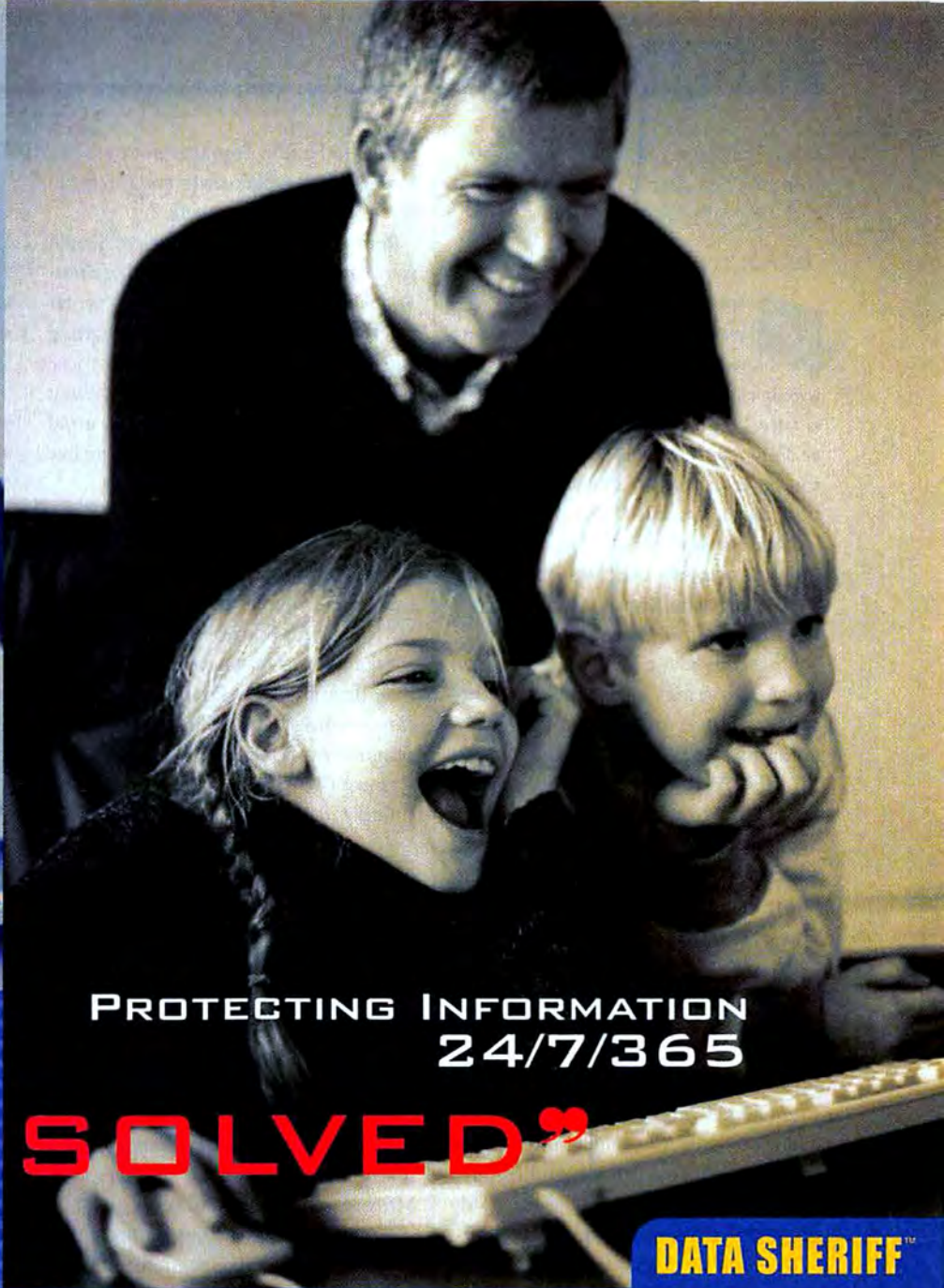
DO SEVERAL PEOPLE check their e-mail on your computer? Adding others' mail accounts to your Outlook Express Inbox means everybody gets to read everybody else's mail and makes finding new messages more difficult. You can solve both problems by segregating users via Identities. To create a new mail user, select *File•Identities•Add New Identity*, choose OK to switch to the new identity when prompted, and complete the account configuration. To switch to or log off of an identity, choose *File•Switch Identities*.

and moves the good stuff to another folder. Create a destination folder (*File•New•Folder*) and name it **Filtered Mail**; then click OK. Choose *Tools•Message Rules•Mail*, and click the *New* tab (but if this is your first rule, you won't need to click that tab). In the Conditions box, check *Where the To or CC line contains people* (scroll down to find it) and, optionally, *Where the From line contains people*; then click the resulting *contains people* links in the rule description box. Itemize e-mail addresses, mailing lists, newsletters, and other known nonspam sources and destination addresses as appropriate, and click *Add*. Click *Address Book* to enter names from your address book. Once you've entered all the acceptable addresses, click OK. Now check *Move it to the specified folder* in the Actions box, click the *specified* link in the rule description box, and click OK twice to save the rule.

Netscape Messenger 4.7x: Create a spam folder. Select *File•New* while in a folder or Explorer window, and then select *Folder* and enter a name.

Now open Messenger and start your filter (*Edit•Message Filters*). Click *New*, select to or CC from the first drop-down list of criteria, click *doesn't contain* in the second, and type your e-mail address in the last field on the line. Click *More* to enter additional filter criteria (additional e-mail accounts, known source or destination mailing lists, and e-mail newsletter addresses, for example). Choose *Move to folder*, ►

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select the spam folder you just created from the last drop-down list, and then click **OK** twice to save the filter.

UNHOLY 'HOSTS' FILE HANG-UP



MY DESKTOP PC won't access such Web sites as www.weather.com, www.newyorktimes.com, and even www.microsoft.com, no matter which browser I use. I get the standard 'The page cannot be displayed...' message. Oddly, I can get into some inaccessible sites if I drop the 'www' from the address. It isn't a phone-line or ISP problem because I can get in when I dial into the same account using the same line from another computer. Someone suggested that I reinstall Windows. Is there an easier fix?

Seth Shaw, Colebrook, Connecticut
YOUR PROBLEM could stem from other causes, but everything you mention points to a Hosts file gone awry. Back before the Web, computers needed the Hosts file to correlate domain names such as 'pcworld.com' with the numeric IP addresses that allow data to move from one machine to another over the Internet.

Internet service providers and office network administrators now use Domain Name System servers to track the ever-changing domains and their associated IP addresses. The Hosts file remains on PCs, however, enabling us to inadvertently mangle our Internet access by adding addresses to the file, and letting Internet utility authors bypass sometimes-poky DNS servers to speed Web-site access. My guess is that you're a victim of the latter.

The problem is that a domain's IP address tends to change over time. If you don't regularly update your speed-up utility, the out-of-date address mappings listed in the Hosts file prevent access to the domain. Meanwhile, the DNS server con-

tinues to handle domains not listed in Hosts, which explains why you can get to some sites but not to others.

Remedying the problem is easy: Search your hard disk (using **Start>Find** or **Start>Search**) for a file called 'hosts' (don't enter an extension). The only entry not starting with '#' should be '127.0.0.1 localhost' (see **FIGURE 2**); if there are other lines without '#', delete them. Or if you want to avoid editing the file, rename it something like 'hosts.bak'—and forget about it.

EXPLORER 6 AND YOUR E-MAIL

IF YOU'RE A Microsoft Network subscriber and you decided to give the slick MSN Explorer 6 browser (explorer.msn.com) a try, you may have discovered that installing the browser moves your existing POP3 MSN mail account to a Web-based Hotmail account (POP3 is the standard Internet mail retrieval protocol). Your e-mail address remains unchanged, but all new incoming mail messages appear in MSN Explorer's Inbox instead of in your existing mail program (such as Outlook or Outlook Express). If you don't want that arrangement, don't download and install MSN Explorer—you can use the MSN service without it. If you've already installed MSN Explorer, you can revert to your previous account type at an MSN account configuration page (go to supportservices.msn.com/us/oeconfig). For details, see support.microsoft.com/support/kb/articles/Q268/7/32.asp.

AOL PLUS JUST WON'T GO AWAY

LOTS OF READERS wrote in to say that February's tip on removing AOL Plus was really great, but that no matter how often they tried, AOL Plus returned when they logged back in. (They described AOL Plus as "a mindless annoyance" and as "ridiculous clutter.") If you use AOL 5 or 6 software and log in over a high-speed Internet connection, you will always get an AOL Plus window on your screen.

DOWNLOAD OF THE MONTH

Jazz Up Your E-Mail With IncrediMail

SENDING HTML MAIL, with its multitude of fonts, backgrounds, embedded graphics, and sounds, is a bad idea. It costs your recipients time and effort to download and display, and its inherent scriptability presents a serious security risk. HTML messages also clog the Internet with useless froufrou. But you're not going to listen to me. HTML mail is fun, and—to judge from the volume of it that I receive regularly—it's not going away anytime soon.

So instead of using your current mail program's tasteful, meager HTML templates, why not go whole hog? IncrediMail dresses up your missives with background images, quirky animations, and silly sounds. You can



download the free 5.63MB program from PCWorld.com's Downloads or from IncrediMail's site at www.incredimail.com.

Once you have gotten the digital equivalent of the whoopee cushion out of your system, you can always go back to your staid old text-only mail program. Please.

Until America Online gives you more control over pop-up windows, your only recourse is to minimize the AOL Plus window and pray that it stays that way. The 'Remove AOL Plus' keyword does help if you're taking your laptop on the road. Removing the AOL Plus software should work in that case, as long as you log in only over a dial-up line.



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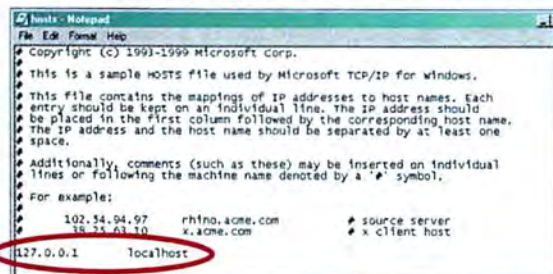


FIGURE 2: AVOID WEB SITE HANG-UPS: Keep your Hosts file lean. Better yet, rename the file—you probably don't need it.

Shreeesh

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Your PC's Case: Enter With Caution

EVERY TIME YOU crack open your PC's case to add or remove hardware, you're rolling the dice. Maybe you'll slip that new modem or ethernet card into its slot and watch Windows seamlessly install its drivers. Yeah, and maybe your Internet stocks will return to triple-digit share values, too—but I sure wouldn't count on it.

Even with such technologies as Plug and Play, hardware can still be quite tricky to install. Mistakes or problems can lead to hours of troubleshooting, or even to an unusable PC. These installation guidelines should help keep your system running.

First, create a backup. Windows 98 automatically backs up its Registry files every day. By default it stores the last five backups in the Windows\Sysback folder as .cab files named rbxxx.cab, where xxx is the number of the backup—001, 002, or whatever. Copy the most recent .cab file, and give it a different name so it won't be overwritten by a corrupted copy. If you need to restore a backup file, restart your system in DOS mode and run regscan.exe—running it from a DOS session in Windows won't work.

Windows Me's System Restore utility automates system backups. Click *Start*•*Programs*•*Accessories*•*System Tools*•*System Restore* to reload a system configuration that Windows saved previously.

Last, make sure that you're electrically grounded. Even a small static charge on your body can damage your PC's delicate circuitry. Touch the system's metal chassis just before you unplug it from its

grounded outlet. Always remove all traces of the old device before you install the new one. Here's what to do:

1. Use the Add/Remove Programs applet in Control Panel to remove all of the software associated with the device.
2. Remove the device's driver. Click *Start*•*Settings*•*Control Panel*•*System*, choose the *Device Manager* tab, double-click the device's category, select the device you're uninstalling, and click the *Remove* button. **Note:** To remove the driver of a graphics card (Windows calls it a "display adapter"), first double-click the device name, choose the *Driver* tab in its Properties box, and select the *Update Driver* button; then use the Update Device Driver Wizard to install Windows' generic VGA driver (see **FIGURE 1**).
3. Shut down your PC.
4. Open your system's case, and remove the old device. If you're upgrading your graphics card, put the new one in now.
5. Restart the PC and check Device Manager. If the old device's entry is still there,

repeat the uninstall. Sometimes you have to "remove" a device more than once before there are no traces of it left in Windows.

Install new devices one at a time, and use your PC for a few days between each installation to give problems time to reveal themselves. Some things to remember as you install:

1. Plug and Play isn't always the best method for installing a device. Some drivers have their own installation programs that are best run independently of



Reserve a Cab

ABOUT THE ONLY time you need your Windows CD-ROM once your PC is running is when you install hardware. If you can't find the disc, or if you can't get your CD-ROM drive to work, you could be stuck. To play it safe, make a folder on your hard disk, name it **CABS**, and copy Windows' .cab files (the compressed versions of Windows operating system files) to it. Just copy the 'win98' and 'drivers' folders from the Windows CD. They occupy about 275MB, but it's space well used, even if you only need the files once.

Windows' own installation routines.

2. If the installation instructions are unclear or refer to a different model number, go to the manufacturer's Web site and look for updated documentation.
3. Get the latest driver update. The drivers on the floppy or CD-ROM that came with the device may be out-of-date. Check the vendor's Web site for newer versions.
4. Don't interrupt a driver installation. Stopping in midprocess can cause all kinds of trouble. If you want to abort an installation, finish the procedure completely, and then uninstall the driver.
5. Secure cards to the case with their fastening screws. Unfastened cards can work their way out of their slots over time.



For additional hardware tips, visit www.pcworld.com/heres_how. Send your tips and questions to kirk_steers@pcworld.com. We pay \$50 for published items. Kirk Steers is a PC World contributing editor.

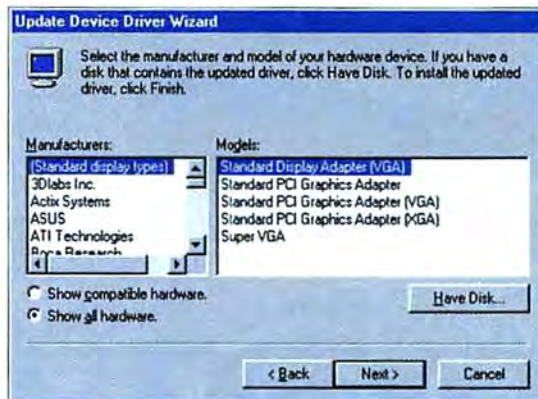


FIGURE 1: BEFORE INSTALLING A NEW graphics card, replace the old driver with Windows' Standard VGA driver.

HUGHES



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Keep It Powered, Keep It Cool

THEY MAY NOT be as glamorous as ultra-fast CPUs, humongous hard drives, or the latest 3D graphics cards, but cooling and power components are the oft-forgotten workhorses every PC relies on. If you plan to add new components, make sure your power supply can handle the added load.

Alas, some PC makers scrimp by installing cheap power supplies that can't handle varying wall voltage or voltage spikes or can't provide the clean DC power needed for long PC life. Worse, many use inexpensive "sleeve-bearing" fans that wear out in a year or so; a CPU fan failure can cause the processor to fry in minutes. Long-life ball-bearing fans are essential.

Actually, power supply failures aren't unusual. They can be hard to diagnose, but if the fan on the back of the power supply isn't spinning, that's usually a good indication the supply has expired. You can also use a voltmeter to see if voltage is reaching the power supply connectors; and PC Power and Cooling (see "The Top Down") sells an inexpensive (\$9), easy-to-use power supply tester.

Even if your PC's power supply seems okay, a new one provides clean power and high-capacity cooling—and is usually quieter than the original equipment.

Stan Miastkowski is a PC World contributing editor.

THE TOP DOWN

Benefits: Longer component life, more-reliable operation, greater resistance to brownouts and voltage spikes

Costs: Power supply \$40 to \$100, cooling fan \$15 to \$50

Expertise level: Intermediate

Time required: 45 to 60 minutes

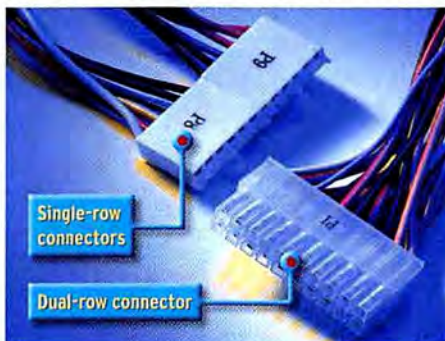
Tools required: Phillips screwdriver, anti-static wrist strap (recommended)

Vendors: Antec (www.antec-inc.com), Enlight (www.enlightcorp.com), PC Power and Cooling (www.pcpowerandcooling.com), Sparkle Power (www.sparklepower.com)



KEEPING IT POWERED

1 Identify the power supply. Turn off your PC, unplug it, and remove the cover. Virtually all PCs made in the past three to four years use an ATX power supply, which has a dual-row motherboard power connector. Older PCs may have an AT power supply, which uses two single-row



power connectors. AT power supplies also have a thick black cable that runs to the system switch. (ATX supplies are switched from the motherboard and don't have a switch wired to them.)

Note that although most ATX supplies are the same size, the physical size of power supplies does vary. AT supplies come in several shapes and sizes; what's called a "slim" supply is the most common.

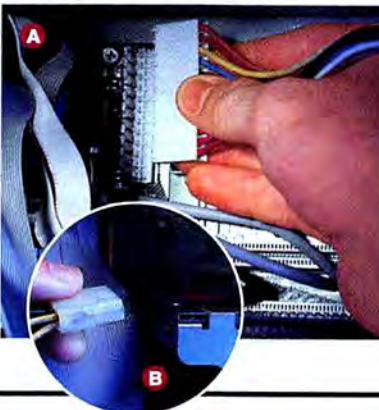
Also, a few PC models use proprietary power supplies that can't be replaced with standard units. If your PC uses one, you'll have to order a replacement directly from the manufacturer.

2 Size it right. It's crucial to purchase a power supply that matches or somewhat exceeds the power needs of your PC. Each component requires a certain amount of power. Using the chart at right, add up the power requirements of your PC's components, and then add another 30 percent for "wiggle room." Most systems will do fine with a 250- or 300-watt supply; there's no advantage in purchasing a supply with considerably more capacity than your system needs.

COMPONENT	Power required (watts)
Motherboard	15-30
700-MHz Celeron chip	21
1-GHz Pentium III chip	33
1.2-GHz Athlon chip	70
RAM	7 per 128MB
PCI add-in card	5
Network card	4
Graphics card	20-50
Floppy drive	5
CD-ROM, CD/RW, or DVD-ROM drive	10-25
IDE hard drive	5-15
Standard SCSI hard drive	10-25
10K- or 15K-rpm SCSI hard drive	10-45

3 Disconnect the power connectors. Remove the power connectors from the motherboard (A) and drives (B). If any of these connectors seem stuck, check for a locking tab on the side and gently rock it to loosen the connection.

AT only: Remove the power switch (C) and grounding wire (D).

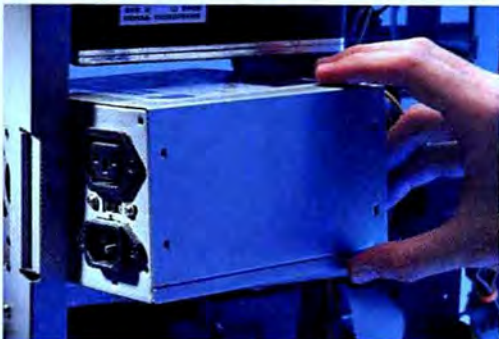


- 4 Remove the old power supply.** Extract the screws (usually four) from the rear of the power supply, and carefully prise the power supply from the case.

In some instances, you may need to disconnect cables or even take out components to free up enough space to remove the supply. If such steps are necessary, keep track of what goes where. Hint: Use masking tape to mark cables and components.



- 5 Install the new power supply and reconnect power cables.** Carefully place the new supply in the case, secure it with screws (new ones usually come with the supply, although you can use the old ones), and carefully connect the motherboard power cable, other power connectors, and any other cables that you had to remove or disconnect in step 4.



AT only (photo at left): Ensure that the two motherboard power connectors on an AT system are connected correctly. The red wires are always located to the outside of the connector. Also, attach to the case the new switch that comes with the AT power supply.

- 6 Check the voltage and power up.** IMPORTANT: If there's a voltage selector switch on the rear of the power supply, confirm that it's set to the correct voltage for your country.

Connect the main AC power cord from the power supply to the wall, and power up your system. Make sure your PC starts up correctly and that everything works. If the PC seems dead, disconnect the AC power cable, double-check all your connections, and then try again.



KEEPING IT COOL

Cooling via air movement is essential for the long-term reliability of your computer and its components. Here are some accessories to keep your PC cool and happy.

Drive bay cooler (\$30 to \$50)

A high-capacity hard-drive cooler is helpful for large-capacity or high-speed hard drives, and necessary for most SCSI hard drives.

Auxiliary case fans (\$8 to \$15)
Most cases have exterior mounting locations for fans to increase the interior airflow. Some fans are thermostatically controlled—as the case temperature increases, the fan spins faster.

CPU fans (\$15 to \$20)
Although all contemporary CPUs come with a fan, a higher-capacity ball-bearing fan with a large heat sink can significantly reduce the CPU temperature.

Hard drive contact cooler (\$15)
A stick-on fan for hard drives is designed to cool their operation.

Graphics card cooler (\$15)
The processors used in today's high-performance graphics cards can run as hot as your PC's main CPU. An auxiliary cooling fan can keep things cool.

Card cooler (\$15 to \$30)
An add-in card that plugs into a free slot and increases airflow.

Temperature alarm (\$15)
Sounds a loud alarm when the temperature inside the case exceeds 110°F, indicating a failure in your PC's cooling components.

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- Your Own CGI-BIN
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- Unlimited POP Email Accounts
- Unlimited Email Forwarding/Aliases
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Max # of domains you can host	N/A	25	25	75	75	N/A	25
Base Monthly Server Cost	\$18.95	\$59.95	\$89.95	\$149.95	\$199.95	\$18.95	\$89.95
Max. per domain cost @ \$2.00/domain/mo	N/A	\$50.00	\$50.00	\$150.00	\$150.00	N/A	\$125.00*
Max. possible cost to you/ month	\$18.95	\$109.95	\$139.95	\$299.95	\$349.95	\$18.95	\$214.95
Your monthly gross profit @ \$19.95 domain	N/A	\$498.75	\$498.75	\$1,496.25	\$1,496.25	N/A	\$498.75
Your monthly net profit reselling hosting	N/A	\$388.80	\$358.80	\$1,196.30	\$1,146.30	N/A	\$283.80
Additional Profit Reselling AIT Extras**	N/A	\$1,250.00	\$1,875.00	\$3,750.00	\$5,625.00	N/A	\$1,250.00
Total Monthly Profit	N/A	\$1,638.80	\$2,233.80	\$4,946.30	\$6,771.30	N/A	\$1,533.80

*Additional domains for Windows2000 Reseller Hosting Solution - \$5.00/month

**Assumes Reseller sells the many FREE AIT offerings at \$50/month per customer (Standard Accounts) or \$75/month (Plus Accounts)

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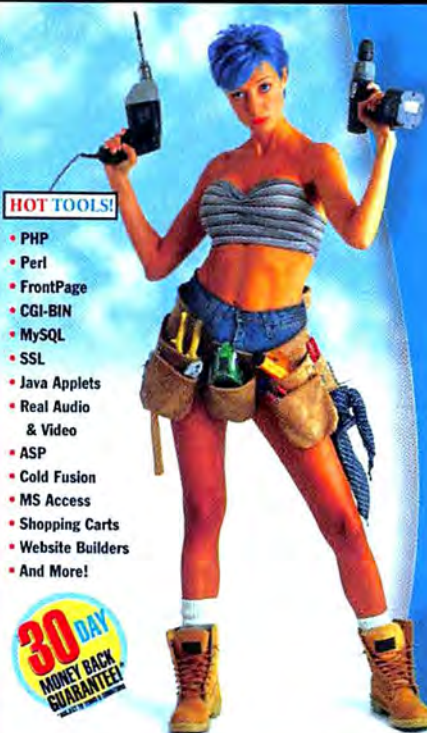
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- Gold Contacts

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Now you can safely remove any SCSI device from a SCSI chain by simply clicking a switch. Optional Power Supply provides term. power.



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Blue Neon glow strip in every bay shows that drive is powered properly.

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Benefits:

- Improves SCSI Bus Performance
- Less Errors; More Reliable Data Transfer
- Diagnoses Problems
- Analyzes Signal Quality

Features:

- Active Regulation
- Fast 50 & Fast Wide 68
- Status Indicators
- Gold Contacts

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- One 2 Port Escalade™ PCI RAID Controller.

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Kit

240 Gigabyte 4 Hot-Swap Bays

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- Hot-Swap Case, 4 Bays, with 200 watt power supply.

- Four Hot-Swap Bays with fans

- Four 36" Teflon Cables

- Four Maxtor 60 Gigabyte 5400 rpm ATA 100 IDE Drives

- One 4 Port Escalade™ PCI RAID Controller.

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480 Gigabyte 8 Hot-Swap Bays

Kit Includes:

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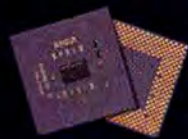
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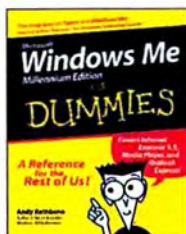
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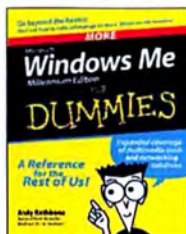
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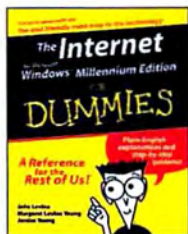
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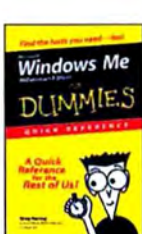
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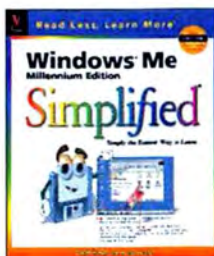
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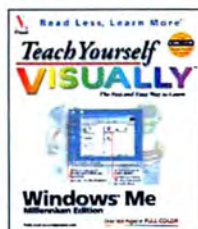
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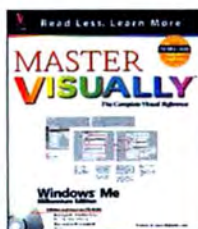
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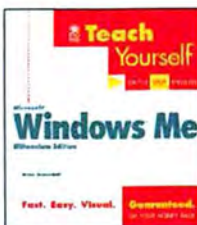
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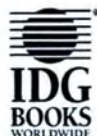
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A Little Respect for a 20-Year-Old

TWENTY YEARS AGO, the original IBM PC taught the world that simple, flexible, and open systems beat complicated, inflexible, and closed ones—and it became the most widely imitated computer in history. Today, it gets virtually no respect. Aging techies blithely declare that long before the IBM PC's August 1981 debut, users could choose among dozens of equally capable models without the

three famous initials. Apple fanatics mock DOS's command-line interface and remind us that the juggernaut of mice and icons began with the Macintosh and its big sister, Lisa. To hear the revisionists tell it, the PC was some sort of inconsequential historical anomaly.

Wrong, wrong, wrong. I was there to watch IBM almost single-handedly change a PC market dominated by hobbyists into one aimed primarily at helping people get work done. Strikingly, no single conspicuous element led to the PC's success. The attractiveness of the overall package was what made it a winner.

MORE COMPLETE, LESS GEEKY

WHY DID I PLUNK down my money for an IBM PC instead of one from Apple or one of the many options from now-forgotten makers like Northstar and Cromemco? For openers, service: I'd been a satisfied user of IBM's Selectric typewriters, and the company was willing not only to fix anything that might go wrong but also to finance my purchase. That wasn't a trivial consideration for a computer worth more than my car.

Other monitors often exhibited flickery, blocky text. IBM's green-on-black display delivered highly readable, rock-solid characters. The much-maligned keyboard had layout oddities, but it easily beat competitors that sometimes lacked even arrow keys.

IBM systems were more complete and less geeky than the competition's. Getting an Apple II to display lowercase characters required installing an extra card. Setting up a CP/M machine could mean learning how to connect and configure a terminal.



IBM changed a PC market dominated by hobbyists into one aimed primarily at helping people get work done.

Not so with IBM's PC. And the machine's biggest advantage was its flexible but awkward-to-program 20-bit addressing. That let the IBM PC handle 16 times more memory than the 64KB typical of older machines, permitting faster, more-sophisticated programs like Lotus 1-2-3.

THE LEGACY LIVES ON

REVISIONISTS INSIST that IBM's big mistake was to let Microsoft license DOS to all comers. But earlier small IBM machines with proprietary operating systems had already failed, and hindsight shows us exactly what happens when you keep an operating system proprietary and closed: the Macintosh's marginalization. Microsoft's ability to sell DOS elsewhere created a broader platform for independent software developers—and thus more DOS software.

IBM's real failure stemmed from its fear that PCs would cannibalize sales of its more expensive machines—as they inevitably did. Instead of setting out to dominate the lucrative add-on market, the world's biggest computer hardware company stupidly tried to defend its high-end business. Since its products were exorbitantly priced, third parties stepped in to fill demand for serial ports, multipurpose cards, modems, and so on. I kept my original PC running for more than seven years with various upgrades. The only one labeled "IBM" was a revised boot ROM.

When clones and new luggable designs arrived from unknown upstarts like Compaq, IBM reacted by delivering inferior products at significantly higher prices. The market did the rest. Still, in the face of competition from dinky but capable microcomputers, only IBM among the major computer firms of the time managed to create a real PC business at all. Without exception, the PC efforts put forward by competitors

like Digital Equipment, Xerox, and Wang were utterly clueless.

The legacy of the PC lives on at Microsoft, which went to school on IBM's mistakes. You can see it in the company's constant attempts to co-opt any new development that threatens to minimize the Windows PC's dominance—from cell phones to set-top boxes. The IBM PC's brutal lesson is this: If somebody's going to devour your business, it might as well be you.

PC World Contributing Editor Stephen Manes is a cohost of Digital Duo, a series that has appeared on public television stations nationwide. He has written about PCs for nearly two decades. ■



Volume 19, number 8. PC World® (ISSN 0737-8939) is published monthly at \$24.95 for one year (12 issues), \$49.90 for two years (24 issues), \$74.85 for three years (36 issues) by PC World Communications, Inc., 501 Second Street #600, San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add \$15 per year for Canada; add \$46 per year for airmail for all other countries. Canadian GST Registration #R124669680. Periodicals postage paid at San Francisco, California, and additional mailing offices. Canada Post International Publications Mail Product, (Canadian Distribution) Sales Agreement No. 663549. POSTMASTER: Send address changes to PC World, Subscription Dept., P.O. Box 37571, Boone, IA 50037-0571. Editorial and business offices: 501 Second St. #600, San Francisco, CA 94107; 415/243-0500. Copyright © 2001, PC World Communications, Inc. All rights reserved. The trademark PC World is owned by International Data Group and used under license by PC World Communications, Inc. PC World Top 10®, Top 10®, PC World Top 100®, Top 100®, and Consumer Watch® are trademarks of International Data Group, Inc., and used under license by PC World Communications, Inc. Printed in the United States.



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