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PC MAGAZINE

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THE INDEPENDENT GUIDE TO TECHNOLOGY FEBRUARY 8, 2000

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Macromedia's New Web Tools

PLUS: How to Master Your PDA

TOP SITES

100

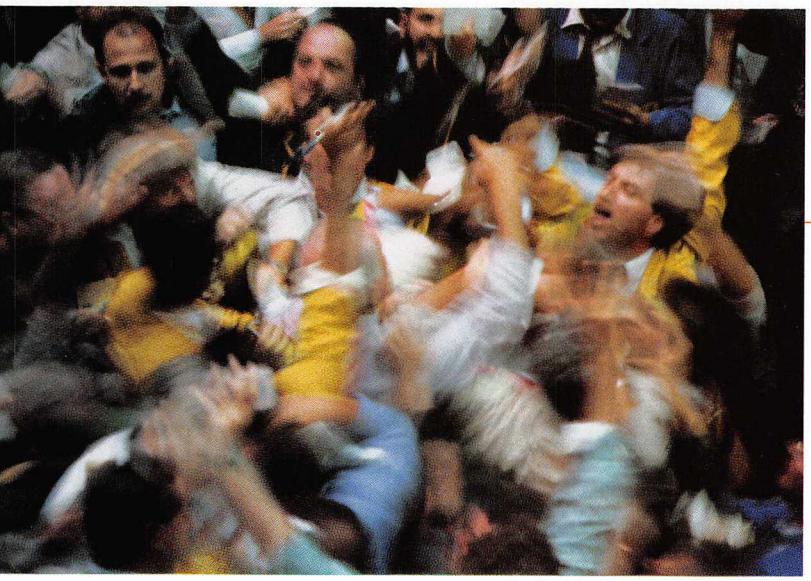
And the Technology That Makes Them Work

Our Essential Bookmarks to The Web's Most Useful Sites

Microsoft®

Windows® 2000

The Busi



With millions of business transactions being conducted daily over the Internet, ***Windows 2000 Advanced Server*** *gives you the reliability and scalability to compete in the digital economy.*

Windows 2000 Professional

The reliable operating system for business desktops and laptops.

- Keeps your users up and running with a robust system architecture, support for self-healing applications, and comprehensive system, application, and driver protection.
- Provides an excellent mobile solution, delivering great laptop support — plug'n'play, power management, and broad device support with integrated security and file encryption to protect critical business data.
- Easier to use with enhanced Windows user interface, seamless Internet integration, and new technology to automate setup, management, and support of your systems.

Microsoft Windows 2000 Professional

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ness | Internet |

starts here.

Windows 2000 Professional *offline folders let you bring your network with you when you are on the road.*

Windows 2000 Server

The multi-purpose network operating system for businesses of all sizes.

- Internet enable your business with new Web and communications services such as Internet Information Services 5.0, XML support, and integrated Virtual Private Networking.
- Centrally manage or delegate control of all your users, applications, and network resources with the policy-based management tools in the Active Directory™ directory service.
- Increases server uptime with improved reliability, advanced memory management, and dynamic system configuration support.
- Supports up to 4-way SMP with up to 4 GB RAM.

Microsoft Windows 2000 Server

Windows 2000 Advanced Server

The operating system for e-commerce and line of business applications.

Includes everything offered by Windows 2000 Server, plus:

- Build and manage scalable Web server farms for the most demanding e-commerce sites with Network Load Balancing to distribute traffic across multiple servers.
- Ensure high availability of your critical Web applications and services with a 2-node clustering infrastructure.
- Support demanding enterprise applications with 8-way SMP and up to 8 GB RAM to provide increased server performance and scalability.

Microsoft Windows 2000 Advanced Server

Windows 2000 Datacenter Server

The operating system for business solutions that demand the highest degree of scalability.

Includes everything offered by Windows 2000 Advanced Server, plus:

- 4-node clusters provide increased system availability.
- Provides the highest level of performance and scalability within the Windows 2000 line to support mission critical solutions like data warehousing, on-line transaction processing, and ERP.
- Supports the highest level of Windows scalability with up to 32-way SMP and up to 64 GB RAM.

Microsoft Windows 2000 Datacenter Server

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Which is why our new operating system

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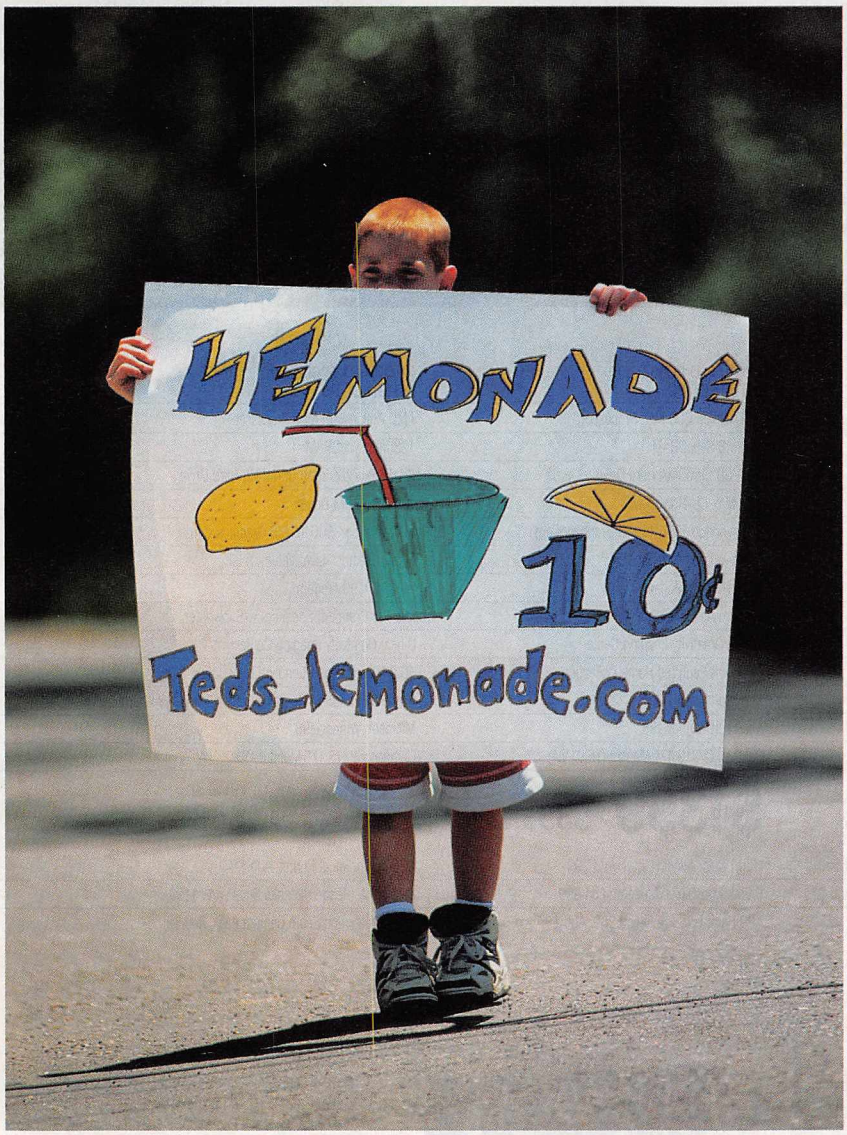

The Internet is changing the way every business works, every day. Which is why we created Microsoft® Windows® 2000, a family of server and desktop operating systems built on NT technology. It's the operating system built for businesses of all sizes, with the most comprehensive set of Web services, and the reliability that today's digital economy demands. Because it's Windows you also have the widest choice of hardware, software, devices, and trained technical professionals. In fact, there are already more than 1,000 applications running on Windows 2000. To build your business around the Internet, start evaluating Windows 2000 today.

Go to **www.microsoft.com/windows2000/**

Microsoft® **Windows** 2000

PRESARIO 5900Z-550 INTERNET PC	PRESARIO 5900Z-600 INTERNET PC	PRESARIO 5900Z-600 INTERNET PC
AMD® Athlon™ 550 MHz Processor	AMD Athlon 600 MHz Processor	AMD Athlon 600 MHz Processor
64 MB SyncDRAM	128 MB SyncDRAM	128 MB SyncDRAM
10.0 GB UltraDMA Hard Drive[1]	13.0 GB UltraDMA Hard Drive[1]	20.0 GB (7200 rpm) UltraDMA Hard Drive[1]
32X Max CD-ROM Drive[2]	32X Max CD-ROM Drive[2]	10X DVD-ROM Drive[8]
3Dfx Voodoo 1000 16 MB Graphics Card	3Dfx Voodoo 1000 16 MB Graphics Card	3Dfx Voodoo 3500 16 MB Graphics Card
Creative Labs 1373 Audio	Creative Labs 1373 Audio	Sound Blaster™ Live! Value
56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]	56K ITU V.90 Modem[3]
JBL Pro Amplified Speakers	JBL Pro Amplified Speakers	JBL Pro Premium Speakers w/Subwoofer
Digital Creativity Imaging Center[4]	Digital Creativity Imaging Center[4]	Digital Creativity Imaging Center[4]
Microsoft® Featured Home Collection	Microsoft Featured Home Collection	10.0 Mbps Home Phoneline Networking Card[8]
Microsoft Word	Microsoft Word	Microsoft Featured Home Collection + MS® Word
Microsoft Windows®98	Microsoft Windows98	Microsoft Windows98
Compaq CV515 15" Monitor (13.8" VIA)	Compaq CV715 17" Monitor (16.0" VIA)	Compaq CV715 17" Monitor (16.0" VIA)
$1099‡ As low as **$31** per mo.[†]	**$1399‡** As low as **$39** per mo.[†]	**$1699‡** As low as **$48** per mo.[†]
Personalize by choosing:		
20.0 GB (7200 rpm) UltraDMA Hard Drive[1]: Add $50	IJ300 Color Inkjet Printer: Add $99	IJ750 Color Inkjet Printer: Add $149
100 MB Iomega® Zip Built-In™ Drive + 1 disk: Add $79	6.0Mb Max Digital Modem[5]: Add $99	8X CD-RW (Read/Writeable) Drive[7]: Add $199
IJ300 Color Inkjet Printer: Add $99	APC Back-UPS Pro Office 280: Add $89	Intel® Create and Share Camera Pack: Add $99

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‡All prices shown are Compaq Direct selling prices and do not include applicable sales tax and shipping, are valid in the U.S. only, and are subject to change or cancellation without notice. Not all models available in retail stores. Illustrations may not accurately represent exact configurations priced. Compaq is not liable for editorial, pictorial, or typographical errors in this advertisement. †This product is provided and administered by MBNA American Bank, N.A. Financing available on approved credit. Payment based on a 48-month term at 14.99% APR. Your APR may be higher. There is no fee for Compaq purchases billed directly to your account. However, there is an access check fee of 3% of the U.S. Dollar amount of each advance check ($5 min./$30 max). ††System tested using NSTL YMARK2000 hardware test. Non-compliant third-party software/hardware products may affect rollover results. For more details, see www.compaq.com/year2000. *Requires sharing subscriber profile information and viewing targeted ads. Other terms and conditions also apply. See NetZero User Agreement for details. [1]For hard drives, GB=billion bytes. [2]32X Max CD-ROM data transfer rates may vary from 1800 to 4800 Kbps. [3]ITU V.90 modems are designed only to allow faster downloads from K56flex- or V.90-compliant digital sources. Maximum achievable download transmission rates are currently unknown, may not reach 56 Kbps, and will vary with line conditions. [4]Works with most third-party devices. [5]The 6.0Mb Max Digital Modem uses the ADSL/G.Lite protocol. ADSL/G.Lite updates may be downloaded from Compaq's website when available. The ADSL/G.Lite protocol is designed to allow faster downloads from ADSL/G.Lite-compliant digital sources. Availability of ADSL/G.Lite services will vary by region and Internet Service Provider (ISP), and may differ from V.90 ISP services. Maximum achievable download transmission

Compaq Home

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3Dfx Voodoo 3500 16 MB Graphics Card
Sound Blaster Live! Value
56K ITU V.90 Modem[3]
Klipsch v.2-400 Watt Speaker System
Digital Creativity Imaging Center[4]
8X CD-RW (Read/Writeable) Drive[7]
Microsoft Featured Home Collection+MS Word
Microsoft Windows98
Compaq CV715 17" Monitor (16.0" VIA)
$2299‡ As low as **$64** per mo.†
6.0Mb Max Digital Modem[5]: Add $99
Creative Annihilator 32 MB Graphics: Add $147
IJ750 Color Inkjet Printer: Add $149

PRESARIO 5900Z-750 INTERNET PC
AMD Athlon 750 MHz Processor
128 MB SyncDRAM
27.0 GB (7200 rpm) UltraDMA Hard Drive[1]
10X DVD-ROM Drive[6]
Creative Annihilator 32MB w/GeForce256 Graphics
Sound Blaster Live! Value
6.0Mb Max Digital Modem[5]
JBL Pro Amplified Speakers
Digital Creativity Imaging Center[4]
Microsoft Office 2000 SBE®
Microsoft Windows98
Compaq CV915 19" Monitor (18.0" VIA)
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COMPAQ

rates with ADSL/G.Lite are currently unknown, may not reach 6.0Mbps, and will vary with line conditions and distance. [6]10X DVD-ROM drives read a minimum of 5,545 Kbps and a maximum of 13,525 Kbps. [7]CD-RW drive data transfer rates may vary as follows: for recording to CD-R media, the data transfer rate may vary from 150 to 600 Kbps; for writing to CD-RW media, the data transfer rate may vary from 150 to 300 Kbps; for reading to CD media, the data transfer rate may vary from 1500 to 3600 Kbps. An appropriate license may be required. [8]Home Phoneline Networking and Ethernet Port cannot be used simultaneously. Additional PC must have a network adapter, sold separately. AOL is a single-user system and will not allow multiple users to access simultaneously under the same account. Other Internet Service Providers may have the same restrictions. One year parts and labor. Labor for Desktop systems is pickup service during the first 90 days of ownership. Labor for notebooks is pickup service. Compaq, the Compaq Logo, and Presario are registered in the U.S. Patent and Trademark Office. AMD, AMD Athlon, and AMD-K6 are registered trademarks of Advanced Micro Devices, Inc. Intel, the Intel Inside Logo, and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. Microsoft® Windows®98 installed. Microsoft, MS, and Windows are registered trademarks of Microsoft Corporation. Iomega and Zip are registered trademarks and Zip Built-In is a trademark of Iomega Corporation. Product and company names mentioned herein may be trademarks and/or registered trademarks of other companies. Call Compaq Monday–Friday, 7:00am–11:00pm (CT). Saturday and Sunday, 7:00am-7:00pm (CT). ©2000 Compaq Computer Corporation. All rights reserved.

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2 **Greater Data Security.** Your data's safer than it would be on your office PC. NetLedger uses passwords, multiple backups daily, offsite data storage, redundant servers and power systems, and more. And Oracle Business Online™ hosts NetLedger, the same service Oracle delivers its Fortune 500 applications on.

3 **No More Upgrade Hassles.** NetLedger is updated weekly. So each time you log on it's at its best. Forget old-time software nightmares like file incompatibilities, time-consuming and costly upgrade ordering, and waiting days for support when you upgrade.

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7 **Easy, Instant Conversion.** NetLedger converts QuickBooks data with one mouse click. And if you ever want to go back to your old way, exporting data from NetLedger is easy, too.

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MICHAEL J. MILLER

Forward Thinking

DON'T JUST SURF; GET THINGS DONE!

A COUPLE OF YEARS AGO, THE Web was all about browsing—going to different sites, looking at the information, and then jumping to other sites. That's why portals such as Excite, Netscape Netcenter, and Yahoo! grew so rapidly. We needed guidance on where to go first. Today, people still spend lots of time surfing and reading online, but those activities no longer drive Web usage as they once did.

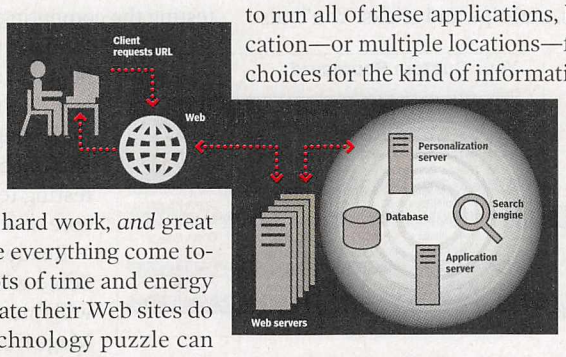
Instead, today's focus is on what you can get done on the Web and with Internet computing in general. Today's best Web sites let you research specific topics, shop and compare prices, store your calendar or your contacts, and exchange information with others in your company or those in other companies who are working on the same project. These sites provide communities for discussions of business and personal information. They often show you pages that are personalized with information tailored to you or your company. They may even host applications that you used to run on your PC.

The change from a Web defined by its links to a Web defined by the services that sites provide is a massive change. Indeed, 74 sites on our current list of "The Top 100 Web Sites" (page 144) are appearing for the first time, as are many of the categories into which we put them.

This change will force every organization to analyze how it views its own Web presence and force all of us to rethink our own lists of essential bookmarks. The good news: There are countless new services out there to choose from, and you're sure to find some gems.

PAY ATTENTION TO PRODUCTS BEHIND THE CURTAIN

AS I TALK TO THE PEOPLE WHO ARE DEVELOPING THESE new Web sites and Web-based services, one theme I'm hearing is that making the right technology decisions up front is critical to their success. That may sound obvious, but it goes against the conventional wisdom that says the amount of processing power you have and the kind of software you use don't matter as much in an Internet-centric world. I've heard too many people say that anything that does the job is good enough. They're wrong.



Producing wonderful Web sites like those on our Top 100 list requires great ideas, lots of sweat and hard work, *and* great hardware and software tools to make everything come together. The best companies spend lots of time and energy making sure the tools they use to create their Web sites do the right jobs. Each piece of the technology puzzle can have a significant impact on the overall quality of a site and the quality of the experience it delivers to its visitors.

To create a great Web site, you need a lot of different technology components. You need design tools—from page design software to photo editors to full design suites. The products you choose will determine how quickly you can design the site, how good it looks, and what it can and can't do.

You need Web servers and probably application servers and database servers to get the right information to the right people. You may want load-balancing software and hardware, clustering solutions, and redundant servers or storage. You may need personalization software, inventory management software, or ERP software to keep things going. You probably need some way of tracking customers, data, and Web site performance. And you need hardware to run all of these applications, backup systems, and a location—or multiple locations—for the site. With the right choices for the kind of information you have, you can create a site that's fast, powerful, and reliable.

There's a constant struggle among cost, time to market, and the quality of the Web experience you are delivering. Choosing the right architecture and products is crucial. Almost no company has all the skills it needs to make each part of the operation work as well as it should. Therefore, most companies don't do everything in-house. Most outsource something—perhaps hosting or design—so they can concentrate on the areas where they can bring added value.

Building a great Web site depends largely on understanding what your unique needs are, what your internal skills are, and which mix of tools will work best for you.

Forward Thinking

MICHAEL J. MILLER

PERFORMANCE STILL MATTERS

BY THE WAY, THE "PERFORMANCE DOESN'T MATTER" argument doesn't hold for individual PCs, either. Anyone who plays computer games, creates complex Web images, or works with graphics or video knows that. But that's not all. In November, our new i-Bench tests proved that even downloading a series of complex Web pages can be twice as fast on a new computer as on an older system. (We also found eye-opening differences between PCs and Macs.) CPU speed does make a difference. Of course, that's not to say performance is the only thing that matters. For corporate users, things like PC manageability and consistency among product lines are important (Compaq, Dell, HP, and IBM do those things right). For individual users, things like style, looks, and special features count. And everyone cares about reliability and support. But performance remains part of the equation.

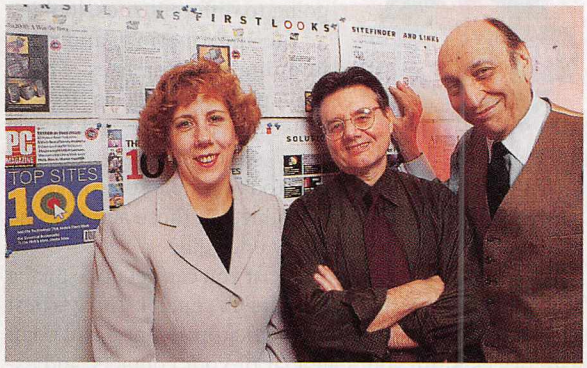
When will that stop? When software developers stop creating new applications. But for the foreseeable future, every time the hardware companies come up with products that are faster, developers keep finding new things to do with that speed. And that's the good news.

PC MAGAZINE'S NEW LOOK

AS YOU CAN PROBABLY TELL BY NOW, *PC MAGAZINE* HAS undergone something of a change. The issue you hold in your hand is rather different from previous issues in a lot of ways: organization, look, typography, even colors.

We had several goals in creating our new design. One was to be more useful to our readers—making the most critical information in the magazine as accessible as possible. The First Looks section—one of the most popular sections of the magazine—now starts right after the table of contents. Our Solutions section, which offers help on improving your everyday computing experience, has taken a trip from the back of the magazine to a more prominent position—before our feature evaluations. That means our big features are a little farther back, but they run more continuously, with fewer ads breaking up the stories. Our Site Finder section, which has always included links to Web sites on a particular subject, has expanded to include links to all the products mentioned in the magazine. We're even printing it as a special tear-out guide, so you can keep it as a handy reference.

Another goal of our redesign was to help connect the magazine with changes on the Internet. Every day our Web site (*www.pcmag.com*) features new First Looks, new trend and technology reports, and new downloads, as well as product reviews, opinions, and tips and tricks. You'll also find conversations in our online Solutions section and User to User, as well as our unique *PC Magazine* utilities.



Art director Laura Baer with Walter Bernard and Milton Glaser.

Redesigning a Web site is easier than redesigning a print magazine, and as a result, our Web site is always improving. It, too, will reflect the changes we've made. One major new feature you'll find is a new way of customizing our PC Magazine Labs scorecards. Now, for any comparative review, you can rate the criteria that are most important to you on a five-point scale and get a list of products that best meet your needs, ranked according to those criteria.

Design changes don't come easily. Art director Laura Baer worked closely with two of the world's best designers: Walter Bernard and Milton Glaser of WBMG. Along with their colleague Irene Vandervoort, they helped us with all the aspects of the design, including our modified logo and our wonderfully readable new typeface, Poynter, designed by Tobias Frere-Jones.

But some things don't change. We're still committed to testing the computing and Internet products that you need to make your business work better and that help you make the most of your personal life as well. No matter what *PC Magazine* looks like, the testing—all of which takes place in PC Magazine Labs, the world's largest magazine lab for testing technology products—remains at the core of what we are.

Readers often react strongly to a redesign. Some will love it, some will hate it, and many will find that it takes some time to get used to. Magazines—successful ones, at least—take the decision to change very seriously. This is the first major redesign of *PC Magazine* since 1993, and it's the culmination of nearly a year's worth of reader surveys, focus groups, and design efforts. Drop us a line at *pcmag@zd.com* and let us know what you think.

Tell us what matters most to you and we'll tell you which products best meet your needs.

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2	Compaq Armada M700	Read Review	Check Prices
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	☐ Toshiba Tecra 8100	Read Review	Check Prices
3	Gateway Solo 9300XL	Read Review	Check Prices
4	HP OmniBook 4150	Read Review	Check Prices
5	Compaq Armada E700	Read Review	Check Prices
6	Dell Latitude CPx H500GT	Read Review	Check Prices
	IBM ThinkPad 390X MNU	Read Review	Check Prices
7	Dell Latitude CS R400XT	Read Review	Check Prices
8	WinBook XL3 500	Read Review	Check Prices
9	NEC Versa LXi	Read Review	Check Prices

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32MB SDRAM	64MB SDRAM	64MB SDRAM	64MB SDRAM
8 GB Ultra ATA Hard Drive	10 GB Ultra ATA Hard Drive	8 GB Ultra ATA Hard Drive	15 GB Ultra ATA Hard Drive
Intel 3D Direct AGP Integrated Graphics	Intel 3D Direct AGP Integrated Graphics	Creative Labs 3D AGP Graphics Card (16MB)	Creative Labs 3D AGP Graphics Card (16MB)
15", .28 Dot Pitch Monitor (13.8" viewable)	17", .25 Dot Pitch Monitor (16" viewable)	15", .28 Dot Pitch Monitor (13.8" viewable)	17", .25 Dot Pitch Monitor (16" viewable)
PCI Wavetable Integrated Sound	PCI Wavetable Integrated Sound	48X (max) CD-ROM Drive[1]	48X (max) CD-ROM Drive[1]
44X (max) CD-ROM[1]	44X (max) CD-ROM Drive[1]	3Com Fast EtherLink XL PCI Adapter	3Com Fast EtherLink XL PCI Adapter
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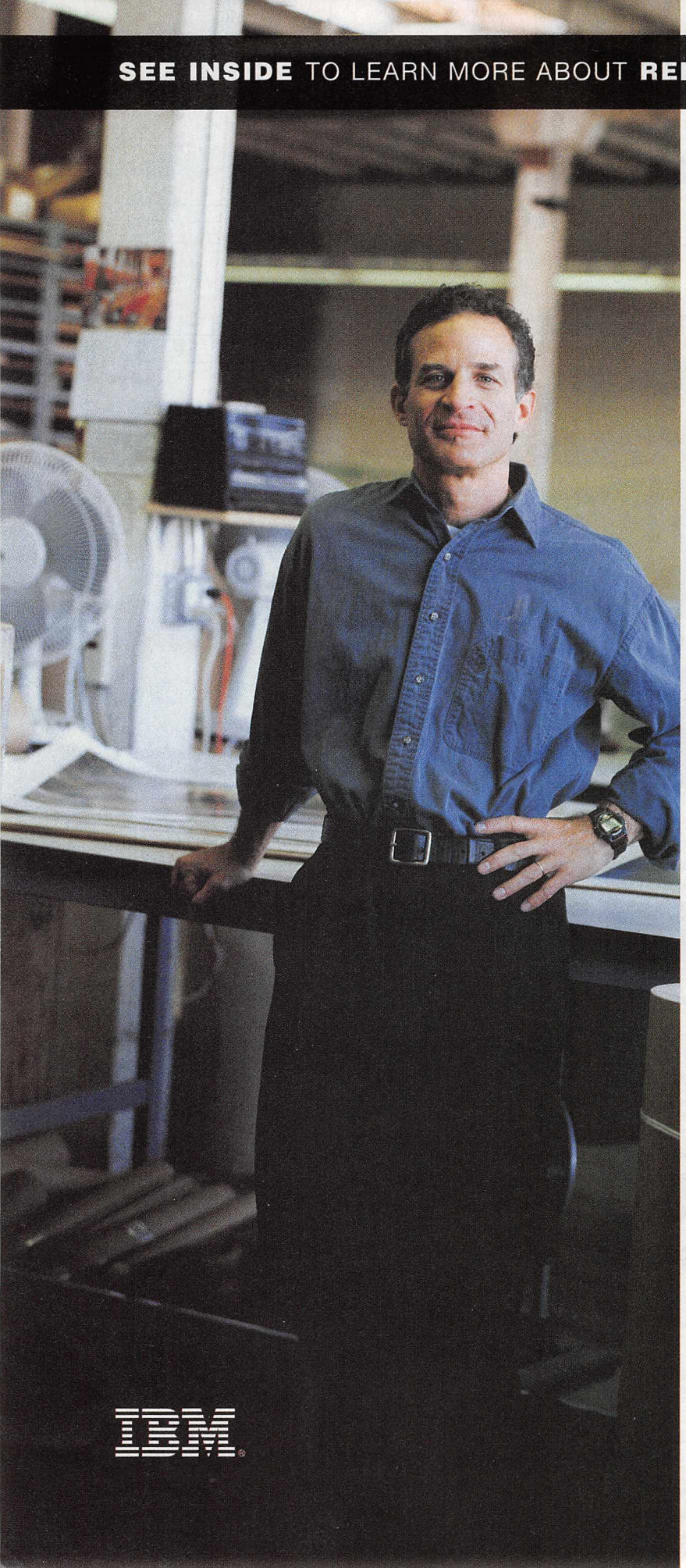

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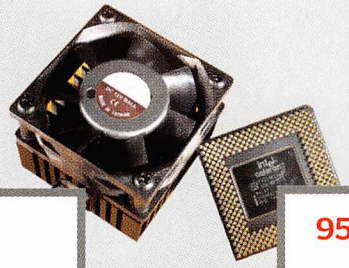

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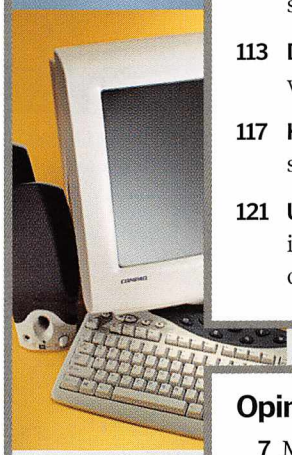

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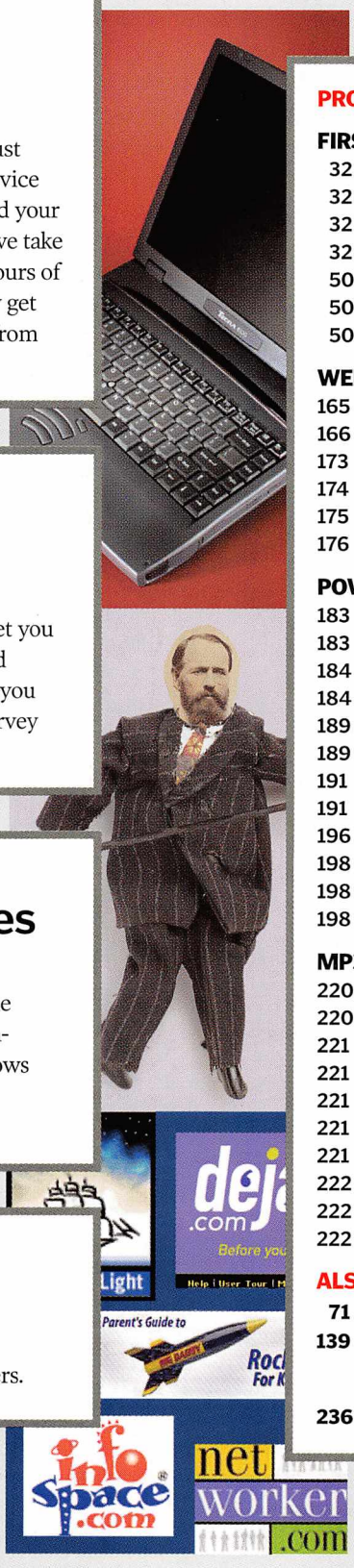

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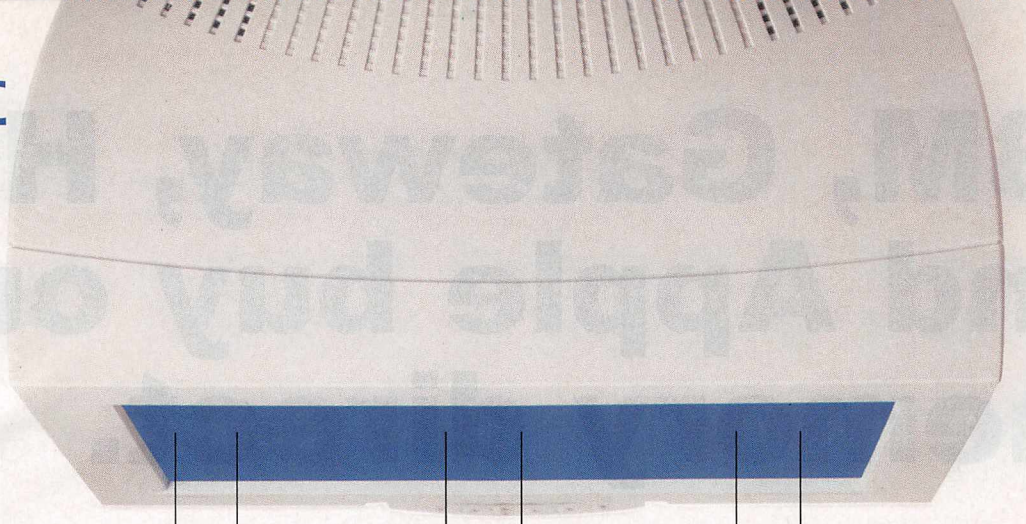

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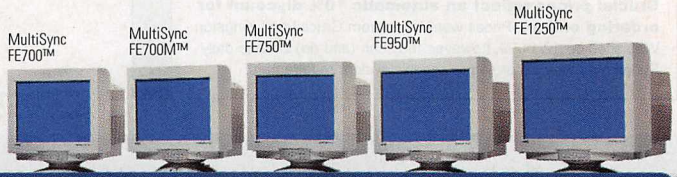

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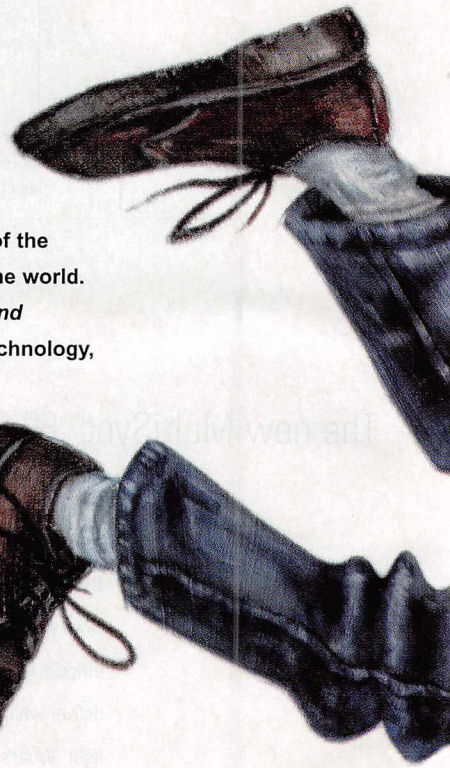

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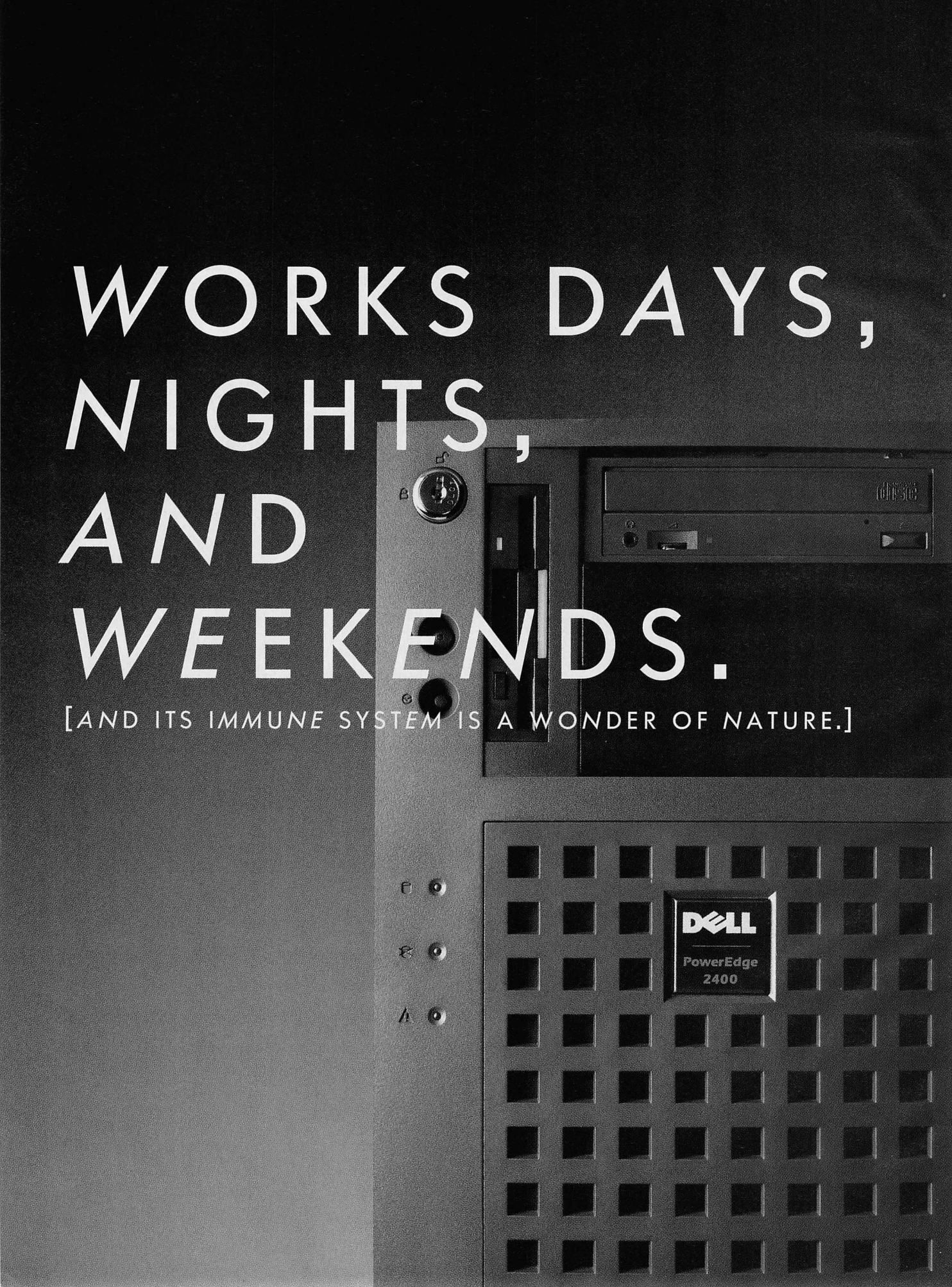
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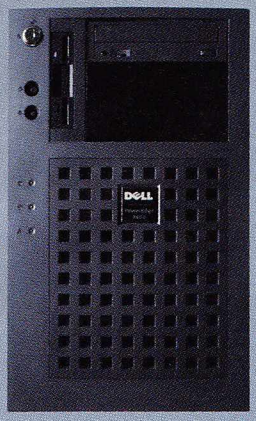

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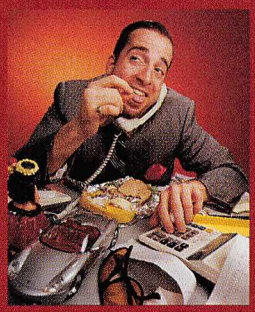

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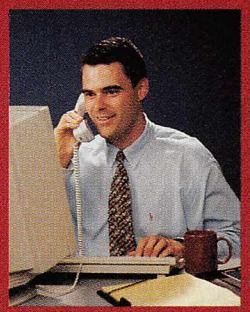

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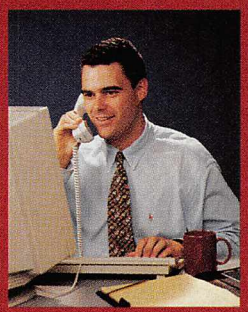

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- 128MB SDRAM
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- Cooling Fan Status
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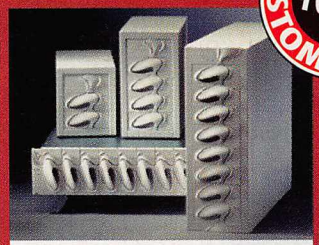

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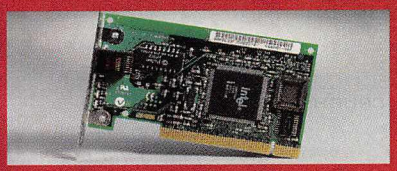

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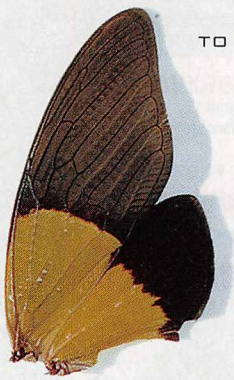

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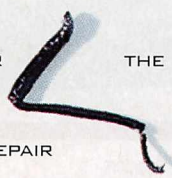

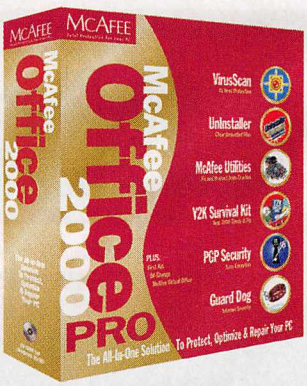

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LAB TALES

ASTONISHING DEVELOPMENTS OVERHEARD AT THE LAB

BY ROSS MACDONALD

FIRST

HANDS-ON TESTING OF NEW PRODUCTS

40 Dreamweaver 3
Fireworks 3 Studio
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49 Compaq Presario EZ2200
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50 DealPilot
50 R U Sure
52 Now You're Talking on the Web
52 Andrea DA-400 Desktop Array Microphone
52 Labtec ClearVoice Digital Microphone
56 Sony VAIO XG9
56 IBM Travelstar 10Ei

Light and Bright Projectors

BY ALFRED POOR

Assisted by its microlens technology, the Epson PowerLite 710c came close to its ambitious 1,000 lumens rating, making it the brightest in its class.

Aside from video glitches, the NEC MultiSync LT140 offers the best mix of performance and features, including a slot for a PC Card.

THE MAGAZINE WORLD'S LARGEST COMPUTER TESTING FACILITY

PC LABS

When it comes to presentations, a picture is worth at least a thousand words. And projector manufacturers are making the task of taking your picture show on the road easier than ever with a new crop of color projectors that weigh 6 pounds or less.

The race started by Compaq, Lightware (First Looks, September 21, 1999), and InFocus (First Looks, December 14) has been joined by four more companies: Epson, NEC, Sony, and ViewSonic. Even more are poised to join the pack; Sharp has announced the Notevision7 but was unable to provide an evaluation unit in time for testing. For this miniroundup, we looked at the Epson PowerLite 710c, the NEC MultiSync LT140, the Sony VPL-CS1 SuperLite, and the ViewSonic PJL1005 LiteBird.

Last year, projectors in this class accounted for just 6 percent of the total market, or about 23,000 units. But 5-pound-and-under projectors are predicted to grow at a rate of 74 percent a year and should account for more than half of all projectors sold within five years, according to market research firm Stanford Resources.

Of course, there's more to a projector than weight. For most users, the next most important feature is brightness. Manufacturers specify an ANSI lumen rating that describes the amount of light a device can produce. For normal conference room lighting situations

PHOTOGRAPHY BY THOM O'CONNOR

LOOKS

58 SkyMap 2000/GPS
58 TripMaker Deluxe 2000
58 FastSite Release 3
58 Zinnote 2000

60 Adobe PhotoDeluxe Home Edition 4.0
60 Canvas 7
62 Apple AirPort
62 Cobalt RaQ 3i

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and an image size up to 4 or 5 feet across, 600 or 700 lumens should be sufficient.

It is important to note that the perception of brightness is logarithmic; for an image to appear twice as bright, it must have ten times as much light. In general, one image must be about a third brighter than another for any difference to be clearly perceived. As a result, the difference between 600- and 750-lumen projectors is negligible, whereas the difference between 600 and 1,000 lumens should be quite noticeable. Our tests results came in a range of 434 to 909 lumens among these four projectors.

You may want to consider other important features. Despite advances, image scaling still produces visible artifacts, especially when showing a higher-resolution image on a lower-resolution device. For best results, match the native resolution of your projector to the image source. Three of the four units have XGA resolution (1,024 by 768); the Sony projector has only SVGA (800 by 600).

The type of imaging engine is also a factor. Two of the projectors (the Epson and the Sony units) rely on sets of three polysilicon LCD panels. If the three images are not aligned precisely, you will notice convergence errors on the screen.

The other two projectors (the NEC and ViewSonic units) use single-digital light process (DLP) micromirror chips, with a rotating color filter wheel that illuminates the reflective chip in a sequence of red, green, and blue lights. This design can be noisier, because of the added mechanical parts of the color wheel.

All the projectors reviewed here have a way to focus the image, but only three of the four also have a zoom function (the ViewSonic unit has a fixed zoom). A zoom feature conveniently lets you place the projector on a table or some other surface and then adjust the image size to fill the screen.

One feature offered by some of the projectors is of limited value. Digital keystone correction is designed to straighten the sides of the image if the projector is aimed slightly up or down at the screen. Unfortunately, these produce noticeable artifacts—especially "roping" in thin vertical lines—and most users may prefer the angled yet unaltered image without this correction.

All four projectors use 120-watt ultrahigh efficiency and performance (UHE/UHP) lamps that use small arc lengths to provide smaller light sources, which in turn require smaller reflectors. This reduces overall size and makes light path management more efficient. One important difference in lamps is that the NEC is rated for just 1,000 hours of use, whereas the others are rated for 2,000 hours. With replacement lamps costing hundreds of dollars, this difference can have a significant effect on the cost of operation over time.

And speaking of cost, the four projectors in this roundup represent a wide range of prices: The NEC model is more than twice as expensive as the Sony unit. Depending on the features you need and the brightness and image quality that you'd accept, you may find your best buy at the top or bottom of this range.

Epson PowerLite 710c

Weighing 5.8 pounds, the Epson PowerLite 710c ($6,000 street) has a brighter image than most projectors twice its weight could offer just a few years ago. One reason that Epson can wring out more light from this three-panel 0.9-inch (diagonal) polysilicon LCD design is that the unit relies on a microlens array behind each panel. These tiny lenses steer the light from the lamp away from each cell's opaque transistor, so more light passes through the panel and continues to the screen.

The design apparently works, as the PowerLite was clearly the brightest of the bunch. Our tests measured it at 909 lumens—close to the manufacturer's rating of 1,000 lumens. The contrast, at 146:1, was also very good, and the brightness variance measure was a smooth 1.25.

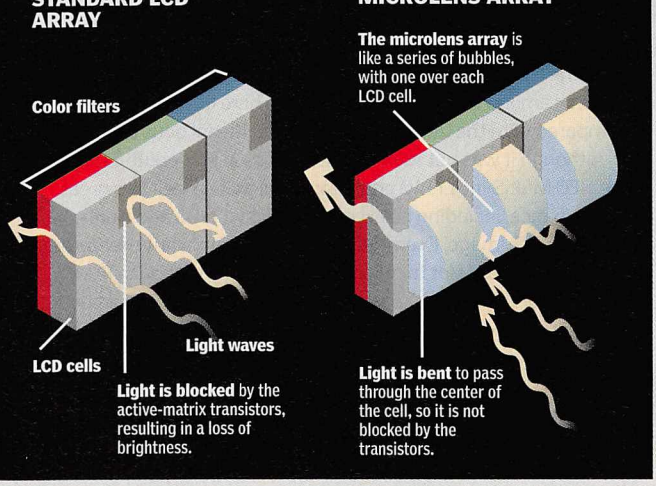
The PowerLite has a number of attractive features. Two adjustable front feet make positioning the image easy, and the unit has a tethered lens cap, which makes it hard to misplace. The full-function remote includes easy-to-use mouse functions and lighted buttons. The remote also has a power switch, so the batteries won't run down if a button is pressed in transit, and a hatch that reveals all the buttons you need to fine-tune the projector's settings.

WHAT THE RATINGS MEAN

●●●●● – EXCELLENT
●●●● – VERY GOOD
●●● – AVERAGE
●● – FAIR
● – POOR

Microlens Technology: See the Light

Active-matrix LCD panels have a tiny transistor in each cell that turns the cell on and off. The opaque transistors prevent a portion of the light from passing through the cells, thus reducing efficiency and image brightness. Microlens technology uses a tiny lens behind each cell to gather the light and steer it through the cell opening, avoiding the transistor. The result is a brighter image.



A simple custom logo feature lets you capture any image on the screen and use it as the splash screen. Another innovation, a picture-in-picture feature, lets you monitor a video input while working with the computer signal on the full screen.

The images had some good qualities. The colors were clear, pixel jitter was almost nonexistent, images were free of ghosting or streaking, and focus was uniform across the screen.

We found some other significant flaws, however. The most serious was a noticeable convergence problem. The image from the red panel was offset by at least half a pixel's width on the right half of the screen, which diminished the image's sharpness. We also observed problems with color tracking: Shades of gray should all have the same tone, but dark shades were noticeably purple, and the midrange shades had a distinct green tint.

Video images with the PowerLite were the best in the bunch, with only a slight posterization on facial tones and no other obvious artifacts or defects. The sound system has a limited volume but should still be sufficient for a typical conference room, and the sound did not distort at maximum levels.

The Epson PowerLite 710c literally outshines the competition, and the unit has an edge in video display. But the convergence and color-tracking flaws may detract from data displays—especially when running Windows applications on-screen, where fine details are important.

Epson PowerLite 710c

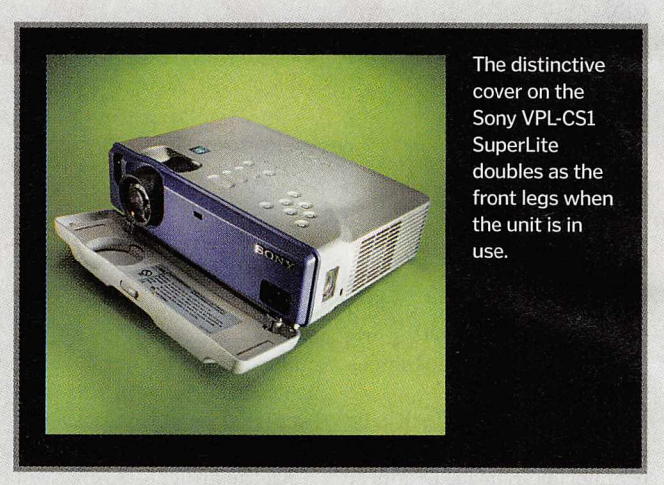
Street price: $6,000. Epson America Inc., Long Beach, CA; 800-463-7766; www.epson.com. ●●●●

NEC MultiSync LT140

The NEC MultiSync LT140 ($6,400 street) is based on a DPL projector design from Plus Technologies with electronics built to NEC's specifications, which explains why you will see other projectors (such as the Sharp Notevision7) with nearly identical housings. The LT140 carries a hefty price tag, but you'll find a lot of features for the money.

The projector comes with a credit-card-size remote control powered by a thin watch battery. The remote may look as if it's designed to be easily lost, but the device slides neatly into a slot in the projector where you can safely keep it close at hand.

Another slot in the projector accepts a PC Card. The projector includes software that lets you download a presentation to a PC Card, which you then can put in the projector to display your images without needing a PC. Special software lets you download any JPEG or BMP file across a serial connection to use as a splash screen on the projector.



The distinctive cover on the Sony VPL-CS1 SuperLite doubles as the front legs when the unit is in use.

The projector is rated at 800 ANSI lumens, and our tests results were close to that at 735 lumens. As is typical with DLP projectors, the contrast ratio was a stunning 231:1, and the image was uniform with a score of 1.24.

We found no noticeable pixel defects, another advantage of DPL technology. The projector had very little light leakage from the case and was relatively quiet when in use.

Image quality was generally good. Focus was sharp across the entire screen, and the image was rock steady, with no pixel jitter on even the most demanding test patterns.

Since the image engine uses only a single panel, convergence was perfect. There was some slight ghosting on high-contrast patterns, and dark gray shades had a slight olive tint, though not enough to be objectionable. As is sometimes the case with DLP projectors, yellow shades tended to be a bit brown, and red shades tended toward orange.

The most serious image flaws occurred during video playback. We noticed pronounced crosshatch artifacts on the borders between contrasting color areas, which may have been the result of problems with decoding the composite video signal. We also saw noticeable artifacts in fast-moving images and some posterization in continuous-tone images, such as close-ups of faces.

The sound system has limited range but should be capable of filling an average meeting room. It did not distort at top volume.

The NEC MultiSync LT140 is not as bright as the Epson unit, but it is still bright enough for the most typical settings, and its image quality is better suited for data applications, especially where fine details are involved. If your budget can handle the price, it is the best bet for computer presentations.

NEC MultiSync LT140

Street price: $6,400. NEC Technologies Inc., Itasca, IL; 877-632-3348; www.go.nectech.com. ●●●●

Sony VPL-CS1 SuperLite

With a street price of just $2,700, you would not expect the Sony VPL-CS1 SuperLite to compete on the same level as the other three projectors in this group. Its only common feature is its light weight (although slightly over the 6-pound limit at 6.4 pounds), and the system has its own strengths and weaknesses.

The unit's native resolution is only SVGA (800 by 600); the other three projectors in this roundup have XGA (1,024 by 768). The SuperLite uses three 0.7-inch polysilicon LCD panels to create the image. And the projector is rated at just 600 ANSI lumens, significantly lower than the 800-to-1,000 rating range of the other three.

PC MAGAZINE EDITORS' CHOICE

NEC MultiSync LT140

Microportable projectors fall into two categories: the higher-priced XGA-resolution units and the budget-minded SVGA models. In the former category, the NEC MultiSync LT140 ($6,400 street) is our top choice not only among the projectors reviewed here but also when compared with the Compaq MP1600 and the InFocus LP330.

Although it was not as bright as the Epson PowerLite 710c, the NEC MultiSync LT140 projector nevertheless delivers great performance, including an excellent contrast ratio and a uniformly bright image. Even better, NEC offers innovative features such as a PC Card slot for giving presentations without a PC.

An honorable mention goes to the Sony VPL-CS1 SuperLite, which is really competing against the only other low-priced, SVGA projector in this weight class, the Lightware Scout. Although the SuperLite is about a pound heavier than the Scout, it offers better performance and more features at a similar price, making it the best choice in this class.

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[1]April 1999. [2]When referring to hard drive capacity, GB stands for one billion bytes. Some utilities may indicate varying hard drive capacities. Total user-accessible capacity may vary depending on operating environments. [3]DVD movie playback is not supported under Windows NT Workstation 4.0. Data on DVD is read at a variable transfer rate from the innermost to the outermost track. [4]When referring to storage capacity, MB stands for one million bytes. Some utilities may indicate varying storage capacities. Total user-accessible capacity may vary depending on operating environments. [5]Notebook computer only without 1.44MB diskette and CD-ROM drives and AC adapter. NEC is a registered trademark, Versa a U.S. registered trademark and VersaBay a trademark of NEC Corporation. All are used under license. Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation. Intel, the Intel Inside Logo and Pentium are registered trademarks of Intel Corporation.

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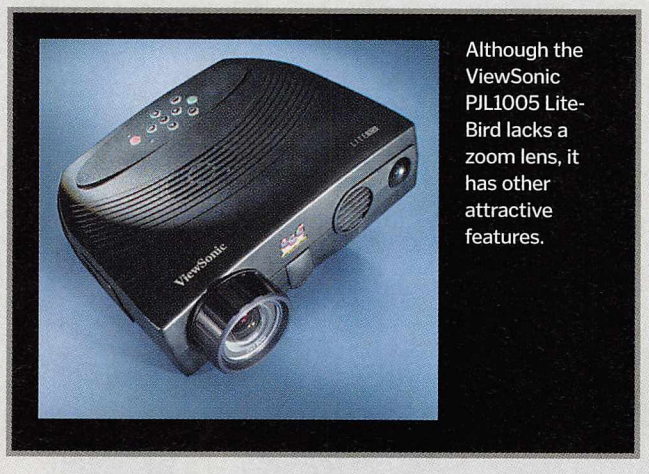

Although the ViewSonic PJL1005 LiteBird lacks a zoom lens, it has other attractive features.

One difference that you'll immediately notice is the self-contained case: Instead of just a lens cap, the entire front edge of the projector folds up.

The unit has a carrying handle built into the case (though Sony also includes a soft case as well.) This feature is both a strength and a weakness: It provides protection for the device but, when open, the cover is intended to serve as the front legs. This does not allow for any height adjustment and makes positioning the image accurately on-screen difficult. The projector does, however, have a zoom lens.

The SuperLite is a study in such contradictions. On the one hand, a USB connection and a handy utility make light work of adjusting the projector's settings from your computer. On the other hand, you cannot access these settings from the remote control; you have to use the buttons on the projector's panel.

On our tests, the screen variance index was an attractive 1.30, but the brightness was just 434 lumens, with a contrast ratio of only 87:1. These results are better than those of the Lightware Scout, which is in its price range but trails behind the others in this weight class.

We noted no obvious pixel defects, and the image was stable with no pixel jitter, but we did experience significant convergence problems; the green image was off by a full pixel-width or more on the right half of the screen. The convergence error was so great that it was difficult to assess the focus using a black-and-white pattern.

There was little posterization in video playback, though there were black outlines present on objects. The sound system showed some distortion at maximum levels but had sufficient volume at lower levels.

The Sony VPL-CS1 SuperLite projector would have been a miracle a few years ago but now represents compromises between image quality and cost. If price is a major consideration, then the unit is the best buy in its class, but for top-quality images, you'll want to consider some of the other options.

Sony VPL-CS1 SuperLite

Street price: $2,700. Sony Electronics Inc., Park Ridge, NJ; 800-686-7669; www.sony.com. ●●●

ViewSonic PJL1005 LiteBird

The ViewSonic PJL1005 LiteBird ($5,800 street) is priced well below the more expensive competition in this weight class. The XGA DLP projector produces some favorable test results but also has some flaws .

Rated at 900 ANSI lumens, the LiteBird produced 721 lumens on our tests. The contrast ratio was a strong 165:1, and the image variance index was a competitive 1.37.

Color tracking was fairly good, with an olive tint to the darker shades of gray. As with the NEC unit, yellow shades tended to have mustard tones, but the image was free of pixel jitter and had no ghosting or apparent defects. And because the LiteBird uses a single DLP panel, convergence was perfect.

Video images showed some flaws, with slight cross-hatch artifacts across the boundaries between contrasting colors and strong posterization of facial tones. The sound system was easily overdriven, distorting at full volume.

The most disappointing aspect of the LiteBird was its optics. The lens carries the famous Carl Zeiss brand, yet we encountered focus problems. When the center of the image was in focus, the corners were noticeably blurred. More important, the optical system does not have a zoom feature. There is a digital zoom feature, but that won't help when you are adjusting the image size to fill the screen.

The projector has a one-touch image synchronization feature that worked well. No tweaking of the image position or timing was required after using this feature.

The LiteBird also has a handy cable feature. A single cable connects the projector to your computer's graphics adapter. In the middle, you'll find a large block with jacks for a variety of inputs, including composite video, stereo sound, USB, mouse, and even a pass-through connection for a monitor (something missing on most projectors in this weight class).

These useful features provide some balance to the other shortcomings of the ViewSonic PJL1005 LiteBird. The projector is about as bright as the top performers in its class, but the lack of zoom and uniform focus are significant drawbacks. If you have a tight budget and can live with these shortcomings, the LiteBird is a good value.

ViewSonic PJL1005 LiteBird

Street price: $5,800. ViewSonic Corp., Walnut, CA; 800-888-8583; www.viewsonic.com. ●●●

KEY STATS

PC LABS

We evaluated all the projectors with DisplayMate Technologies' DisplayMate test software (*www.displaymate.com*). The Lumens measurement gauges the brightness of each unit. The Contrast Ratio indicates the difference between white and black in the images. The Brightness Variance indicates the difference between the brightest and dimmest measured points on the screen when projecting an all-white image (1.00 is a perfect score).

	PERFORMANCE			FEATURES							
▲ High scores are best. ▼ Low scores are best. Bold type denotes first place among reviewed units.	Lumens ▲	Contrast Ratio ▲	Brightness Variance ▼	Street price	Display engine	Native resolution	Rated weight	Dimensions (HWD, in inches)	Zoom lens	Rated lamp life (hours)
Epson PowerLite 710c	**909**	146:1	1.25	$6,000	Poly LCD	XGA	5.8 lbs.	3.5 x 10.5 x 8.4	Yes	2,000
NEC MultiSync LT140	735	**231:1**	**1.24**	$6,400	DLP	XGA	5.7 lbs.	3.0 x 12.7 x 9.3	Yes	1,000
Sony VPL-CS1 SuperLite	434	87:1	1.30	$2,700	Poly LCD	SVGA	6.4 lbs.	2.9 x 11.0 x 8.3	Yes	2,000
ViewSonic PJL1005 LiteBird	721	165:1	1.37	$5,800	DLP	XGA	5.0 lbs.	3.1 x 10.0 x 8.1	No	2,000
Compaq MP1600[1]	598	205:1	1.11	$4,500	DLP	XGA	4.2 lbs.	8.3 x 2.5 x 9.0	No	1,000
InFocus LP330[2]	695	162:1	1.61	$5,900	DLP	XGA	4.8 lbs.	2.5 x 8.8 x 9.8	Yes	1,000
Lightware Scout[1]	331	84:1	1.53	$2,750	Poly LCD	SVGA	5.3 lbs.	3.9 x 10.5 x 7.5	No	500

RED denotes Editors' Choice. (1) First Looks, 9/21/99; reported for comparison. (2) First Looks, 12/14/99; reported for comparison.

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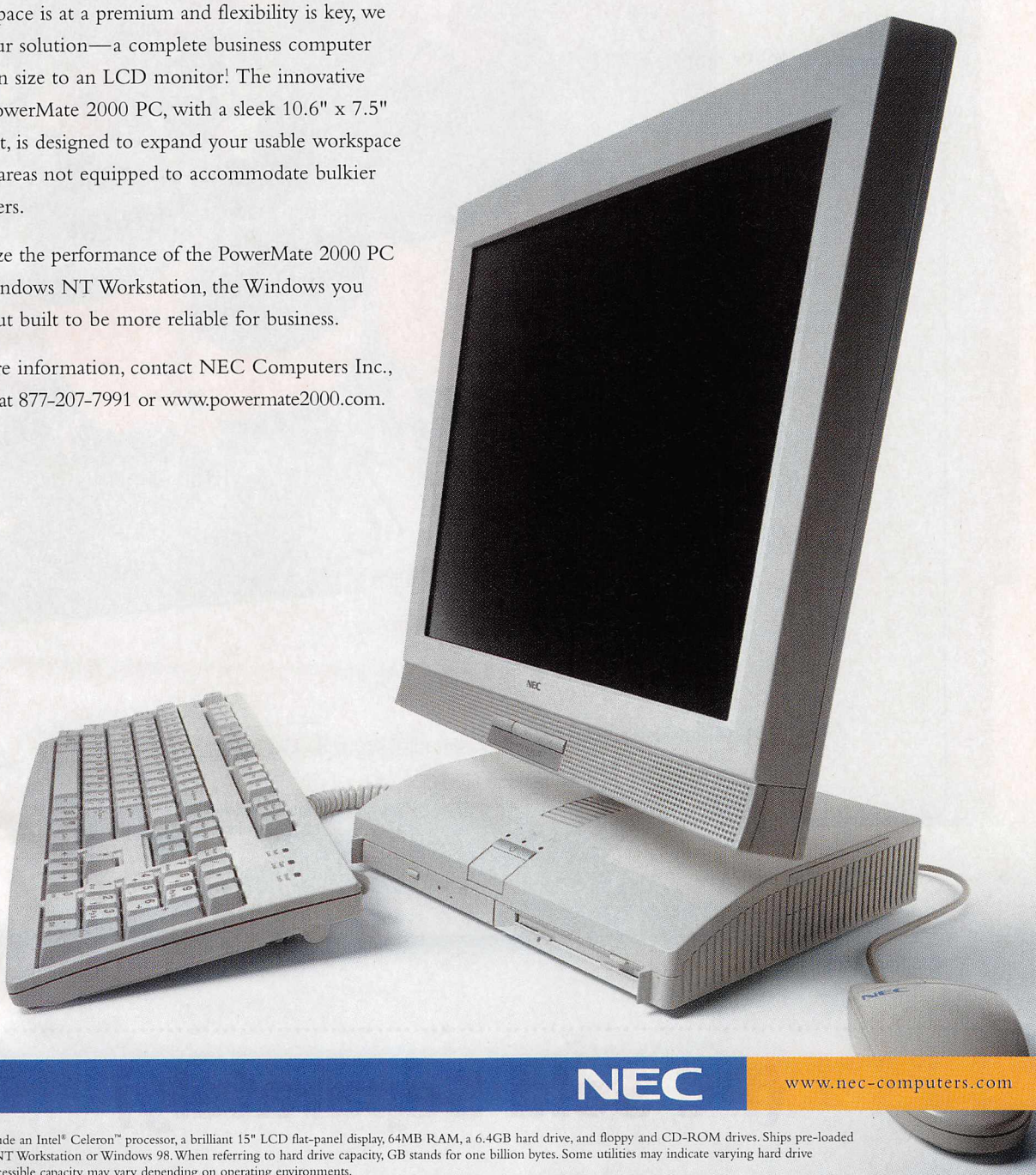

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November 1999

Web Tools Woven Together

BY LUISA SIMONE

If you are a professional Web developer, chances are that you already use at least one of Macromedia's Web-centric products. With the release of Dreamweaver 3 Fireworks 3 Studio ($399 direct), Macromedia has provided several compelling reasons to use two of its products together. Macromedia has bundled the premiere HTML authoring tool and the leading Web graphics program as one low-cost product. More important, the company has provided mechanisms that make using Dreamweaver and Fireworks in tandem easier than ever.

Dreamweaver and Fireworks are, in Macromedia's parlance, JavaScriptable. Both experienced coders and nonprogrammers will soon find themselves using this feature to create macro commands or extend each program's functionality.

Key to this power is the new History palette, which records all of your actions. You can use the History palette to undo any of your edits, to replay specific operations, or to save a series of actions as a command. Commands are written in JavaScript, so they're usable across both PC and Mac platforms.

Macromedia provides several simpler, more direct ways to integrate Dreamweaver and Fireworks. A new wizard walks you through copying and pasting Fireworks HTML code into an existing Dreamweaver (or GoLive or FrontPage) document. And Dreamweaver contains a new object, called Fireworks HTML, that lets you easily insert a Fireworks graphic and all of its associated slice objects and code into a Web document.

Of course, Macromedia also sells Dreamweaver 3 ($299 direct, upgrade $129) and Fireworks 3 ($199, upgrade $99) as standalone products. So in addition to the synergistic new functions, each program offers a number of new internal features.

Macromedia concentrates on polishing Dreamweaver's HTML tools. A pop-up Quick Tag Editor lets you code snippets of HTML for a selected object in the WYSIWYG working view of your document. The HTML Source Inspector window has also been updated with line numbers, the ability to select entire lines of code from the margin, and draggable selections.

Dreamweaver has new objects that simplify the HTML creation process. A new table object lets you specify a source data file, and precoded symbols such as trademark and copyright characters obviate the need to hand-code special characters. In addition to the Fireworks HTML object, the program now has rich media objects for Shockwave 7 movies, Flash 4 movies, and Generator objects.

Fireworks 3 integrates critical preview functions directly in the workspace. You can preview

Using Dreamweaver and Fireworks in tandem is now easier than ever.

sliced objects containing multiple compression settings, compare different output options in two-up or four-up configurations, and view the shift in gamma when an image is displayed on a Mac. You can even see JavaScript rollovers in action without exiting to a browser.

Big productivity boosts are provided by the new Symbol library. Not only does this let you quickly reuse images, but it also preserves the JavaScript code for buttons. There's also a new wizard that automates the process of creating a rollover button.

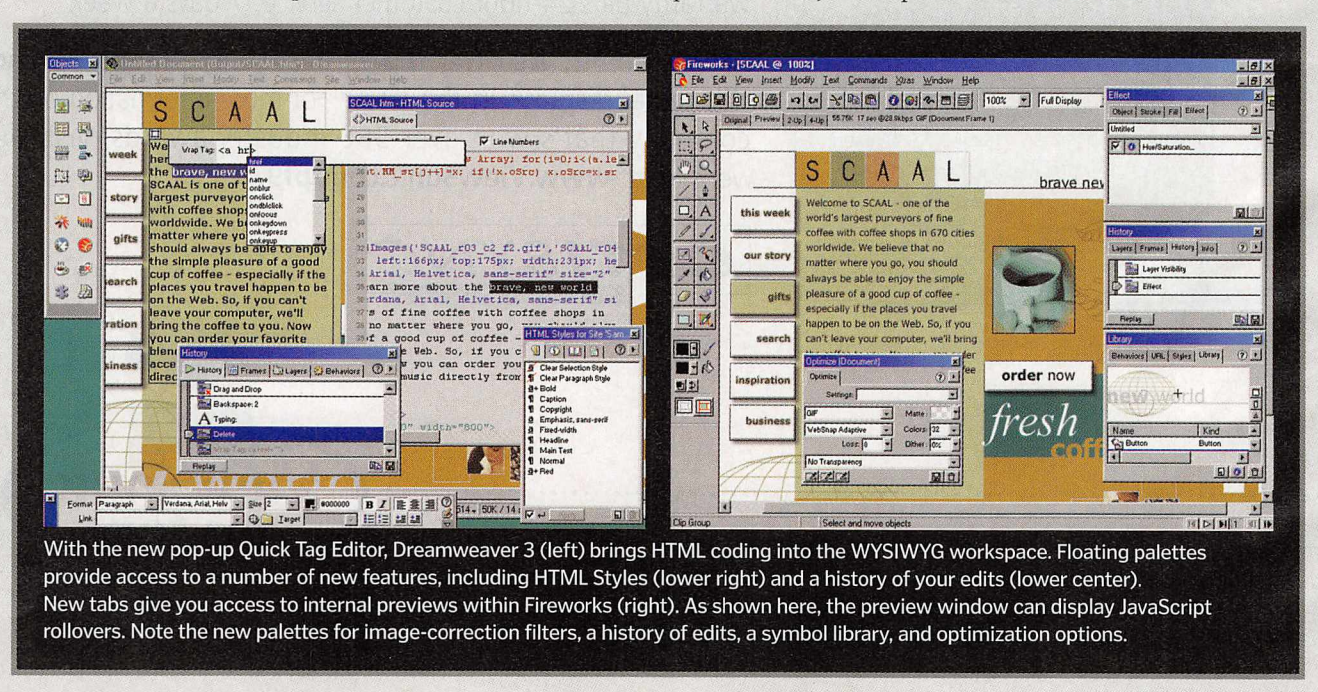
Most impressively, you no longer have to exit Fireworks to access image-correction filters. Both basic correction tools, including brightness/contrast and hue/saturation, and third-party filters have been implemented as editable Live Effects.

We found the two products to be stable, but we do have a few caveats to report. Despite Macromedia's minimum requirements, the advanced functions require substantial horsepower. We also found glitches in some of the sample JavaScript commands.

Dreamweaver 3 Fireworks 3 Studio is more than the sum of its parts. Both Dreamweaver and Fireworks—already top-notch tools—get significant new features. But it is the integration of the two that will make a big difference for professional Web producers.

Dreamweaver 3
Fireworks 3 Studio

Direct price: $399, upgrade $199/$249. Requires: 64MB RAM; 60MB hard disk space; Microsoft Windows 95, 98, or NT 4.0 with Service Pack 3 or later. Macromedia Corp., 800-457-1774; www.macromedia.com. ●●●●●



With the new pop-up Quick Tag Editor, Dreamweaver 3 (left) brings HTML coding into the WYSIWYG workspace. Floating palettes provide access to a number of new features, including HTML Styles (lower right) and a history of your edits (lower center). New tabs give you access to internal previews within Fireworks (right). As shown here, the preview window can display JavaScript rollovers. Note the new palettes for image-correction filters, a history of edits, a symbol library, and optimization options.

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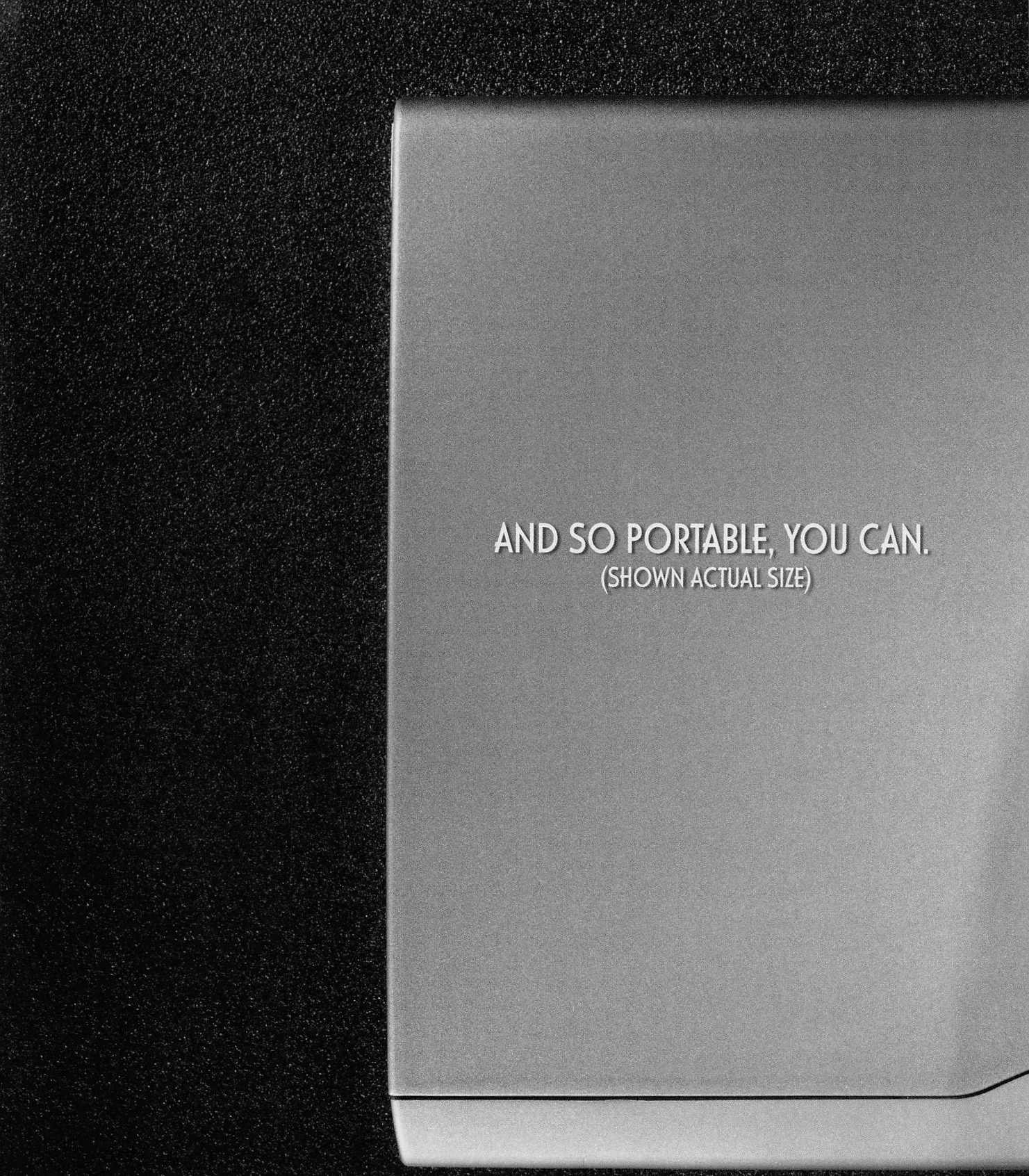

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Compaq's New Appliance PC

BY BRUCE AND MARGE BROWN

Joining the growing list of vendors offering alternatives to traditional PCs, Compaq Computer Corp. has introduced its own version of the kinder, gentler computer. These new machines differ from traditional PCs in two respects: They leave behind conventional parallel and serial ports and are designed to make both setup and day-to-day operation easier. Based on price, bundled components, and overall ease of access and setup, the **Compaq Presario EZ2000** series is an unqualified success, particularly for users seeking hassle-free computing, Internet access, and MP3 recording.

The Compaq Presario EZ-2000 series is available in two models: the tested 500-MHz Celeron-based EZ2200 with CD-ROM and CD-RW drives ($1,000 street, without monitor) and the EZ2700, based on a 550-MHz Pentium III with an 8X DVD-ROM, a software MPEG decoder, and CD-RW drives ($1,500 street after rebate, with a 17-inch monitor). The EZ2200 is sold through direct and retail channels; the EZ2700 is sold through direct channels and via retail-based kiosks only.

Each of the models includes 64MB of SDRAM as well as the Intel 810e chip set. The EZ2200 is equipped with a 17GB, 7,200-rpm Ultra DMA ATA66 hard disk and a 56-Kbps V.90 modem; the EZ2700 has a 20GB hard disk, a single-card connection solution with an integrated 56K modem, a 1-Mbps Home PNA, and a 10-Mbps Ethernet connection (only one of the network connections can be used at a time). Bundled software for both of the models includes Just-Burn! CD-R software, Microsoft Works 2000, and RioPort Audio Manager.

The EZ2000 series includes an Internet/multimedia USB keyboard and USB mouse and uses a conventional monitor. The off-white monitor is bundled with the EZ2700 and is available for $400 (street) with the EZ2200.

With no parallel or serial ports, the EZ2000 series can accept only USB (or rare 1394 FireWire) peripherals without optional third-party port adapters. In addition to the four USB ports on the PC, the keyboard has two ports for low-power USB devices (typically, one is used by the mouse).

The Compaq Presario EZ2000's Digital Dashboard provides feedback on setup, e-mail, and system status.

We were able to get the EZ2000 up and running—and on the Internet—in only 10 minutes.

Setup is aided by a clearly labeled poster and color-coded ports and cables. The Digital Dashboard LCD status screen, located on the top front of the system, prompts you to connect the keyboard and mouse.

Software wizards assist users in connecting to the Internet via existing or new accounts with AOL, Compaq.net, or NetZero. ISP start-up deals include 150 hours of free Internet access during the first month with both the Compaq.net and AOL plans. You can also select an alternative ISP but will need to use the standard Microsoft Windows 98 Internet Connection wizard.

We were able to get the unit fully up and running in only 10 minutes, including a connection to the Internet via our own EarthLink account. After installation, the Digital Dashboard displays the time in large numerals, but it can also signal incoming e-mail, attached USB and FireWire accessories, and system status.

There are four drive bays in the system, all of which were used in both models. The front panel—which doubles as a cable manager—slides into the side of the case to expose the floppy disk drive, the CD-ROM drive, and the CD-RW drive, in addition to two USB ports and one FireWire port.

Compaq backs the Presario EZ2000 series with a one-year parts-and-labor warranty with toll-free technical support for hardware for one year. The Compaq Presario EZ2200 has an impressive number of design features that simplify use and configuration and make the system a good choice for mainstream users who want to browse the Web—as well as for those who want to burn CDs.

BENCHMARK TESTS

PC LABS

Although it is designed primarily for ease of use rather than performance, the Compaq Presario EZ2200 holds its own against more traditional PCs with equivalent processors, such as the Compaq Presario 5834. Our Winstone benchmark tests measure performance on business and content creation applications. Other tests gauge performance of disk and graphics subsystems. Note that the Presario 5834 that we tested previously had a slight advantage because of its additional system memory.

High scores are best.	RAM	Chip set	ZD Business Winstone 99	ZD Content Creation Winstone 2000	ZD Business Disk WinMark 99 (thousands of bytes per second)	ZD Business Graphics WinMark 99
Compaq Presario EZ2200	64MB	Intel 810e	18.4	17.8	3,445	87.6
Compaq Presario 5834*	96MB	Intel 810	20.3	18.7	N/A	N/A

Both machines had Celeron/500 CPUs. We ran all tests at 1,024-by-768 resolution, with 24 bit color.
* Reviewed 12/14/99; reported for comparison. N/A—Not applicable: We did not run the test on this system.

Compaq Presario EZ2200

Street price: With 17-inch monitor, $1,325 (after $75 rebate); without monitor, $1,000. Compaq Computer Corp., Houston; 800-345-1518; www.compaq.com/athome.

●●●●●

Comparison Shopping Online

BY DON WILLMOTT

Have you developed loyalties to particular online stores yet, or do you always search for the lowest price? If you're the bargain-hunting type, help is at hand.

ClickTheButton.com makes it very easy to compare prices at 233 retailers of books, electronics, hardware/software, movies, music, and toys. After the simplest of installations (no registration required), you'll find a red bull's-eye icon in your Microsoft Windows system tray. When you land on a product page at a shopping site, click on the icon and, after a short wait, you'll be presented with a list of online stores selling that product, along with current prices.

We shopped for Michael Crichton's new novel, *Timeline*. ClickTheButton.com returned results from 12 stores, with prices ranging from $13.45 to $26.95. Though we didn't like the way the results first listed 11 places to buy the large-type edition of the book, we did like the way the service factored in two to four types of shipping at each store.

The Comparison Cart (registration required) is great when shopping for several different items. Simply dump the items in the cart as you go and do the comparison price checks after you're done shopping.

Next, we shopped for a Toshiba PDR-M4 digital camera. ClickTheButton.com showed us prices at 40 stores, from a low of $388.95 at Buy.com to a high of $564 at Acentia. Unfortunately, these listings were borrowed from CNET's computer shopping site, so they didn't include the kind of in-depth shipping information that our book search included.

Nevertheless, ClickTheButton.com is an easy-to-use shopping assistant that clearly illustrates just how wide-ranging online prices can be.

ClickTheButton.com

ClickTheButton.com Inc., New York; 212-929-2888; www.clickthebutton.com. ●●●●

DealPilot and its always-on adjunct DealPilot Express are in public prerelease, and it shows. Right now, this shopping buddy knows only about books, music, and movies, and its listings do not include Buy.com, which typically offers very low prices.

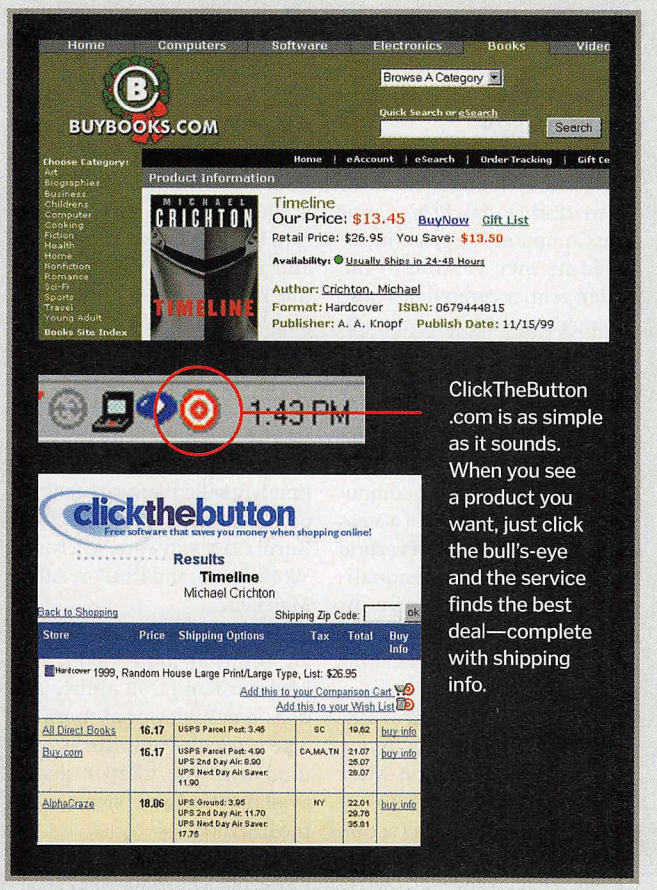
As you shop, you see a gray bar at the bottom of your browser window. When you land on a product you're interested in, DealPilot goes out and searches, and when you click on the results, you get another unattractive gray pop-up window to scroll through. The results are sorted by total price (including shipping).

A search for Michael Crichton's *Timeline* came up with 47 listings, which seemed like a lot until we realized that each shipping option from each store got its own separate listing, making for a confusing list.

To compete with other products, DealPilot will have to add many more stores and categories and work on its interface.

DealPilot

Dealpilot.com, Ludwigsburg, Germany; 49-7141-250043; www.dealpilot.com. ●●



ClickTheButton.com is as simple as it sounds. When you see a product you want, just click the bull's-eye and the service finds the best deal—complete with shipping info.

R U Sure, currently in public prerelease, is the flashiest of the shopping buddies. This shopping buddy has the most complicated registration and setup, but in the end you get several shopping options, including one in which you don't visit the online stores at all but rather search for items directly through R U Sure's comparative price interface.

Our search for *Timeline* yielded 13 results, and this time the low-price winner was Amazon.com, at $17.42. The search for the digital camera brought 24 listings, from the same $388.95 price at Buy.com that ClickTheButton.com had identified to $541 at Computer Quick.

If you use the AutoPilot pop-up option, R U Sure works very much like ClickTheButton.com and does a very good job of identifying low prices in a wide variety of product categories.

R U Sure

R-U-Sure LTD., Tel Aviv, Israel; 972-3-6888832; www.rusure.com. ●●●

More Ways to Shop

Flyswat (*www.flyswat.com*) is a fascinating Internet Explorer add-on that, like GuruNet, highlights lots of words on Web pages so you can click on them to get more information. Find the word "Seattle" highlighted, for example, and a click brings you hotel, weather, and travel information and other related links. flyswat, also available through mySimon.com (*www.mysimon.com*), can help you do some live comparisons.

PriceWorld.com (*www.priceworld.com*) is a specialized Web site that helps compare prices on high-tech products. Our digital camera query yielded 25 locations to buy it, and the best deal found by PriceWorld.com was the same as the others: $388.95 at Buy.com.

If you'd like to take Amazon.com with you wherever you go online, try zBubbles (*www.zBubbles.com*). zBubbles, which works only with IE 5.0, will pop up as you shop and tell you how much an item costs at Amazon.com. You can also read recommendations others have left and take advantage of related links provided by Alexa.—*DW*

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Break free from headsets with a digital array microphone.

Freedom of Speech

BY GREG ALWANG

Digital array microphones let you literally cut the cord—from your PC, that is—and use voice recognition and teleconferencing software without being tethered to a headset microphone. These new microphones use integrated DSPs (digital signal processors) to differentiate between speech and background noise, providing superior noise cancellation relative to traditional headset and directional microphones.

By placing several microphone elements in the units, vendors can use a process called *adaptive beamforming*, in which the microphone focuses in on a sound source, canceling out background noise. This also lets you move around in front of the microphone while speaking, which you can't do easily with a headset or directional mike.

We tested the Andrea DA-400 Desktop Array Microphone and the Labtec ClearVoice Digital Microphone. We tried each microphone with Dragon NaturallySpeaking Preferred 4.0 and Lernout & Hauspie's L&H Voice Xpress Professional 4.0 and had very good results.

The size of a telephone handset, the **Andrea DA-400 Desktop Array Microphone** ($149.95 list) connects to the mike-in port on your sound card and easily fits between your keyboard and monitor. There are no proprietary drivers, so the unit is operational as soon as you plug it in.

Like the Labtec ClearVoice, the DA-400 converts analog input to digital signals and uses its own beamforming algorithms to narrow the "wanted" acoustic signal by canceling the "unwanted" noise. The algorithms even cancel the ringing phones and noisy conversations found in typical office environments.

With both NaturallySpeaking and Voice Xpress, we had only to rerun the microphone tuning options to set the input levels after connecting the DA-400 (that is, we didn't have to fully reenroll as a new speaker). Surprisingly, recognition accuracy was indistinguishable from that of our high-quality Andrea NC-61 headset microphone.

Extremely sensitive, the DA-400 picked up heavy keystrokes as spoken words, but the problem went away when we placed the unit on top of our monitor. Recognition was consistently good within 45 degrees off center of the microphone, even when we backed 4 or 5 feet away.

If you use speech recognition or audio/video conferencing software frequently, we highly recommend the Andrea DA-400 Desktop Array Microphone.

Andrea DA-400 Desktop Array Microphone

List price: $149.95. Andrea Electronics Corp., Melville, NY; 800-442-7787; www.andreaelectronics.com. ●●●●●

Unlike the DA-400, the **Labtec ClearVoice Digital Microphone** ($130 street) plugs into the line input on your sound card. The unit is about one-third wider than the DA-400 but still fits comfortably in front of your monitor. A very handy power-indicator light on the front switches from red to green when it detects audio input, so you know when it's picking up your voice or when you're out of range. The power-on button doubles as a mute button, so you can quickly suspend audio input.

While processing audio signals, the ClearVoice implements noise cancellation at multiple steps to catch unwanted noise from different environmental and natural sources, such as room fans, radios, or noise from your PC's electrical components. The unit also listens for and reduces echoes and reverberations.

The ClearVoice was even more sensitive than the DA-400, and we had to tweak input levels manually to keep it from picking up background noise. The ClearVoice required reenrollment in both voice recognition packages as new speakers before we were able to obtain good results with the software.

On our voice recognition tests, the ClearVoice's recognition was not as consistent as the DA-400's. Either product is a great alternative to a headset, but the Andrea DA-400 Desktop Array Microphone has the edge.

Labtec ClearVoice Digital Microphone

Street price: $130. Labtec Inc., Vancouver, WA; 360-896-2000; www.labtec.com. ●●●

Web Talk

BY GREG ALWANG

Lernout & Hauspie's **Now You're Talking on the Web** ($49.95 list) lets you control your browser, e-mail, and instant-messaging (IM) software by voice. Geared to users who do a lot of Web surfing or are comfortable using voice recognition, Now You're Talking simplifies many tasks with Web-centric natural-language commands.

L&H's SayLinks feature indexes the links on a Web page so that you can say the number of a link you want. You can also navigate and enter URL addresses by voice, though we were forced to revert to spelling mode when entering most nonstandard addresses, which can be slower than typing the address.

Use voice commands for everyday tasks with Now You're Talking.

When dictating into IM or chat applications, phrases are automatically converted into conventional chat abbreviations—"by the way" becomes "BTW," for example. E-mail-specific commands such as "create an e-mail to Mary" are supported in AOL Mail, Eudora Pro, Juno Mail, and Microsoft Outlook.

All in all, we find controlling a browser by voice takes some getting used to. If voice control of Web-centric applications is a necessity, you'll find Now You're Talking useful; otherwise you may surf faster using your keyboard and mouse.

Now You're Talking on the Web

List price: $49.95. Requires: 32MB RAM (48MB for Windows NT); 200MB hard disk space; Sound Blaster or compatible sound card; Microsoft Windows 95, 98, or NT 4.0 with Service Pack 3. Lernout & Hauspie Speech Products Inc., Burlington, MA; 781-203-5000; www.lhs.com. ●●●

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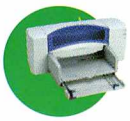

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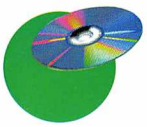

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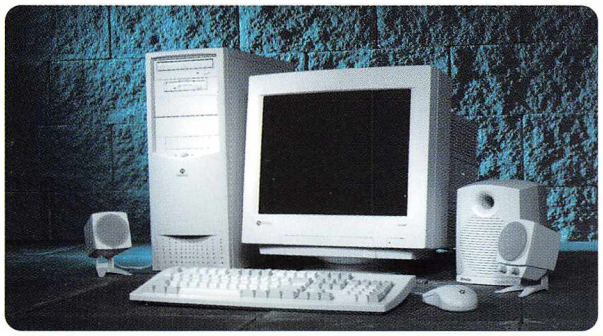

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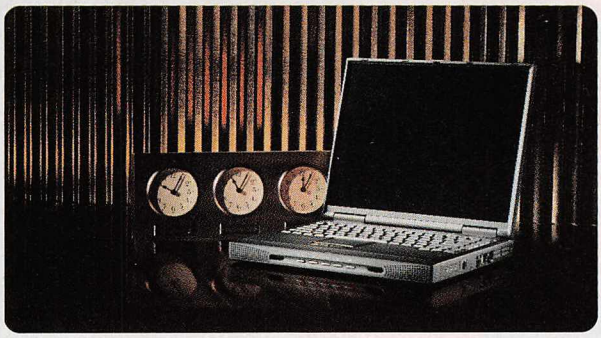

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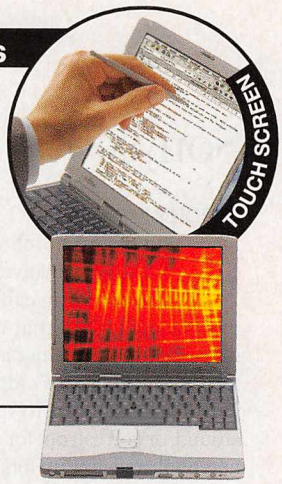

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- Built-in 56K[1] V.90 modem
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- Includes LAN pass-thru
- Less than 1" to 1.25", under 4 lbs.[3]
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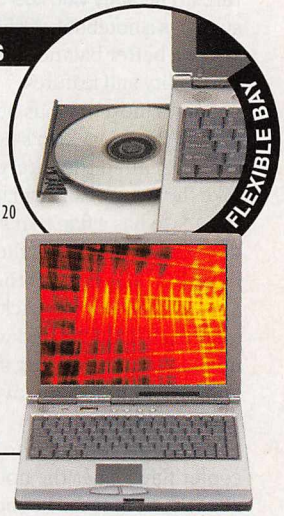

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FUJITSU PC CORPORATION

Sony's 007 Notebook

BY JOHN MORRIS

Choosing a notebook PC inevitably involves compromise. You can either purchase a laptop that almost mirrors the performance and features of a desktop PC, although you wouldn't want to carry it around, or you can opt for a mini-notebook and give up lots of features. The **Sony VAIO XG9** ($3,300 street) is a notebook designed to strike a better balance between portability and features.

Sony's most obvious new feature is the VAIO XG9's cooling system, called the Intercooler. Like the wing of an airplane, the VAIO XG9 has a flap that swivels down when you open the notebook PC. This creates room for a line of vents at the back of the system that, combined with an unusual liquid cooling system and fan, help to improve heat dissipation.

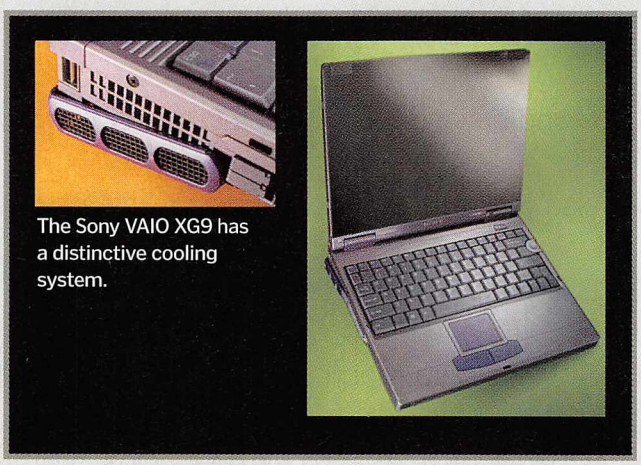
As a side benefit, the Intercooler flap angles the notebook slightly, so that the keyboard is in a more comfortable position. The keys have also been redesigned for precision: Each is supported by a stainless steel mechanism, which makes the VAIO XG9 feel more like a typewriter. Although it took a while, we grew to like the tactile feedback and the mechanical sound that the keys made when typing. The keys have reflective paint, so you can see them in low light.

With the standard 4X DVD drive, the VAIO XG9 weighs in at 6.6 pounds, but you can also leave the modular bay empty (a plastic cover is included), and its weight then drops to 5.9 pounds. The hot-swappable bay can also accommodate a floppy disk drive (included), a CD-RW drive ($550 street), a 10GB hard disk ($800), or an extra battery ($250).

Our test system included a 500-MHz Pentium III processor, 128MB of RAM, an 18.1GB hard disk, a 13.3-inch XGA (1,024-by-768) TFT display, and a NeoMagic MagicMedia 256AV graphics accelerator with 2.5MB of video RAM. Other standard features include two Type II PC Card slots, an integrated 56K modem, and single USB and FireWire ports.

On our benchmark tests, the unit was on a par with other Pentium III notebooks ("Pentium III Goes Mobile," First Looks, December 1, 1999). The VAIO XG9 notched a ZD Business Winstone 99 score of 23.2, a slightly better-than-average score (20.5) on our ZD Content Creation Winstone 2000 test, and a score of 2 hours 11 minutes on our BatteryMark test. In addition to a touch pad, the VAIO XG9 has a Jog Dial, a feature borrowed from Sony's consumer electronics devices. On the desktop, the Jog Dial is most useful for performing operations such as adjusting volume, brightness, and contrast, as well as for launching applications. The Job Dial is context-sensitive so, when you are in Word, for example, you can use it to scroll documents.

Some of the most appealing aspects of the VAIO XG9 are not standard features but options.



The Sony VAIO XG9 has a distinctive cooling system.

Some of the most appealing aspects of the VAIO XG9 are not standard features but options. For instance, the Privacy Screen ($300 street) is a panel that snaps onto the display, making it impossible to view the screen from the next seat over on the plane. This option is so effective that we wish other notebook makers would implement it.

Another great option is the XG Dock ($350 street), a port replicator that is packed with multimedia features. In addition to the standard serial, parallel, and USB ports, you get an optical digital output for connecting the system to surround-sound speaker systems, an S-link audio/video interface for controlling devices such as CD changers, S-video and NTSC video-out, and a FireWire port.

The VAIO XG9 includes Sony's generous bundle of video- and image-editing applications, as well as several of its own utilities for managing battery power and other system functions. The VAIO XG9 is backed by a one-year warranty.

Although not the thinnest or lightest unit around, the Sony VAIO XG9 is a solid performer with great multimedia capabilities and enough gadgets to keep James Bond busy.

Sony VAIO XG9

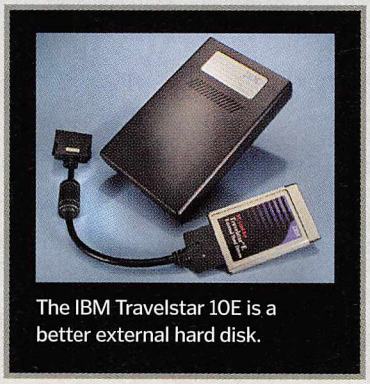
Street price: With Pentium III/500, 128MB RAM, 18.1GB hard disk, $3,300. Sony Electronics Inc., San Jose, CA; 888-315-7669; www.sony.com/pc. ●●●●

Take an Extra Drive

BY BILL HOWARD

Need lots of storage when you're traveling with your notebook PC? The new **IBM Travelstar 10E** external hard disk plugs into your notebook's PC Card slot, self-configures within seconds without an external CD or floppy disk, and gives you 10GB of storage for $550 (street). The vendor also offers an 8GB model for $450.

Other vendors have done external hard disks before. The Travelstar is the best external hard disk to date, not only be-cause it's small at 1 by 4 by 7 inches (HWD) and light (12 ounces) but also because the disk has better capacity, does not require a transformer, draws just over 2 watts (peak), avoids the pokey parallel port, and lives inside a shock-mounted housing. We found that the Travelstar delivers real-world throughput of 1 MBps (the claimed spec is 2 MBps).



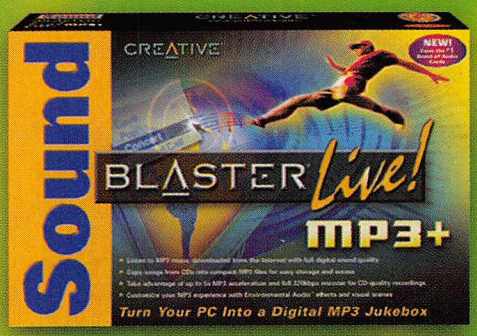
The IBM Travelstar 10E is a better external hard disk.

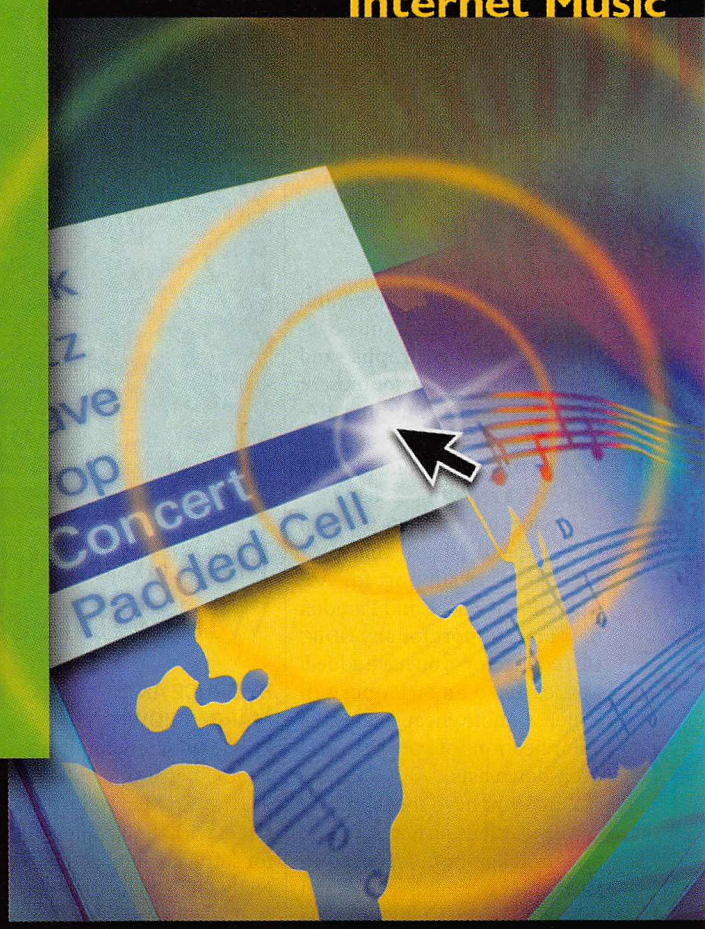
IBM bundles RioPort digital audio jukebox, data encryption, and backup software. When the disk first boots, it offers to back up the entire contents of your notebook.

The IBM Travelstar 10E takes up more space than PC Card solutions, but it offers much more storage.

IBM Travelstar 10E

Street price: $550. IBM Corp., San Jose, CA; 888-426-5124; www.ibm.com. ●●●●●





Hear the revolution

Turn your PC into a digital jukebox

The Internet is alive with great music. The MP3 revolution is changing the way we listen and record music. But this new world can be confusing and distorted if you don't have the right tools.

With new **Sound Blaster Live!™ MP3+**, you'll instantly turn your PC into a home stereo quality, digital jukebox. This superior sound card comes bundled with exciting Internet audio software that lets you encode MP3's and much more. All at an incredible price!

Plug in the latest Cambridge SoundWorks® speaker system, **SoundWorks® Digital**, and your Internet audio will sizzle with rich, full sound. This powerful subwoofer speaker system digitally connects to Sound Blaster Live!™ sound cards for crystal clear audio.

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Visualize Data With Ease

BY BARRY SIMON

Transforming rows and rows of data into eye-grabbing graphs and charts is no easy task for most of us. But Positive Support Review's **Zinnote 2000** ($995 list) puts all the tools in one place to make data reporting a snap.

Zinnote imports data using an ODBC-based wizard that provides built-in support for Access, dBASE, Excel, and Paradox data and support for any ODBC OLE connectors you have added. You can use an SQL query in which Zinnote encapsulates the complications of SQL in several drop-down lists.

Once you have the data, you can display it using line, area, bar, box-whisker, bubble, contour, Pareto, pie, pyramid, scatter, and surface charts and graphs, among others. While displaying your data, you can open a data editor to view the related data.

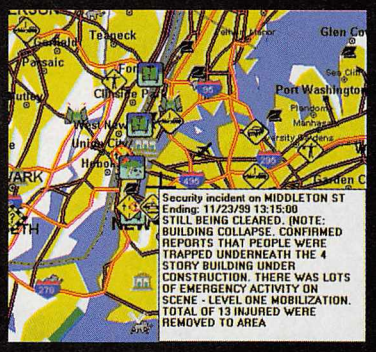
Using Zinnote, you can combine tables and charts into reports. Reports, charts, and data sets can be combined into workspaces and projects that can be saved and updated. As the data changes on the back end, you can update the data source, and these changes are then reflected in charts and reports.

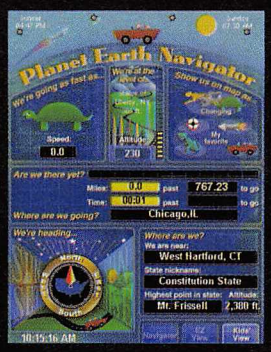
Reports can be exported to HTML and Microsoft. In Word, charts are embedded as bitmaps, and tables are embedded as editable Excel tables. HTML export places the charts as JPEG files.

Our only complaint is that given its lack of analytical tools, the program seems high-priced. Nevertheless, Zinnote 2000 is a versatile, easy-to-use tool for generating data-intensive reports in Word or HTML.

Zinnote 2000

List price: $995; five-license pack, $2,795. Requires: 16MB RAM, 15MB hard disk space, Microsoft Windows 98 or NT 4.0 or later. Positive Support Review Inc., Santa Monica, CA; 310-453-6100; www.zinnote.com. ●●●●





Subscribers to real-time traffic reports in SkyMap 2000/GPS can get detailed reports of traffic jams in a metropolitan area (far left). Young travelers can have fun with the Kids' GPS view in TripMaker Deluxe 2000.

Hit the Road With Hi Tech

BY BRUCE AND MARGE BROWN

Two new mapping software upgrades, Etak's SkyMap 2000/GPS ($200 street with the bundled GPS, $40 for software only) and Rand McNally's TripMaker Deluxe 2000 ($30 street after rebate), take advantage of links to the Internet, GPS receivers, and PDAs to complement their excellent maps, route planning, and travel references.

SkyMap 2000/GPS includes SkyMap 2000, a U.S. trip-planning and street-finder program, a 12-channel GPS receiver, and an earbud-style headphone/microphone set.

SkyMap 2000 offers solid map detail for creating routes, a street database for locating specific addresses, 1.4 million points of interest, and exit services information. But the process of selecting and installing regional maps from SkyMap 2000's 275-file library was not intuitive.

The real-time traffic reports (30 days free, $60 street per year) are provided for 36 metropolitan areas via the Internet. We tested real-time traffic reports in Hartford, Connecticut, and New York City with good results.

You can download map segments to Palm devices. SkyMap 2000/GPS is a better-than-adequate value for business and leisure travelers.

SkyMap 2000/GPS

Street price: $200. Requires: 32MB RAM; 130MB hard disk space; 2X CD-ROM drive or better; Microsoft Windows 95 or 98. Etak Inc., Menlo Park, CA; 800-765-0555; www.etak.com. ●●●●

With its new RV Planner, Kids' GPS view, and support for Palm devices, Rand McNally's **TripMaker Deluxe 2000** provides exceptional road-trip support for the leisure traveler via a notebook connected to an NMEA-compliant GPS receiver.

If your RV breaks down in unfamiliar territory, the RV Planner can pinpoint RV exit services. The new Kids' GPS Planet Earth Navigator provides answers to the most commonly asked question heard from the back seat: "Are we there yet?"

TripMaker Deluxe 2000 supports downloads of maps, directions, and information to Palm and Microsoft Windows CE devices.

TripMaker Deluxe's latest upgrade adds to its strengths: an exemplary map interface, personalized itineraries, and Internet-based references.

TripMaker Deluxe 2000

Street price: After rebate, $30. Requires: 16MB RAM; 125MB hard disk space; Microsoft Windows 95, 98, or NT 4.0 or later. Rand McNally, Skokie, IL; 800-671-5006; www.randmcnally.com. ●●●●

Publish Web Pages Posthaste

BY EDWARD MENDELSON

If you have old documents and spreadsheets that you need to post on an intranet or Web site, nothing gets the job done faster than **FastSite Release 3** ($100 street). But choose this package only if you're willing to sacrifice elegance for speed.

FastSite can convert dozens of documents into HTML format and generate Web pages with hyperlinked tables of contents in minutes. But the resulting pages won't have a consistent look, and the only navigation tools available on the converted pages are simple icons for the home page and the Next and Previous pages.

FastSite's wizard interface prompts you to choose a built-in template design for the table of contents page, then lets you choose one or more files to convert into either HTML or Adobe Acrobat's PDF format. One more click generates a Web site that can then be uploaded to a remote server. Use care when uploading: If you hit the wrong button, the wizard deletes all existing files on the server.

FastSite makes quick sites from legacy documents, but for more power, move up to Info-Access's HTML Transit.

FastSite Release 3

Street price: $100. Requires: 16MB RAM; 10MB hard disk space; Microsoft Windows 95, 98, or NT 4.0. Lotus Development Corp., Cambridge, MA; 800-343-5414; www.lotus.com/fastsite. ●●●

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The One-Stop Graphics Shop

BY JOHN McCORMICK

For the greatest versatility in a graphics package, it's hard to imagine a better program than Deneba Software's **Canvas 7,** which is actually a complete suite of graphics tools combined with useful Web publishing features.

Instead of trying to outdo other graphics programs such as Adobe Illustrator, Adobe Photoshop, or CorelDraw, Deneba has targeted the graphics generalist by integrating technical installation, image editing, and page layout in a single package.

The most important new feature is SpriteEffects. When you are working only with paint (bitmapped) objects, this tool appears to be the usual special-effects feature that lets you blur, sharpen, or otherwise alter images. But Canvas lets you apply the effects not only to bitmapped images but also to text and technical (vector) drawings. Even better, after you have the page the way you want it, the original elements can still be edited.

Though Canvas doesn't rival complete desktop publishing programs, it does offer a powerful set of features that will meet the needs of many businesses. For example, a wizard automates the creation of multipage documents such as brochures or newsletters and includes advanced features such as various ways to adjust text kerning.

The technical-drawing features of Canvas have always been strong and remain so. The redesigned vector graphics engine, with new Bezier curve capabilities, and the AutoCurve tool make it easy to generate smooth curves. The technical-drawing tools offer extreme precision (to 0.5 microns) and drawing sizes up to 38 by 38 feet.

If Canvas has a particular niche, it's in fast Web page development and publishing. Most Web pages include text and graphics, and many designs use a combination of photographs, clip art, and even vector graphics. Only Canvas lets you edit and combine all these elements in a single editing environment. This offers several advantages. First, you can paint, draw, work with text, and apply special effects without ever moving files between separate programs—a process that can be tricky when working with large graphics. Second, the only program you need to know is Canvas.

The Navigator window lets you view, zoom, and pan large documents.

FTP support is also included, so you can upload finished documents to the Internet. Not only can you export documents directly to the Web, but Canvas comes with a graphics Web server that runs on any Windows NT server.

Using Deneba Internet Graphics Server, you can view Canvas pages with any browser, search for and download files, use thumbnail images, and even pan, zoom, and navigate through pages and drawing layers without plug-ins.

Canvas is not the tool for most graphics professionals, nor does Deneba intend it for high-end users. But because it is so easy to learn and use, Canvas 7 is ideal for either SOHO settings or businesses that do occasional graphics work.

Canvas 7

List price: Full version, $375; download (without clip art and fonts), $129.95; competitive upgrade, $199.95. Requires: 32M RAM; 80MB hard disk space; Microsoft Windows 95, 98, 2000, or NT. Mac version available. Deneba Software Inc., Miami; 800-622-6827; www.deneba.com. ●●●●

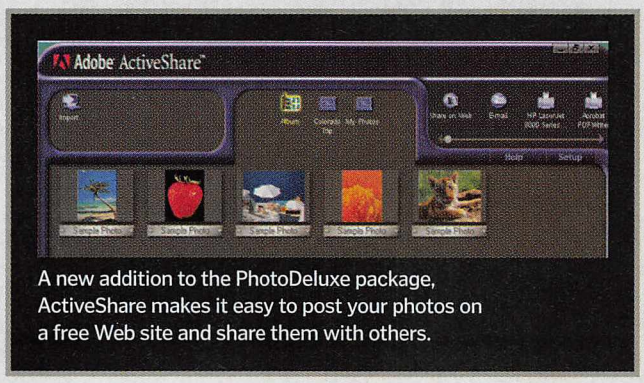
PhotoDeluxe Updates Its Image

BY SALLY WIENER GROTTA

Based on Adobe's professional image-editing software, **Adobe PhotoDeluxe Home Edition 4.0** ($50 street; competitive upgrades, $40) is a fun program with a simple interface, new Web functionality, and online photo-sharing capabilities (via Adobe's ActiveShare online service). PhotoDeluxe avoids confusing the user with too many options and instead provides step-by-step guidance and a collection of entertaining activities. Included in the box is the even easier-to-use ActiveShare software, which is fully integrated with PhotoDeluxe's revamped photo albums.

PhotoDeluxe's primary competitors are MGI PhotoSuite III Platinum Edition and Microsoft Picture It! 2000 (First Looks, November 2, 1999). Corel has also released a minor update to its home image-editing program, now known as Corel Custom Photo ($49.95 list).

There are two different ways to work with PhotoDeluxe. The step-by-step activities walk you through the process of editing images and creating activities using them. The Advanced Menus button, designed for more experienced users, lets you directly access a full range of Photoshop-like commands.



A new addition to the PhotoDeluxe package, ActiveShare makes it easy to post your photos on a free Web site and share them with others.

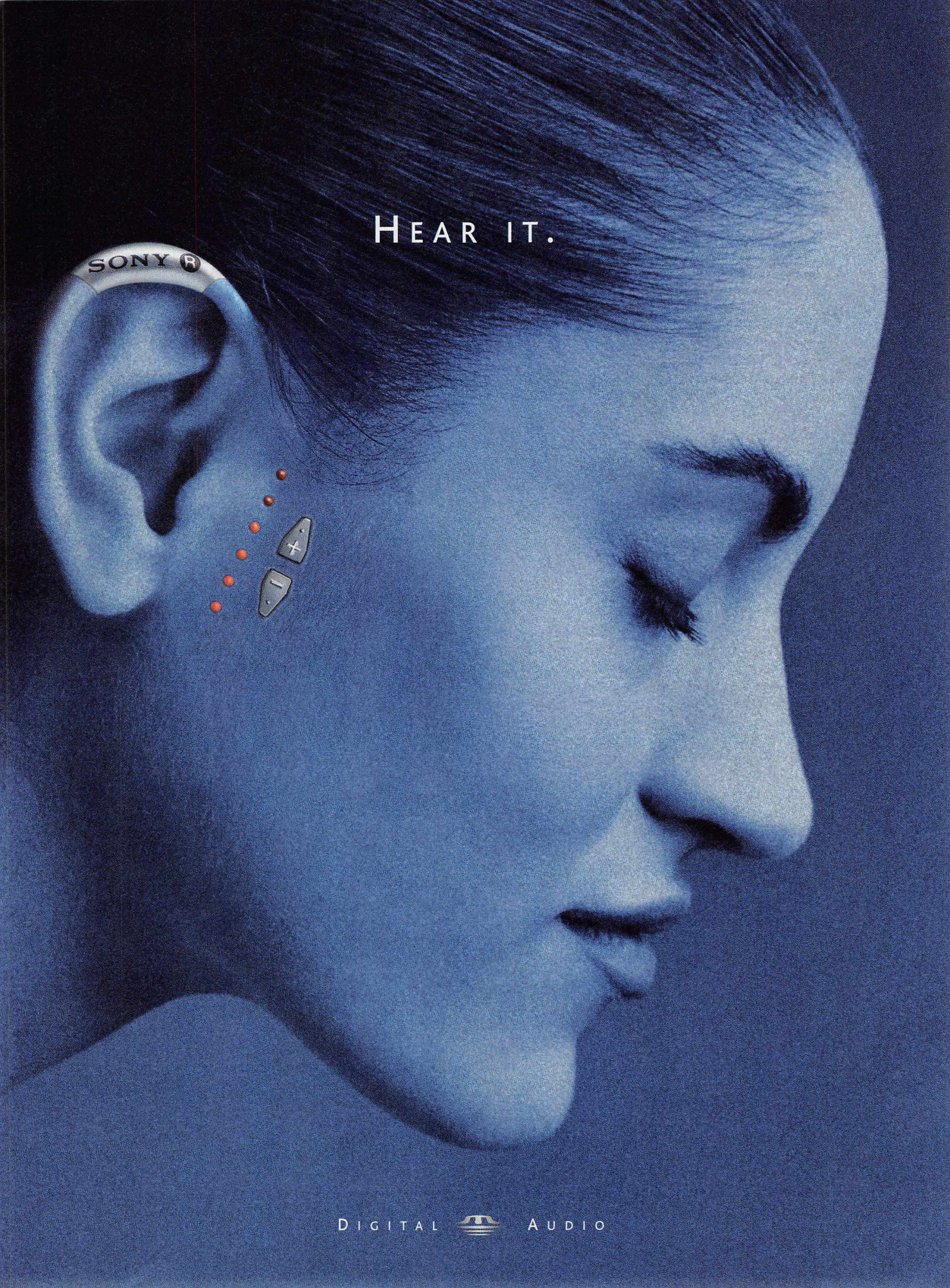
The new floating (undockable) My Photos tool is far superior to PhotoDeluxe's previous Easy Photo Gallery cataloging. You can create your own albums, drag and drop photos into them, and search for images using keywords. Too bad PhotoDeluxe has no batch-processing capabilities.

Uploading images to the password-protected ActiveShare .com, a free online community for sharing photos, is also an easy, drag-and-drop process. Though more limited than PhotoDeluxe, ActiveShare does support batch processing and for basic tasks, such as rotating an image, it can also be quicker. Because the two programs' albums are integrated, anything you edit in one is automatically updated in the other.

PhotoDeluxe still has only one level of undo, and some functions require too many mouse clicks. But with Version 4.0, PhotoDeluxe has raised the bar in novice photo editing.

Adobe PhotoDeluxe Home Edition 4.0

Street price: $50; competitive upgrade, $40. Requires: 32MB RAM (64MB for Windows NT); 100MB hard disk space; Microsoft Windows 95, 98, or NT 4.0 with Service Pack 3. Adobe Systems Inc., San Jose, CA; 800-888-6293; www.adobe.com. ●●●●


HEAR IT.
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DIGITAL AUDIO

The Apple AirPort Finally Arrives

BY LES FREED

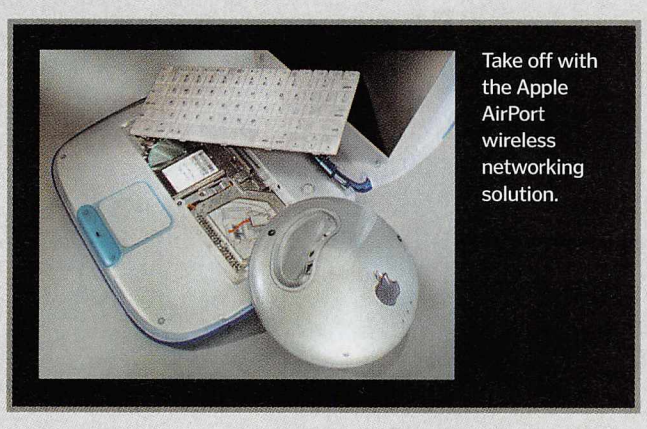
When Apple announced the iBook computer last summer, one of the big crowd pleasers was the **Apple AirPort** wireless networking system. Based on technology jointly developed with Lucent Technologies, the AirPort is an IEEE 802.11b-based wireless LAN that allows iBooks, newer iMacs, and G4-based desktops to communicate wirelessly at 11 Mbps. What got the crowd's attention was the AirPort's price: $299 list for the AirPort Base Station and $99 for the AirPort Card, or about a third the price of similar PC-based products. Well, the AirPort system is finally here.

The AirPort Base Station is the heart of the AirPort system. The Base Station looks like a giant, slightly melted Hershey's Kiss candy. The front sports a large Apple logo and three unmarked status LEDs; a recessed panel on the rear provides connections for power, Ethernet, and phone line connections.

Like most 802.11b-based stations, the AirPort provides a way for mobile wireless computers to communicate with other, wired devices on an Ethernet LAN. But the AirPort also includes a 56K V.90 modem, a NAT server (network address translation), and a DHCP server that work together to provide wireless client Macs with shared Internet connectivity, either via a dial-up connection or via a router, DSL, or cable modem attached to the Ethernet port. Only one other product, Proxim's Symphony wireless LAN, offers a similar feature.

On the client side of the connection, the AirPort Card installs in any AirPort-compatible Mac. These computers come from the factory with an antenna built into the case, so no external antenna is required. Installation is a simple matter of sliding the AirPort Card into its socket and attaching the antenna cable. On the iBook, the AirPort socket is located beneath the keyboard.

A supplied CD-ROM includes AirPort Assistant, which automatically walks the user through the process of setting up both the AirPort Card and the AirPort Base Station. We installed the AirPort Base Station and added AirPort Cards to two iBooks in about 30 minutes total. The AirPort Base Station works with any type of Internet connection. We tested both dial-up and cable connections, and both worked flawlessly. We were able to carry our iBooks around the house with no dead spots or breaks in connectivity.



Take off with the Apple AirPort wireless networking solution.

The AirPort system has a range of about 150 feet and does not support multiple base stations. Despite these limitations, the Apple AirPort is a simple, low-priced solution for the home, small office, and classroom.

Apple AirPort

List price: AirPort Base Station, $299; AirPort Card, $99. Apple Computer Inc., Cupertino, CA; 800-538-9696; www.apple.com. ●●●●●

The RaQ Is Back

BY GREG ALWANG

Following in the footsteps of the well-received RaQ and RaQ 2, the **Cobalt RaQ 3i**, from Cobalt Networks, provides reliability, performance, and simple Web-based administration in a rack-mountable Internet appliance. With a faster processor, L2 cache, more expandability, and features like virtual hosting, bandwidth management, and integrated security (SSL), the RaQ 3i ($3,999 list as tested) is ideal for ISPs and ASPs (application service providers) hosting e-commerce and high-traffic sites.

Running on an AMD K6/300 processor, our test unit came packed with 512MB RAM and a 20GB hard disk. Ports include two 10/100Base-T, two serial, an Ultra-Wide SCSI, and a USB, as well as a PCI slot for expansion. The RaQ 3 starts at $1,749 list with 32MB RAM, an 8.4GB disk, one Ethernet port, and no external SCSI port or PCI slot. A two-line LCD has navigation buttons so that you can configure the IP address and shut down the unit. A customized Linux 2.2 and Apache 1.3.6 combination run the show, but you'd never know it thanks to Cobalt's slick browser-based management interface.

For setup, just plug the unit in and turn it on. The LCD prompts for the primary IP address, subnet mask, and gateway address. You configure the services and create and manage virtual sites using your browser.

The Cobalt RaQ 3i is a great appliance for the host who wants the most.

Unlike Cobalt's Qube server appliance, the RaQ 3i forgoes workgroup features like NAT, DHCP, and cross-platform file sharing, focusing instead on such aspects as performance and hosting features. In addition to e-mail, FTP, SNMP, telnet, and DNS services, the RaQ supports third-party add-ons for such features as e-commerce, encryption, and streaming content. Support for CGI and Perl scripting, FrontPage 2000 Server Extensions, and the Java Run-time Environment ensures compatibility with a variety of Web-based applications.

The RaQ 3i allows virtual hosting by domain or IP, and sites can share IP addresses, so you can choose the method that suits your needs. Site administrators can be assigned to each virtual entity for remote administration. By delegating some administrative tasks to clients, ISPs can off-load some site management and get a return on their server investment more quickly.

On e-commerce sites, you can enable SSL per virtual site or use the Secure POP protocol for authenticating e-mail. Reports let you monitor Web, mail, and FTP usage for the entire RaQ or for each virtual site.

The RaQ 3i was designed from the ground up with ISPs and ASPs in mind, and it shows in the compelling mix of features and the low price.

Cobalt RaQ 3i

List price: With 300-MHz AMD K6 processor, 512MB RAM, 20GB hard disk, $3,999. Cobalt Networks Inc., Mountain View, CA; 888-702-6225; www.cobalt.com. ●●●●●

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Take the Songs, Leave the CDs

Ready to fill your portable MP3 player with Web music? PC Magazine Labs finds the best encoding rates for rock, jazz, and classical music.

MPEG Audio Layer 3, better known as MP3, has created the portable digital audio market, but managing your MP3 music files is a bit more complicated than popping a CD into a stereo. There are decisions to make.

PC Magazine Labs recently conducted listening tests to help you make the right tradeoffs between file size and audio quality. With some basic understanding of digital audio, you can decide what encoding rate best suits the particular music you want to *rip*—MP3 jargon for encoding files. The goal is to maximize the number of songs you can store in your MP3 player with minimal compromises in music quality.

MP3 compresses near-CD-quality music to one-twelfth the size of the original CD audio data, but MP3 players come with a finite amount of memory—either 32MB or 64MB. MP3 music can be encoded at various bit rates. Generally, the higher the bit rate, the better the audio quality and the larger the file size.

MP3 is a "lossy" compression scheme—meaning some quality is lost during compression. But MP3 achieves perceptually "lossless" compression through *psychoacoustics*. The compression technique cuts out all the audio information that we can't perceive or that isn't needed.

Dynamic range and *sample rate* are the two major factors that affect the quality of digital audio. As you lower the bit rate, you give up one or a little of both. A good dynamic range is required to reproduce faint sounds accurately and not clip the loud parts. A high sample rate enables the accurate reproduction of the original recording across a wide range of instruments.

Based on our listening tests, we found that a 128-Kbps MP3 clip (sampled at 44.1 kHz) is almost impossible to distinguish from the music on CD. This is the bit rate you should use for classical music. If you prefer pop or contemporary vocals without high-pitched instruments, then the 64-Kbps encoding (typically sampled at 22.05 kHz) is likely to be just as good at preserving the dynamic range. And the lower bit rate produces files that are half the size.

As an alternative to MP3, Microsoft's Windows Media Format (WMF) 4.0 is designed to store twice as much music as MP3. Most players will soon support WMF, which can encode at 64 Kbps with the full 44.1-kHz sampling rate in stereo. 128-Kbps MP3 files are typically encoded at 44 kHz stereo. They can also be encoded at 64 Kbps, but most MP3 encoders sample at 22.05 kHz, limiting the frequency range to 11 kHz. We found that Microsoft's proprietary algorithms produce near-CD-quality music files at 64 Kbps, compared with the 128 Kbps required by MP3 for such quality.

To test Microsoft's claim that its 64-Kbps encoding is a better way to go, we encoded three types of music (rock, jazz, and classical) with MP3 at 128 Kbps stereo and WMF at 64 Kbps stereo (at 44.1-kHz sampling rates). Only WMF-encoded jazz (with a lot of cymbals) produced annoying artifacts. For the other clips, we found it difficult to distinguish the MP3- and WMF-encoded files from the originals.

—S. Jae Yang and Jay Munro

CHOOSE A BIT RATE

With a basic understanding of digital audio, you can decide what encoding rate suits the music you want to *rip*—MP3 jargon for *encode*.

Encoding rate	Quality	Number of minutes stored in 32MB
16-bit WAV (44.1-kHz stereo)	Identical to CD	3
128-Kbps MP3 (44.1-kHz stereo)	Nearly indistinguishable from CD	33
64-Kbps WMF (44.1-kHz stereo)	Near-CD quality; optimized for classical music	66
64-Kbps MP3 (22.05-kHz stereo)	Acceptable for music; stronger in bass than in treble	66

PHOTOGRAPHY BY THOM O'CONNOR

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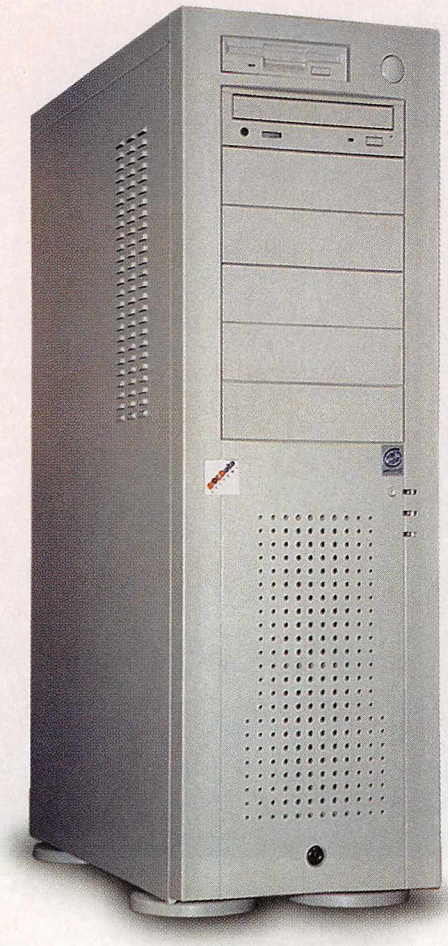

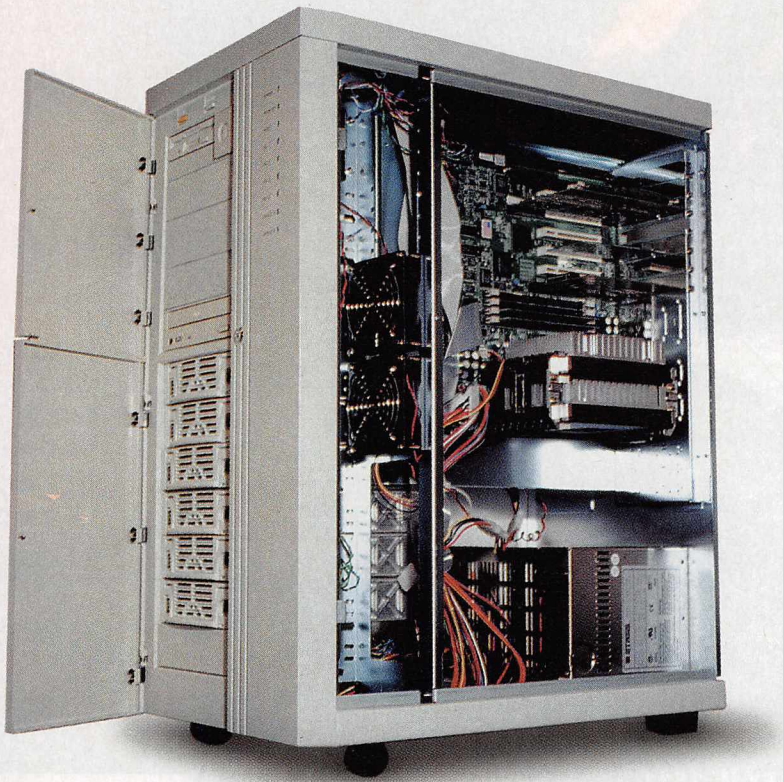

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Feedback

"I think nVidia deserves a Technical Excellence Award for the GeForce chip."

TECHNICAL EXCELLENCE AWARDS

I THINK NVIDIA DESERVES A TECHNICAL EXCELLENCE AWARD for the GeForce chip. This is the first time we've seen a next-generation chip in a news conference and found it on store shelves a month later. Not only that—the GeForce actually delivers what it promises. Maybe Intel can learn a thing or two from the people at nVidia.

KHALED AL ANANI
Cairo, Egypt

IN TWO INSTANCES, THE WINNER IN ONE CATEGORY should have been competing in another. MetaCreations' 3-D Web tools won for best application, but they should have won for best Web application. The 3Com Palm V won for best design, but it should have won for best hand-held. This clearly indicates that Web apps and hand-held devices are the significant technologies of the year.

MARTIN
via the Internet

WHERE THE HECK IS THE APPLE IBOOK? Where's the logic in choosing the Palm V for best design this year? Consider this: The general design for the Palm device has been around for over a year, so I don't understand how the design can be considered fresh and innovative. The design that is currently driving the boundaries outward is the iBook.

RATTMAN
via the Internet

IN YOUR DECEMBER 14 COVER STORY "Technical Excellence Awards," surely BeOS deserved mention. BeOS may have a small market and mind share, but any objective evaluation of BeOS would put it far ahead of other operating systems. BeOS was designed from the ground up to be the most advanced and well-designed OS on the planet. About the only technical criticism that can be leveled against BeOS is that it doesn't yet have a Unix-style multiuser security model, which is supposed to be implemented in a coming release.

All the other barriers to BeOS's acceptance (drivers, applications, and so on) are economic, not technical, and they are rapidly falling. BeOS is where Linux was two years ago, but unlike Linux, BeOS is a highly polished, high-performance desktop OS that is a joy to use for novices and gurus alike.

DAVID BRUCE
via the Internet

I AGREE WITH YOUR ASSESSMENT OF GOOGLE as the best search engine. The way it sorts through millions of sites and usually finds the perfect one for me is amazing. I always try Google first when searching the Web.

ANDREW QUINT
Richmond, CA

SMART PHONES

YOUR DECEMBER 14 TRENDS ARTICLE "Calling the Web" (page 32) includes some misleading information concerning the recent 3Com/Nokia/Symbian announcement. The deal does not foreshadow the Palm moving away from its current operating system; rather, the Palm OS interface and APIs will be ported to EPOC.

Also, I am surprised that you didn't mention the Wireless Applications Protocol Forum (*www.wapforum.com*), an industry group that claims virtually all of the companies mentioned as members, along with a couple hundred more. WAP's markup language for small wireless devices, WML, is available in devices from many sources, including the Motorola and NeoPoint phones you mention, and will soon be in many more.

TOM BRIDGMAN
via the Internet

AN IMAC FOR EVERY BUDGET

IN YOUR DECEMBER 14 ARTICLE "A PC for Every Budget," it would have been nice to see more other Apple iMac models listed. Your Summary of Features table (page 172) shows a wide range of prices and speeds for all models but the iMac. A person unfamiliar with the Apple product line might easily assume that there's only one iMac, for the price of $1,499, when in fact the new 350-MHz iMac ($999, with 64MB RAM and a 6GB hard disk) would be a good choice for someone on a tighter budget.

Your largest complaint seems to deal with the iMac's lack of expansion options. I'll be the first to admit that the iMac is as limited as you say in that regard, but my own experience has shown that computer users on a variety of platforms rarely upgrade. By the time an upgrade becomes necessary, the lower prices of newer and faster systems inspire people simply to buy new PCs.

TOM LANFORD
Fort Worth, Texas

SAY NO TO SPAM

IN YOUR DECEMBER 14 TRENDS ARTICLE on proposed Federal legislation banning spam ("Spam in the Crosshairs"), you didn't mention

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another serious problem caused by junk e-mail—the negative effect spam has had on the growth of online commerce. Although I've been an Internet user for quite some time, I'll just continue to say *no* to all online shopping sites, as long as I know that purchasing over the Internet can subject me to a barrage of advertising spam from the site I purchase from as well as from other sites that engage in renting, trading, or buying e-mail addresses. If either the Unsolicited Electronic Mail Act or the Can Spam Act ever makes it into law, I'll start purchasing over the Web—but not sooner.

TIM STONE
via the Internet

I AGREE WITH THE NOTION OF HAVING PENALTIES and some control over spammers. But this can be carried to the extremes by ISPs. I use one of the free ISPs and am quite happy with the service. Recently, someone figured out a way to send mass mailings using my ISP. When recipients complained, other ISPs blacklisted all e-mail from my ISP; all of my e-mail was returned undelivered. My ISP found the real culprit and corrected the problem, but my gripe here is that other ISPs didn't block the spammer but all subscribers to my ISP. You wouldn't drop an A-bomb on a city with a higher-than-average crime rate. Antispam efforts need to be handled with caution.

RANDY KOLLER
via the Internet

FILLING THE APP GAP

JOHN C. DVORAK IS RIGHT IN HIS COLUMN "The Killer App Gap" (December 14) about the lack of a momentous technological innovation that would spawn a new killer app. Perhaps the Palm revolution is the closest thing. Dvorak, however, does not consider FireWire. I believe that the next killer app is going to be iMovie and its spinoffs, simply because FireWire has made this an entirely feasible application, given the speed of chips and relatively low cost of ATA storage. For the first time, anyone who owns a digital camcorder can edit home movies far more easily than was possible before FireWire. And almost everyone who owns a camcorder is going to want to do that at some time or another.

GHIGO BERNI
London, England

WATCH YOUR BACK

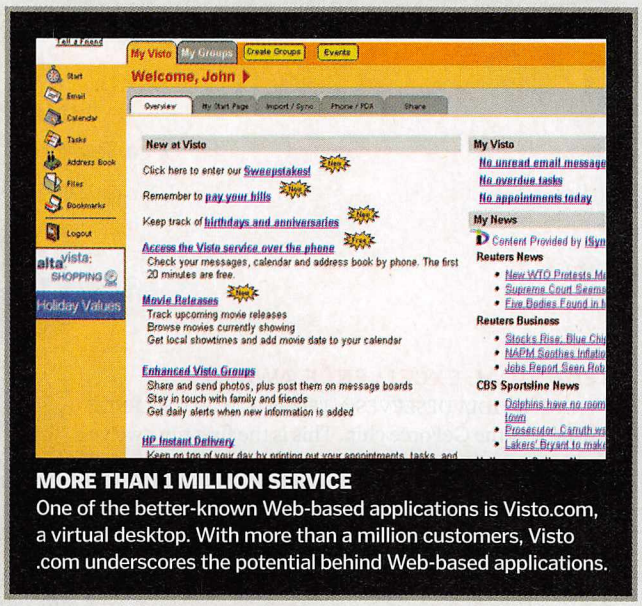
I'VE ALWAYS ENJOYED AND LEARNED FROM BILL MACHRONE'S column. The one about personal firewall software (December 14) really got to me. So much that, upon finishing the column, I immediately tried to obtain one of the two firewall software programs he mentioned, AtGuard and BlackICE Defender. I tried PC Connection, TigerDirect, CompUSA, Datavision and The Wiz—no luck. Could you be kind enough to give me the name of the company that produces or distributes either product? Getting one of these would help reduce that about-to-be-hacked feeling.

JOHN SPENCER
via the Internet

Thanks for your comments. AtGuard is developed and distributed by WRQ (www.wrq.com). BlackICE Defender, which recently received a PC Magazine *Technical Excellence Award (December 14), is a product of Network ICE Corp. (www.networkice.com).—Ed.*

GET IT OUT OF YOUR SYSTEM (TRAY)

IF BILL HOWARD WANTS TO TAME THOSE ANNOYING PROGRAMS he has eating up space in his system tray ("Progress? Not!", December 14), he should try StartupCop 1.01, which I got from *PC Magazine*'s Web site



MORE THAN 1 MILLION SERVICE
One of the better-known Web-based applications is Visto.com, a virtual desktop. With more than a million customers, Visto .com underscores the potential behind Web-based applications.

Ardent About ASPs

BY JOHN MORRIS

Unlike gun control, Internet-based applications aren't life-or-death issues. But judging from our readers' comments, the thought of forfeiting software applications sparks about the same level of controversy as giving up guns does among the general population.

Over the past few months, *PC Magazine* has devoted much attention to the growing phenomenon of Web-based applications. Our coverage has included new services for businesses, known as ASPs (application service providers), that help small and medium-size businesses tackle chores such as payroll and accounting, human resources, ERP, and expenses management ("Send Out for Software," November 2, 1999). And we've also reviewed services for end users such as virtual desktops or *Webtops* (First Looks, November 16), Internet file storage (First Looks, December 1), and online calendars such as AnyDay.com.

Despite all the hype over these services, most readers feel that there are many obstacles to overcome before end users will be trading in their word processors, spreadsheets, PIMs, and other applications for Web-based substitutes. Chief problems include the speed of Internet connections, security, and the features provided by Web-based applications.

In business, however, the ASPs hold more immediate promise, according to readers. This is especially true of smaller organizations that can't afford to deploy enterprise applications such as ERP or sales force automation on their own. The list of ASPs vying to provide applications to these small and medium-size businesses seems to be growing on a daily basis.

Perhaps the most obvious sign that Web-based applications are gathering momentum is the development of online versions of applications we use every day.

Microsoft recently announced an online version of Office. And Sun Microsystems is putting finishing touches on its own Web-based productivity suite (acquired from StarOffice). With heavyweights such as these lining up behind the concept, Web-based applications are surely here to stay.

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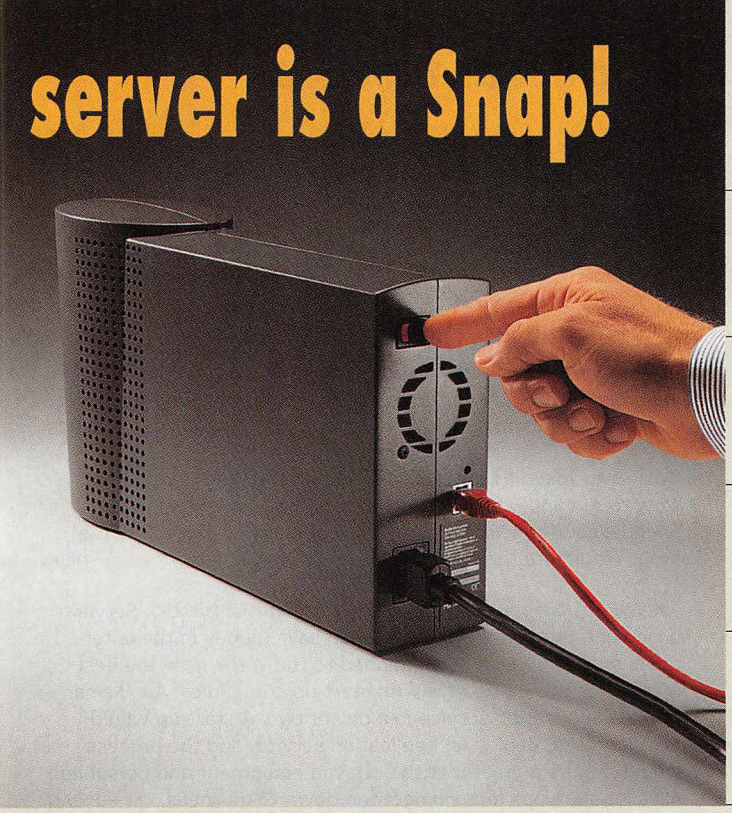

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TERRY COLEY
via the Internet

THE WEB HOST WITH THE MOST

A WEB HOSTING SERVICE NOT MENTIONED in your excellent December 1 article "Web Hosting" is the Miami-based Web Hosting Headquarters (*www.whhq.net*). After trying other services covered in the article, I was led to WHHQ by a friend. I was very impressed with the knowledgeable and helpful staff, who had my site running in a short time. The prices are very competitive, to say the least, and the connections are extremely fast. In addition, thanks to WHHQ's clever way of indexing, my site consistently showed up on search engines at the top. This feature is particularly invaluable for businesses competing on the crowded Web. I have been very impressed by the number of visitors to my site, which resulted in a sharp, almost instant increase in revenues. WHHQ is a great place for small businesses with little or no expertise for building an eye-catching Web site on their own.

G. MUENS
via the Internet

UNPARTITION YOUR HARD DISK

YOUR DECEMBER 1 SOLUTIONS COLUMN on unpartitioning your hard disk was a godsend! When I bought my Dell PC a year and a half ago, it had a 4.8GB hard disk. Because it was running Windows 95 at the time, it had been partitioned into C:, D:, and E: drives. I hated having my hard disk divided like this, but I was terrified to change it when I upgraded to Windows 98 for fear that I would really screw things up. After reading your column, however, I decided to go ahead, and I couldn't believe how easy it was! Thank you.

LINDA LYONS
via the Internet

ALTHOUGH YOUR COLUMN ON DISK PARTITIONING did mention a few reasons why multiple partitions are better, you missed two major ones: defragging and using ScanDisk on a drive. With a single partition, every time there is a write to the disk (such as background loggers or the swap file), defrag and ScanDisk must stop and restart all over again. This is quite annoying. So I have a number of partitions—two for applications; one for the swap file, cache, loggers, and so on; and another two for data. Defragging and ScanDisk run much more quickly, and my hard disk is well organized.

ADHITYA CHITTUR
via the Internet

Corrections and Amplifications

- In our October 19 story "The Virtual Office" (page 154), we incorrectly stated that Instinctive Technology's eRoom 4.0 can't enforce routing rules. In addition, the service's search function is called Search.
- In our November 16 story "Readers Rate the Web" (page 126), AOL and Lycos actually received average and significantly worse-than-average scores for personalization, respectively.
- In our December 1 cover story "Fast PCs" (page 164), the price Tangent Computer quoted for its Medallion was incorrect. With the 19-inch monitor, the correct price is $2,195 direct. Also, Micron has reported to us that because of "a natural disaster in Taiwan," its Millennia Max PIII 733/133 (page 104)—an Editors' Choice—will now cost $100 more than when we reviewed it, or around $2,800.
- In our December 14 review of the Micron Millennia Max 533, in the story "A PC for Every Budget" (page 168), we listed the wrong graphics accelerator and speakers in the configuration. Readers who tried to configure the system accordingly came up with a price much higher than the $1,584 we indicated. The configuration we tested (and awarded Editors' Choice) had a 16MB nVidia RIVA TNT2–based graphics card (not the pricier 32MB upgrade) and three-piece Altec Lansing speakers (not the flat-panel Sonigistix Monsoon option).

SECOND LOOKS

Tell us what you think.... How do you like the new products you're using? Second Looks is your forum for feedback. Join us online to tell us about your experiences. We discuss a different new product each week and summarize your comments here. Here's a sampling of some of the comments from our online discussion of Web-based applications.
www.secondlooks.com

Until everyone has a lightning-fast and dependable Web hookup, ASPs, make no sense, in my view. Can you imagine having an important presentation due in the morning and having to wait on Net congestion? —BRUCE

Bad, bad idea. Even with a T1 line, the Web is way too slow to run applications, especially graphics applications. Speed, security, reliability. You can't get any of these over the Web. Whom are these so-called ASPs trying to fool? —NICK

The ASP platform certainly has an uphill battle. Server-based computing is a proven way to save money in the enterprise, but can it easily be extended to the Web? I see the best market for this industry is with start-up companies. An ASP can provide application service in a day or two. A start-up would take longer to deploy an application service, and the process would require a greater cash outlay in equipment and personnel. ASPs let start-ups focus on getting down to business. —BRIAN

It would be insane to risk your data on a faraway server that has no allegiance to your business and little or no accountability to you as a business owner. The same can be said for home users who need to write only a few letters or balance their checkbooks. These users don't need some server snoop reading those letters or prying into their finances. There is no reason for anyone to rely on Web-based applications. —JOHN

Who said that ASPs had to be Web-based? I agree that Web-based ASPs aren't the greatest idea, as the security and bandwidth just aren't there. Time will tell. On the other hand, any manager with half a brain would realize the advantages of thin-client technology, which is readily available and already being deployed. This technology can be implemented without new hardware. Bandwidth is not much of an issue here, because very little information is actually sent back and forth, only text and changes on the desktop. Also, thin-client technology shares the same software cost benefits as Web-based ASPs. —CHRIS

Almost everyone seems to think of ASPs in terms of a home PC with a modem dial-up connection. Has anyone ever worked in a data entry position (HR, payroll, shipping and receiving, and so on)? Has anyone ever used sales force automation software? These apps are the ones that are being offered by the ASPs and will be a boon for small companies. The benefits of outsourcing e-mail, ERP, and CRM are no-brainers. As for all the concerns about security and reliability, guess what: Your PC is neither secure nor reliable. This idea that a company's data is safer if it is under its own roof is simply a paradigm that must shift for us to move forward in the information age. —M.

All the ASP naysayers will eat their words, just like people who said the earth was flat. Issues of security, reliability, bandwidth, and functionality are all being addressed. And the benefits far outweigh these issues, anyway. The integration of disparate information that exists on individual PCs within corporations will start a revolution. When management can really see how effective its business processes are, companies will rush to embrace this new software model. —FRED

Enter the Third Dimension

This 3-D display technology isn't simulated; it's real.

Tucked inside a nondescript building in Manhattan's Silicon Alley, a group of engineers is thinking outside the box. Literally. Dimensional Media Associates (DMA) is working on a 3-D display. No big deal, except that viewers don't have to wear geeky glasses or goggles.

The technology may enable employees to teleconference in 3-D, consumers to "touch" goods for sale on the Web, and medical researchers to visualize protein-folding models.

A visit to DMA's research lab isn't for the faint of heart. Walk inside and you hear an amplified heartbeat. The heart—actually a high-resolution, 3-D image of it—is suspended a few inches in front of one of the prototype display stations. A set of surgeons' calipers attached to a force-feedback contraption is nearby. A tug on one of the vessels pulls the heart slightly, and you feel the twitch of the muscle in response. (A "stiffness" parameter is built into the software.)

Alan Sullivan, chief science officer at DMA, is overflowing with enthusiasm about the potential of the Multiplanar Volumetric Display that his team is developing. The initial applications are for medical imaging, automobile manufacturing, and other high-end applications, but Sullivan says that prototypes of 3-D displays will be on desktops in six months.

Among more mainstream applications, a 3-D display could assist financial analysts in visualizing trends based on enormous amounts of data, and computer games could take on a whole new dimension. But once 3-D hits the Internet, the fun really begins. Web retailers could let you outfit a model with clothing you're interested in buying and you'd get the full effect, not a flat simulation on your monitor's screen. Although graphics cards today ➤

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ILLUSTRATIONS BY JACK HARRIS/VISUAL LOGIC (TOP), MICHAEL KLEIN (RIGHT)

The Gigahertz Goal

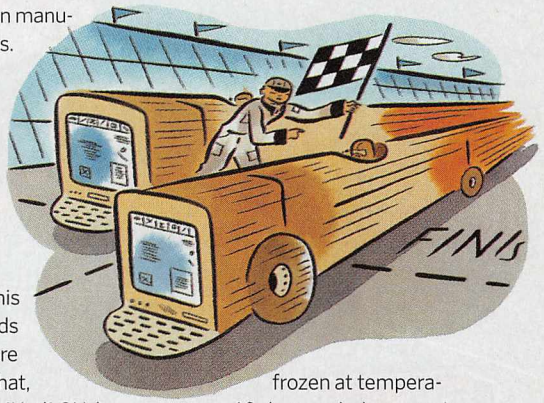
THE RACE IS ON TO DELIVER systems based on processors running at 1 GHz. AMD and Intel are both aiming to deliver these systems by the end of this year, after playing a fierce game of clock-speed leapfrog for most of 1999.

AMD recently announced its new 750-MHz Athlon processor, based on an 0.18-micron manufacturing process. The chip's clock speed surpasses those of several new Intel Pentium III chips based on Intel's Coppermine 0.18-micron manufacturing process.

AMD and Intel are readying 800-MHz Athlon and Pentium III chips, respectively, with shipment expected in the first quarter of this year. Clock speeds up to 933 MHz are expected after that, with the 1,000-MHz (1 GHz) mark seen as viable by the end of the year.

In addition to the speed boost 1-GHz systems will bring, the rapid ramp-up to the clock-speed milestone is also expected to drive the prices of chips in the 750-MHz to 800-MHz range down significantly by the end of 2000. This year's low-cost holiday systems may well feature 800-MHz processors.

Getting to 1 GHz will not be free of challenges. Among other issues, systems based on 1-GHz chips are expected to generate a lot of heat. A small spin-off company of NCR, called Kryotech, is already pursuing a highly unusual strategy for cooling the very first 1-GHz systems. The company is selling a system based on an AMD Athlon processor already running at 1 GHz. The chip is kept cool by being



frozen at temperatures 40 degrees below zero in a built-in refrigeration unit. SysTech has a similar system.

If that sounds a little worrisome from a reliability standpoint, note that AMD is backing the 1-GHz chip with a warranty. Kryotech backs its systems with warranties as well. As interesting as Kryotech's solution may be, look for unrefigerated 1-GHz machines later this year.

Who's Buying the Big-Ticket Items on the Web?

Among Web sites that market to other businesses (B-to-B sites), the median transaction size is more than three times as large as at sites that cater to consumers (B-to-C).

TRANSACTION AMOUNT	B-TO-B	B-TO-C
$1 to $50	5%	22%
$51 to $100	5%	15%
$101 to $500	36%	26%
$501 to $1,000	5%	10%
$1,001 to $10,000	41%	20%
Over $10,000	8%	8%
Median	$800	$244

Source: ActivMedia Research, 1999.

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5. EToys.com (79%)
6. Cheaptickets.com (78%)
7. KBKids.com (51%)
8. Beyond.com (43%)
9. Netzip.com (43%)
10. CDNow.com (35%)

Source: Media Metrix. Percentages indicate the increase in average daily unique visitors of the week ending Nov. 14, 1999 over the average of the previous three weeks' daily unique visitors.

Busting Net No-Goodniks

FROM SCAMS AT AUCTION SITES to e-mail schemes and credit card frauds, con artists are growing along with the Web. Worse, consumers are less concerned about online security than ever before, according to recent market research from Yankee Group.

Several Web sites now track and publicize Internet scams, give advice to consumers, and take complaints. Among them are Consumer.Net (*www.consumer.net*), Internet Fraud Watch (*www.fraud.org*), and Scambusters (*www.scambusters.org*).

Third Dimension Continued

have 3-D features, the 3-D data is squeezed onto a two-dimensional surface. The effect is merely simulated 3-D. DMA has figured out how to liberate the 3-D data so images don't just seem to float in space, but actually float in space.

DMA has kept a low profile so far and isn't divulging details about its technology, because patents are pending. According to Sullivan, the Multiplanar Volumetric Display uses not 1 plane of image data—as conventional displays do—but 12 planes, each depicting a different depth. The end result is essentially a stack of images floating either a few inches in front of the display or inside the display, as if you were watching fish inside an aquarium. The display uses mirrors and beam splitters to collect, focus, and project light in space to form volumetric images. Since the images have volume, they're measured in *voxels*—volume picture elements—rather than pixels.

Having started out as an R & D lab producing advanced visualization systems for the government, the company is now striking out into commercial territory. Its installations of "animatronic" 3-D displays project 3-D images of a product—a Kirin beer bottle, an Adidas sneaker, a diamond watch—into thin air.

DMA is currently working with Silicon Graphics to develop a desktop display. The cost, says Sullivan, would be a few thousand dollars. Future prototypes will offer 24-bit color and have five times as many voxels, says Sullivan. His most far-reaching goal is the complete reinvention of the user interface. Instead of moving files with a mouse, you would actually pick them up to move them.

Shop by Color

The red sweater at the online store catches your eye, so you spring for it. It arrives at your front door a few days later, but to your dismay, it turns out to be orange. Back it goes. The same thing happens when you buy an upholstered chair. You wanted green, but not that green. Back it goes.

MISMATCHED: E-Color's True Internet Color technology corrects the distorted color (left) and displays the actual color (right).

The convenience of buying clothing and furniture over the Web can quickly turn into a big hassle for shoppers—and merchants—when on-screen colors don't match real-life colors. Accurately depicting colors on the Web is no easy job, especially because every graphics card and monitor has its own ideas about color.

Two companies have set out to solve the color confusion. The Pantone Textile Color System and Matching System are currently used by the fashion and home furnishing industries. The company's approach to Web color leverages this existing infrastructure. Web sites can identify a garment's color by the same Pantone number used by the manufacturer and then display a color swatch. The company plans to distribute its Pantone Color Fan so consumers can see what the online color actually looks like.

E-Color's True Internet Color technology is designed to calibrate colors to individual monitors. The software is loaded on a Web site's server, which delivers color-corrected images to visitors who have gone through a four-step color-calibration procedure. E-Color has signed up Bloomingdale's and J.Crew to launch the technology.

This issue's contibutors: **Carol Levin, Sharon Nash, and Sebastian Rupley.**

1 *Quadrillion* Ops per Second

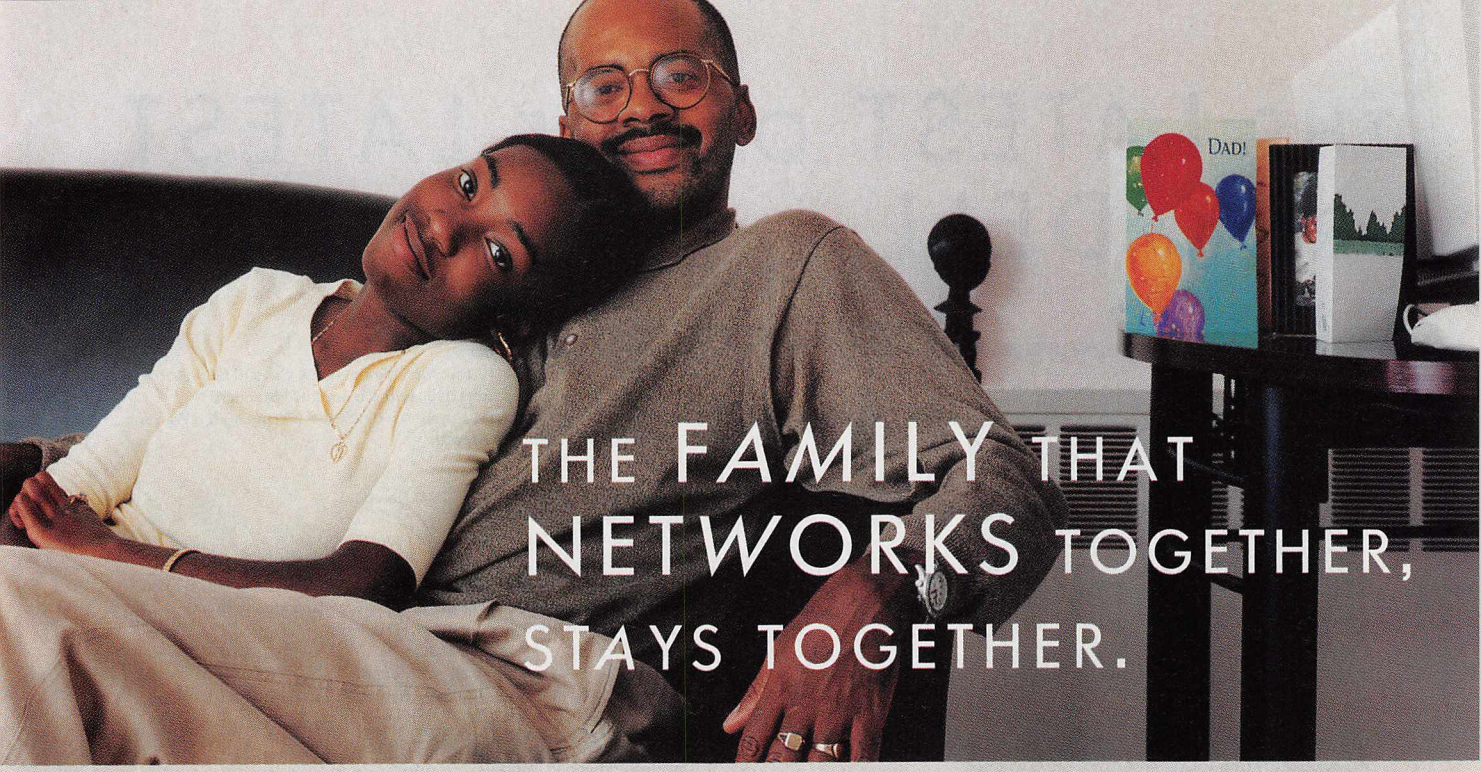
IBM IS ENGINEERING THE OFFSPRING of its Deep Blue supercomputer—the one that beat world chess champion Garry Kasparov back in 1997. Nicknamed Blue Gene, the 2,000-square-foot system is designed to be 1,000 times as powerful as Deep Blue. But the challenge this time isn't chess; it's biology.

Capable of 1 quadrillion operations per second (one petaflop)—a thousand times as fast as Deep Blue—Blue Gene will be used to model the folding of human proteins, a key factor in helping medical researchers understand diseases and develop customized pharmaceuticals.

The experimental architecture, dubbed SMASH (which stands for *Simple, Many, And Self-Healing*), is designed to reduce the number of instructions each processor carries out so that each one can work faster. The blueprint also calls for a massively parallel system that can handle 8 million simultaneous threads of computation as well as self-healing abilities for automatically overcoming failures.

HIGH-END DESKTOP PC	DEEP BLUE	BLUE GENE
1 processor	500 processors	1,000,000 processors
500,000,000 operations per second	1,000,000,000,000 operations per second	1,000,000,000,000,000 operations per second
1 computation thread (hardware)	500 computation threads (hardware)	8,000,000 computation threads (hardware)
2 square feet size	10 square feet size	2,000 square feet size

Source: IBM.



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Nothing unites a family like love, understanding, and a Dell® Home Networking Solution. Which is why we offer you two to choose from. Use your existing phone lines to connect your *NEW* Dell Dimension® desktop to your current PCs — or go wireless. All of your home PCs can share the same Internet connection, files, and printers. Visit www.dell4me.com/homenetworking for more details. Dell Home Networking Solutions. One more benefit of the Dell4me℠ total ownership experience. A complete resource for products and services that make it easy for you to get the most out of technology.

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Togetherness Starts Here

- Intel® Pentium® III Processor at 500MHz ■ 64MB SDRAM at 100MHz ■ 6.4GB[4] Ultra ATA Hard Drive
- *NEW* 17" (16.0" vis, .28dp) E770 Monitor ■ *NEW* 32MB NVIDIA TNT2 M64 AGP Graphics
- 8X Max[10] Variable DVD-ROM Drive with *FREE* $20 DVD Movie Offer[37]
- Yamaha XG 64V Wavetable Sound ■ harman/kardon HK-195 Speakers
- V.90 56K Capable[11] PCI Telephony Modem for Windows
- *NEW* 3Com® HomeConnect™ 10MB Phoneline PCI NIC[44]
- Microsoft® Works Suite 2000 with Money 2000 Basic ■ Microsoft® Windows® 98, Second Edition
- 1-Year DellNet℠ Internet Access[14] Service with 20MB of Online Backup[15] ■ 3-Year Limited Warranty[2]
- 1-Year At-Home Service[3] ■ *NEW* Dell® Home Networking Kit[41] ■ HP® 610CL Printer with Cable

$1699 As low as $46/Mo., for 48 Mos.[33]
E-VALUE CODE: **04245-500116h**

The Dell® Home Networking Kit[41] in the system above allows you to connect your existing PC to your new Dimension® system. Complete with hardware, software, a setup video, and even multiplayer trial games, this kit makes networking simple. To connect more computers, additional Dell Home Networking Kits are available for just $69.

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intel inside pentium® III

[33]Monthly payments based on sales price depicted for 48-mo. term at 13.99% APR. NOT ALL BUYERS WILL QUALIFY FOR THIS APR. APR for qualified customers varies by creditworthiness of customer as determined by Dell Financial Services L.P. Payments exclude taxes and shipping charges that vary. Taxes & shipping charges due with 1st payment unless included in the amount financed, in which case your monthly payment will be higher. Purchase Plan offered through Dell Financial Services L.P., 14050 Summit Dr., Austin, TX 78728, to U.S. state residents (including D.C.) with approved credit, excluding AR and MN residents. Availability may be limited or offer may vary in other states.

THE LATEST OF THE LATEST FROM DELL.

DELL® *INSPIRON*™ 7500 Notebook
Mobile Desktop
- *NEW* Intel® Pentium® III Processor at 500MHz
- *NEW* 15.4" SXGA TFT Active Matrix Display
- 128MB 100MHz SDRAM ■ *NEW* 12GB[4] Ultra ATA Hard Drive (75GB Max[42])
- *NEW* Removable Combo 32X Max[46] Variable CD-ROM and Floppy Drive
- 2X AGP 8MB ATI RAGE Mobility™-P 3D Video
- 3D Positional Sound with Wavetable
- Internal PCI 56K Capable[11] V.90 Fax Modem

$3549 As low as $97/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-800135**

Dell Recommended Upgrade:
- Inspiron™ 7500 Advanced Port Replicator (includes 10/100 NIC Card)
- *NEW* HASBRO® Interactive Family Gaming 5-Pack[22]
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Add $379 E•VALUE CODE: 04249-800139a

Inspiron™ Notebooks include:
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- ***NEW* Microsoft® Works Suite 2000 with Money 2000 Standard**
- **Lithium Ion Battery ■ *NEW* i-Learn My Dell® PC ■ 3-Year Limited Warranty[2]**
- **MusicMatch® Jukebox Standard[35]**

DELL® *INSPIRON*™ 7500 Notebook
Mobile Desktop
- *NEW* Intel® Pentium® III Processor at 500MHz
- 15" XGA Active Matrix Display
- 64MB 100MHz SDRAM ■ *NEW* 6.0GB[4] Ultra ATA Hard Drive (75GB Max[42])
- Removable Combo 24X Max[7] Variable CD-ROM and Floppy Drive
- 2X AGP 8MB ATI RAGE Mobility™-P 3D Video
- 3D Positional Sound with Wavetable
- Internal PCI 56K Capable[11] V.90 Fax Modem
- DellNet℠ 1-Year Internet Access Service[14] with 20MB of Online Backup[15]

$2899 As low as $79/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-800128**

Dell Recommended Upgrade:
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- Microsoft® Office 2000 Small Business plus Encarta
- *NEW* Quicken® 2000 PowerPack

Add $339 E•VALUE CODE: 04249-800132h

DELL® *INSPIRON*™ 3700 Notebook
Light Weight, Light Price
- Intel® Celeron™ Processor at 433MHz
- 12.1" SVGA Active Matrix Display ■ 32MB SDRAM
- 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM
- 2X AGP 8MB ATI RAGE Mobility™-M1 3D Video
- 3D Positional Sound with Wavetable

$1699 As low as $46/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-800116**

Dell Recommended Upgrade:
- Upgrade to 14.1" XGA Active Matrix Display
- *NEW* 6.0GB[4] Ultra ATA Hard Drive
- Removable 6X Max[43] Variable DVD-ROM Drive (Customer Installed)

Add $449 E•VALUE CODE: 04249-800121h

LATE BREAKING NEWS:

HIGH SPEED INTERNET ACCESS: Interested in high speed Internet access? Thinking about a cable modem or DSL? Before you do anything, check out our solutions at www.dell4me.com/broadband.

WIRELESS NETWORKING: Get the latest information on Home Networking Solutions by visiting www.dell4me.com/homenetworking.

RDRAM: To test drive our *NEW* Dimension® XBS B733r with RDRAM memory, a 133MHz bus, ATA-66 hard drive access, 4X AGP graphics and a 733MHz processor, stop by www.dell4me.com/btour.

15.4" NOTEBOOK: Take a virtual tour of our newest Inspiron™ notebooks, featuring Intel® Pentium® III processors, a 15.4" screen, and MegaBay™. Visit www.dell4me.com/7500tour.

intel inside
pentium® III

[33]Monthly payments based on sales price depicted for 48-mo. term at 13.99% APR. NOT ALL BUYERS WILL QUALIFY FOR THIS APR. APR for qualified customers varies by creditworthiness of customer as determined by Dell Financial Services L.P. Payments exclude taxes and shipping charges that vary. Taxes & shipping charges due with 1st payment unless included in the amount financed, in which case your monthly payment will be higher. Purchase Plan offered through Dell Financial Services L.P., 14050 Summit Dr., Austin, TX 78728, to U.S. state residents (including D.C.) with approved credit, excluding AR and MN residents. Availability may be limited or offer may vary in other states.

Pricing not discountable. Prices and specifications valid in U.S. only and subject to change without notice. [2]For a complete copy of Guarantees or Limited Warranties, write Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, TX 78682. [5]At-home or on-site service provided via service contract between customer and third-party provider, and is not available in certain remote areas. Technician dispatched if necessary following phone-based troubleshooting with technical support personnel. Other conditions apply. [4]For hard drives, GB means 1 billion bytes; total accessible capacity varies depending on operating environment. [7]10X Min. [42]20X Min. [46]2.5X Min. [11]Download speeds limited to 53Kbps. Upload speeds are less (in the 30Kbps range) and vary by modem manufacturer. Speeds also vary depending

NEW DELL® *DIMENSION*® XPS B733r Desktop

Cutting Edge Technology

- Intel® Pentium® III Processor at 733MHz ■ 128MB ECC PC700 RDRAM at 356MHz
- 27.3GB[4] Ultra ATA Hard Drive ■ 17" (16.0" vis, .24 -.25 AG) P780 FD Trinitron® Monitor
- *NEW* 32MB NVIDIA geFORCE 4X AGP Graphics Card
- 8X Max[10] Variable DVD-ROM Drive with *FREE* $20 DVD Movie Offer[37]
- *NEW* SB Live! Value Digital with MusicMatch® Jukebox Enhanced[38]
- *NEW* Harman Kardon HK-595 Surround Sound Speakers with Subwoofer
- V.90 56K Capable[11] PCI Telephony Modem for Windows
- 1-Year Dellnet℠ Internet Access[14] Service with 20MB of Online Backup[15]

$2899 As low as $79/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-500128**

Dell Recommended Upgrade:

- 19" (17.9" vis) P991 FD Trinitron® Monitor
- 8X Max[10] Variable DVD-ROM Drive and Decoder Card with TV Out
- *NEW* Altec Lansing THX Certified ADA-885 Dolby Digital Speakers with Subwoofer
  Add $319 E•VALUE CODE: 04249-500132s

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The Dell4me total ownership experience; a complete resource for products and services that make it easy for you to get the most out of technology.

SOFTWARE: Dell® offers a variety of software multipacks designed for work, education or play. ■ Family Fun 5-Pack[22], featuring Star Wars – Rogue Squadron, $99 ■ Quicken Power 3-Pack[22], $89 ■ Choose from one of four Education Packs[22], $79

PRINTERS: Dell simplifies your life and ensures compatibility by pre-installing drivers for select printers[35] on your *NEW* Dell PC. Just turn it on, attach the printer cable, it just takes seconds. ■ HP 895 Printer, $299 ■ Other brands and models available, starting at $149

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SERVICE AND SUPPORT: Dell offers you the help you need when you need it, via phone or online. ■ 24x7 phone and online tech support ■ Dimension Premier 3-Year At-Home Service[3], add $99 ■ Inspiron 3-Year On-site Service[3], add $99 ■ Support.dell.com for innovative online support tools

INTERNET ACCESS AND SERVICES: Dell offers you access to the Internet as well as online services and resources designed to help you make the most of your PC. ■ Dellnet℠ Internet Access[14] with 20MB of Online Backup[15] ■ Simple drag and drop website creation tool with 12MB homepage storage space ■ Over $350 worth of special offers for Dell customers with popular online retailers

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Dimension® Desktop Systems include:

- *NEW* Microsoft® Works Suite 2000 with Money 2000 Basic
- McAfee VirusScan 4.02 ■ Microsoft® Windows® 98, Second Edition
- Keyboard ■ Mouse ■ 3-Year Limited Warranty[5]
- 1-Year At-Home Service[3] ■ 3.5" Floppy Drive

NEW DELL® *DIMENSION*® XPS B600r Desktop

Cutting Edge Technology

- Intel® Pentium® III Processor at 600EB MHz
- 128MB ECC PC700 RDRAM at 356MHz ■ 27.3GB[4] Ultra ATA Hard Drive
- *NEW* 17" (16.0" vis, .26dp) M780 Monitor
- 32MB NVIDIA TNT2 "Ultra" 4X AGP Graphics
- 48X Max[8] Variable CD-ROM Drive
- Turtle Beach Montego® II A3D™ 320V Sound Card with MusicMatch® Jukebox Standard[38]
- Altec Lansing ACS-340 Speakers with Subwoofer
- V.90 56K Capable[11] PCI Telephony Modem for Windows
- 1-Year Dellnet℠ Internet Access[14] with 20MB of Online Backup[15]

$2299 As low as $63/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-500121s**

Dell Recommended Upgrade:

- *NEW* SB Live! Value Digital with MusicMatch® Jukebox Enhanced[37]
- *NEW* Harman Kardon HK-595 Surround Sound Speakers with Subwoofer
- 250MB iomega Zip BUILT-IN Drive with One Disk
  Add $279 E•VALUE CODE: 04249-500124u

DELL® *DIMENSION*® XPS T550 Desktop

High Performance, Great Value

- Intel® Pentium® III Processor at 550MHz
- 128MB SDRAM at 100MHz
- 13.6GB[4] Ultra ATA Hard Drive
- *NEW* 17" (16.0" vis, .28dp) E770 Monitor
- *NEW* 16MB ATI RAGE 128 Pro Graphics
- 48X Max[8] Variable CD-ROM Drive
- Yamaha XG 64V Wavetable Sound
- harman/kardon HK-195 Speakers
- V.90 56K Capable[11] PCI Telephony Modem for Windows

$1499 As low as $41/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-500114s**

Dell Recommended Upgrade:

- 17" (16.0" vis, .24 -.25 AG) P780 FD Trinitron® Monitor
- Turtle Beach Montego® II A3D™ 320V Sound Card with MusicMatch® Jukebox Standard[38]
- 1-Year Dellnet℠ Internet Access[14] Service with 20MB of Online Backup[15]
  Add $229 E•VALUE CODE: 04249-500117v

DELL® *DIMENSION*® L500r Desktop

Affordable Desktop Solution

- Intel® Pentium® III Processor at 500E MHz
- 64MB SDRAM at 100MHz
- 6.4GB[4] Ultra ATA Hard Drive
- *NEW* 17" (16.0" vis) E770 Monitor
- Intel® 3D AGP Graphics ■ 48X Max[8] Variable CD-ROM Drive
- SoundBlaster 64V PCI Sound Card with MusicMatch® Jukebox Standard[38]
- harman/kardon HK-195 Speakers
- V.90 56K Capable[11] PCI DataFax Modem for Windows

$1199 As low as $33/Mo., for 48 Mos.[33]
E•VALUE CODE: **04249-500111**

Dell Recommended Upgrade:

- 13.6GB[4] Ultra ATA Hard Drive
- Altec Lansing ASC-340 Speakers with Subwoofer
- 1-Year Dellnet℠ Internet Access[14] Service with 20MB of Online Backup[15]
  Add $189 E•VALUE CODE: 04249-500114u

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on line conditions. Analog phone line and compatible server equipment required. [14]Includes 150 hours Internet access per month, with $1.50 per hour charge for each hour (or fraction thereof) over 150 hours. Remote subscribers subject to additional charge of $4.95 for each hour of Dellnet service. Excludes applicable taxes and local/long distance telephone access fees or charges. Additional $1.00/hour surcharge for Dellnet service in HI and AK. [15]Online backup services are provided by a third party, and such services are provided subject to terms and conditions between such third party and the customer. Limited to 20MB of online storage; additional storage space available at additional charge. Dell disclaims any responsibility for lost customer data. [22]Software, packaging and documentation differ from retail versions. [35]For select Hewlett Packard printers. [37]Limited time offer. Includes one (1) DVD title (max. $20.00 total value, including tax and shipping charges) with purchase of a new Dell system with a DVD-ROM drive. Internet access required to register for the offer; see details at www.dell.com/dellzone. Offer must be redeemed within 60 days from the date of system invoice. [38]Includes one (1) upgrade and online technical support from MusicMatch. [42]To achieve 75GB Max. hard drive capacity on the Inspiron 7500, you must purchase a 25GB internal primary hard drive and the 25GB HDD option for both the 2nd and 3rd hard drive bays. Note that the Inspiron 7500 notebook must be used on AC power when utilizing the 75GB Max. hard drive configuration. [43]2.4X Min. [44]Only available for use with Windows 98 and Windows 95 desktop systems (no Apple computers). Simultaneous access to the Internet may reduce access performance. There is no ability to use the phone or receive calls when using dial-up connection to the Internet. [46]13.8X Min. [47]Based on Intel AGP 4X Graphics Test and Platform Bandwidth Test. Intel, the Intel Inside logo and Pentium are registered trademarks and Celeron is a trademark of Intel Corporation. MS, Microsoft, IntelliMouse and Windows are registered trademarks of Microsoft Corporation. 3Com is a registered trademark of 3Com Corporation. HP and DeskJet are registered trademarks of Hewlett Packard Corporation. ©1999 Dell Computer Corporation. All rights reserved.

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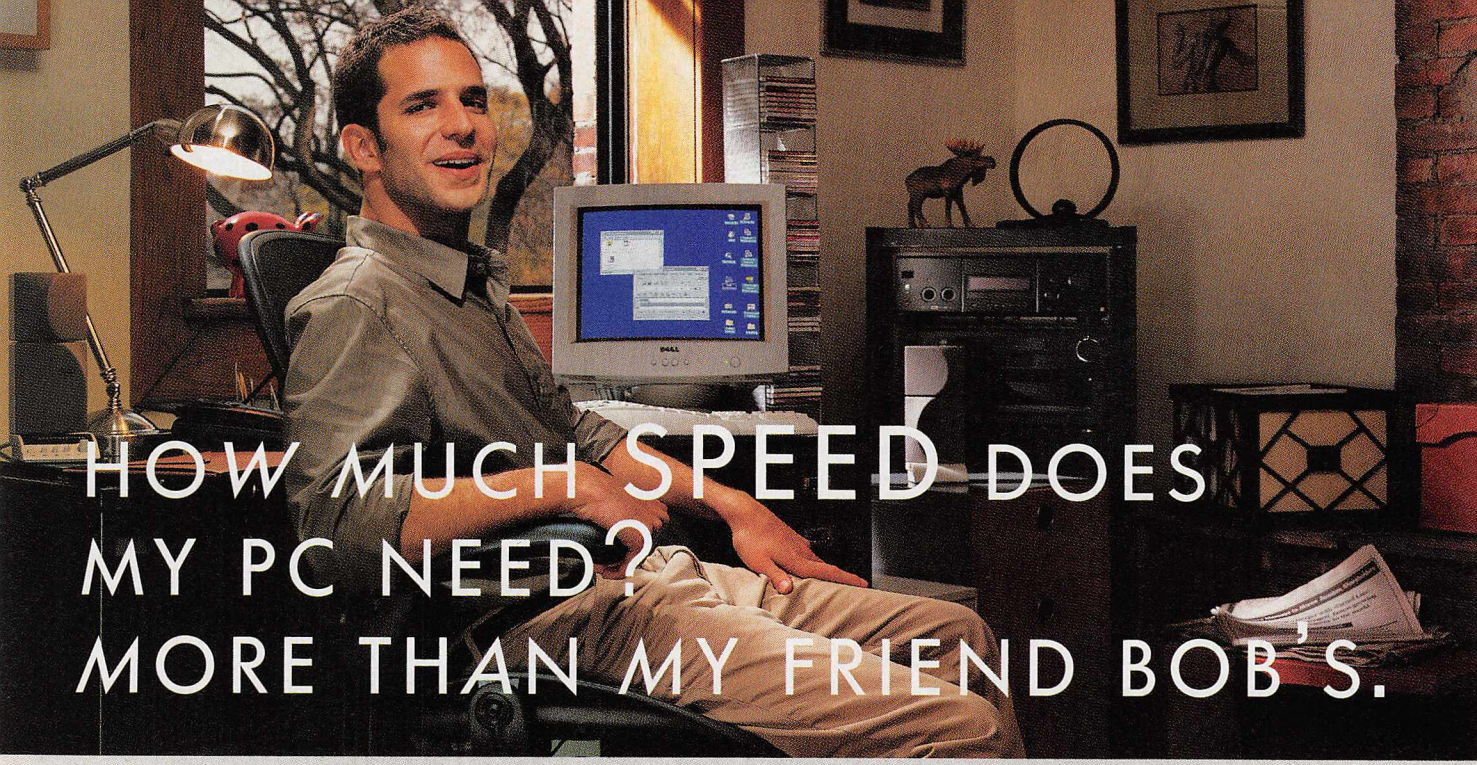
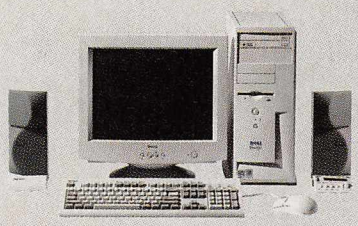


HOW MUCH SPEED DOES MY PC NEED? MORE THAN MY FRIEND BOB'S.



Congratulations. You just left Bob and his computer back there about a half a mile, standing in a cloud of your dust. Meanwhile you're cruising at Mach II thanks to the *NEW* motherboard. Combined with RDRAM, it offers up to a 116% increased memory performance gain over earlier systems.[47] The result — *WHOA!* Start it up and you'll find that everything is faster, smoother, more realistic and more intense. Technology at warp speed. It's one more benefit of the Dell4me℠ total ownership experience. It's a complete resource for products and services that make it easy for you to get the most out of technology.

DELL4me℠ YOUR THOUGHTS EXACTLY.

***NEW* DELL® *DIMENSION*®** XPS B733r Desktop

The Need-for-Speed Solution

- Intel® Pentium® III Processor at 733MHz ■ 128MB ECC PC700 RDRAM at 356MHz
- 27.3GB[4] Ultra ATA Hard Drive ■ 17" (16.0" vis) P780 FD Trinitron® Monitor
- *NEW* 32MB NVIDIA geFORCE 4X AGP Graphics
- 8X Max[10] Variable DVD-ROM Drive and Decoder Card with TV Out with *FREE* $20 DVD Movie Offer[37]
- *NEW* SB Live! Value Digital with MusicMatch® Jukebox Enhanced[38]
- *NEW* Altec Lansing THX Certified ADA885 Dolby Digital Speakers with Subwoofer
- V.90 56K Capable[13] PCI Telephony Modem for Windows
- Microsoft® Works Suite 2000 with Money 2000 Basic
- Microsoft® Windows® 98, Second Edition
- 1-Year DellNet℠ Internet Access[14] Service with 20MB of Online Backup[15]
- 3-Year Limited Warranty[2] ■ 1-Year At-Home Service[3]

$2999 As low as $82/Mo., for 48 Mos.[33]
E•VALUE CODE: **04250-500129**

Dell Recommended Upgrade:

- 19" (17.9" vis) P991 FD Trinitron® Monitor ■ 34.2GB[4] Ultra ATA Hard Drive
- Microsoft® Natural Keyboard Pro, Dell® Edition

Add $389 E•VALUE CODE: 04250-500133u

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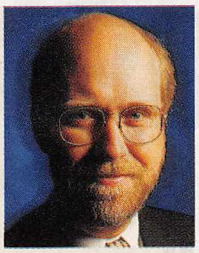
JAKE KIRCHNER

Goodbye to Y2K



Let's get back to the work of using technology to better lives and businesses.

BY ALL MEANS, LET'S FIRST BE CLEAR ABOUT THE lessons we've learned—that technology is central to modern life, that failure to plan for the long term when developing computing systems is dangerous, and that there is a hard-to-discern line between faith in technology and arrogance about our ability to manage it safely. But most important, let's get back to the work of using technology to better lives and businesses.

The optimists out there will probably figure out that *PC Magazine* publishing deadlines required me to write this before all our computer clocks turned to the year 2000. The Y2K skeptics will no doubt note that I timed this to appear several weeks after the big moment so as to be sure that any minor Y2K disruptions have been dealt with by the time you read this column.

No matter how we weathered the moment, the fact remains that Y2K and the billions of dollars of "remediation" it precipitated have been a huge but necessary distraction for the buyers and sellers of computing and Internet products and services.

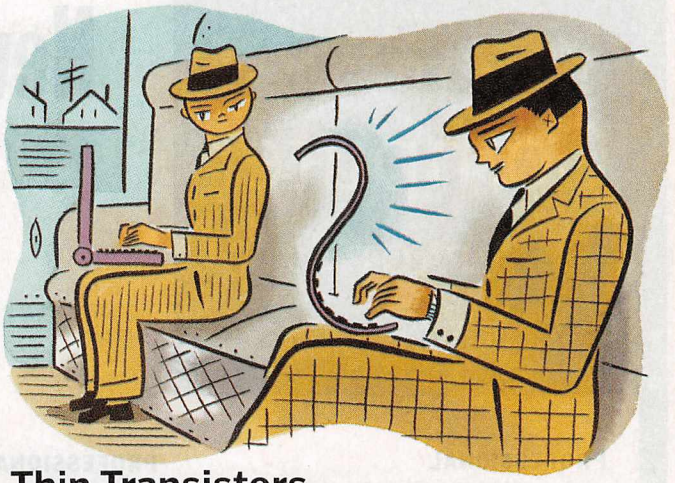
If my predictions from the last two years proved accurate and today we aren't all huddled in cold, dark homes without food or money, people will start spending on things other than Y2K preparedness. Companies that spent all their time and money during the last 18 months updating or replacing old COBOL code will turn their attention to building corporate portals and implementing e-business strategies. Small businesses that bought all new PCs and servers to be sure they would be Y2K-compliant will now start looking for software that takes advantage of their new hardware. Home computer users will have updated their BIOSs and their antivirus software and can confidently sign up for high-speed Internet options. Everyone will wonder, "Should I move to Windows 2000?"

There are two schools of thought on this question. One group says that everyone spent so much money getting ready for Y2K that there's nothing left over for this year. The other group says that computer users put off major expenditures in 1999 because they didn't want to buy products that might not be Y2K-ready. My theory is that if Y2K problems were severe, people will spend more money to fix them; if Y2K breezed by, people will have renewed confidence in technology and will continue the historical trend of spending more every year on computing and the Internet.

For what it's worth, the experts predict positive growth in spending. International Data Corp. reported that worldwide PC sales shook off the Y2K doldrums to rise 15.8 percent from the third to fourth quarter of 1999, and predicted that the sales figures for all of 2000 should be up 18.3 percent over 1999. PricewaterhouseCoopers reported that corporate IT spending among the fastest-growing U.S. companies had bounced back from a Y2K-induced slowdown in the third quarter and will increase this year over last.

I've always said that the best thing about this millennial madness was that at some point, we'd know who was right about the Y2K problem: disaster or dud? I said "dud." If I was wrong, I'll apologize. If I was right, I won't mention it, and this will be my last column on the subject. Please hold your applause.

ILLUSTRATION BY MICHAEL KLEIN



Thin Transistors

MOTOROLA RECENTLY ANNOUNCED that its researchers have developed the thinnest transistor ever, which could lay the foundation for palm-size computers and cellular phones with processors that rival those found in today's fastest desktop computers. This could lead to cellular phones with video-conferencing features and palm-size computers with streaming video and audio capabilities.

Efforts to make transistors thinner have focused primarily on thinning the silicon dioxide layer, but that approach has reached its physical limits and enticed Motorola to explore new materials. The researchers are using a class of materials called *Perovskites*, which have unique electrical properties.

Meanwhile, IBM has produced a transistor that can be sprayed onto plastic, laying the groundwork for devices such as computer displays on plastic sheets that can be rolled up and carried in your pocket. Traditionally, transistors generate so much heat that they need to be mounted on surfaces that won't melt, such as metal. IBM's flexible transistors, however, incorporate both organic and inorganic materials to reduce heat.

Mobile Web for $10 a Month

WEB-BROWSING MOBILE PHONES ARE selling fast, thanks to the attraction of getting Web information on the go. Although the phones cost more than nonbrowsing counterparts, the services aren't prohibitively expensive. AT&T Wireless Services, Bell Atlantic Mobile, and Sprint PCS are all offering packages for relatively low monthly fees, with Nextel expected to follow soon. AT&T's $29.95-per-month plan is the only one to offer unlimited Web access. Both Bell Atlantic and Sprint, however, offer packages for less than $10 a month.

Wireless Web Access

These services bring the Internet straight to your cell phone.

Company	URL	Product	What you get	Price*
AT&T Wireless Services	www.attws.com	AT&T PocketNet	Unlimited service	$29.95/month plus AT&T phone price plan
Bell Atlantic Mobile	www.bam.com	Web Access Micro-browser	Monthly bundle of access minutes shared between voice and data services	$9.95/month plus DigitalChoice voice price plan
Sprint PCS	www.sprintpcs.com	Sprint PCS Wireless	Choice of plans, starting at 50 wireless Web minutes and 50 wireless Web updates from Yahoo!	$9.99/month and up, plus Sprint PCS Service Plan ($29.99/month and up)

* As of 12/99.

THE Computer PAGE.

New Designs on Designing

PROFESSIONAL ACTIVE SERVER PAGES 3.0

by Alex Homer, Dave Sussman, Brian Francis, et al.

Experienced professionals share their programming expertise in a reference filled with the necessary code and guidelines to help you operate a site smoothly with Windows 2000.
(Wrox)

Pub. Price: $59.99
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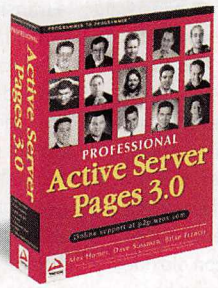
Our Price: $47.99



PROFESSIONAL JAVASCRIPT

by Nigel McFarlane et al.

Learn the vital facets of JavaScript programming from the programmers themselves. *Professional JavaScript* provides proven techniques that will make your skills matchless.
(Wrox)

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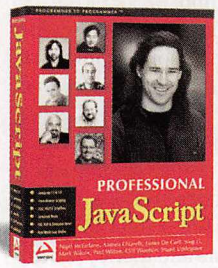
Discount **20%**
Our Price: $39.99



SPECIAL EDITION USING MACROMEDIA® DIRECTOR 7

by Gary Rosenzweig

Designers of all kinds can reap the benefits of Director 7 by utilizing this task-oriented, code-filled reference to the tool that puts graphics, text, sound, and video into one dazzling package.
(Que)

Pub. Price: $39.99
Discount **20%**
Our Price: $31.99

ORACLE WEB DEVELOPMENT TIPS & TECHNIQUES

by Bradley Brown

More than eighty percent of currently running Web sites rely on Oracle, and this one-of-a-kind guide provides developers with time-saving, real-world tips to better fuel your Internet applications.
(Osborne)

Pub. Price: $49.99
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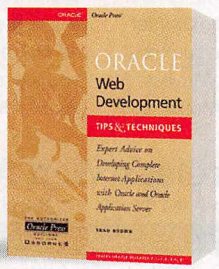

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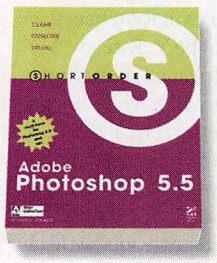

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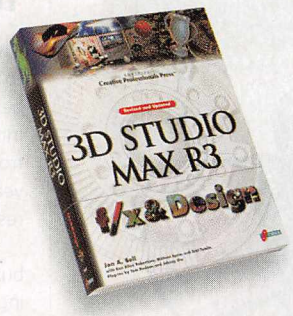

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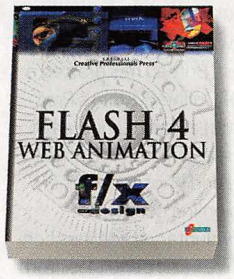

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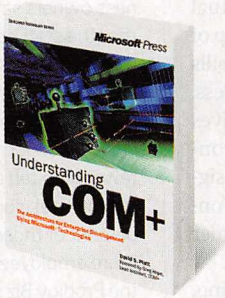

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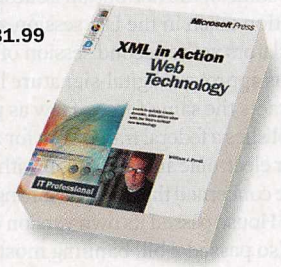

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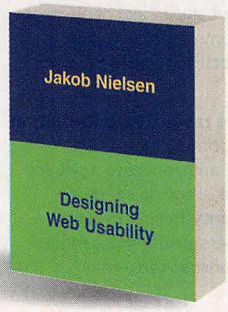

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Online Biz Better Behave

E-COMMERCE BANDITS HAD better watch out. The Better Business Bureau has drafted a Code of Online Business Practices in an effort to encourage businesses on the Web to toe the line and boost consumers' trust in online commerce.

The voluntary guidelines consist of five basic principles, from informing customers about the use of their personal information to protecting children online.

The code of conduct for e-business was drawn up in part with research from the Bureau's online arm, BBBOnLine (*www.bbbonline.org*), which has reviewed more than 5,000 commercial Web sites to determine whether they qualify for the BBBOnLine Reliability Seal and BBBOnLine Privacy Seal programs.

A CODE OF CONDUCT FOR E-BUSINESS

Principle 1:
Disclose, Disclose, Disclose.
Provide accurate information about goods or services offered through online transactions.

Principle 2:
Tell the whole truth and nothing but the truth.
Do not mislead customers about any aspect of electronic commerce, including advertising and marketing.

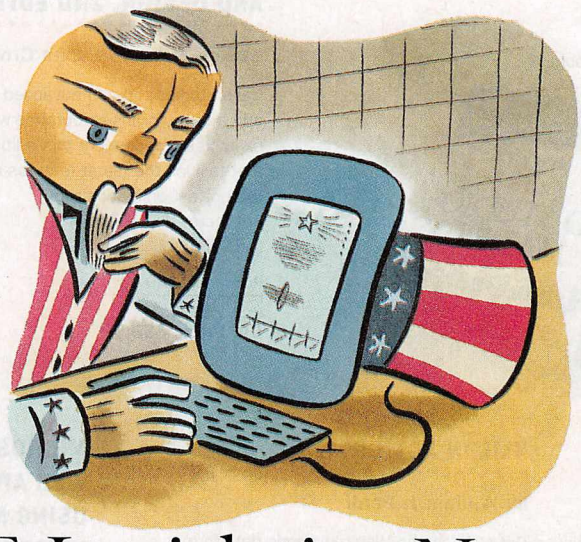
Principle 3:
Have respectful information practices.
Post and adhere to a privacy policy. Provide adequate security. Respect your customers' preferences regarding unsolicited e-mail.

Principle 4:
Aim to please.
Resolve disputes in a timely and responsive manner.

Principle 5:
Take special care with children.
Adhere to the Children's Advertising Review Unit's Self-Regulatory Guidelines for Children's Advertising.

Source: BBBOnLine. Here, the BBB's wording of each general principle is followed by our summary of the specific recommendations.

ILLUSTRATION BY MICHAEL KLEIN



E-Legislation News

Internet bills are flooding Congress as never before, with online privacy, free speech, junk e-mail, encryption, and intellectual property just some of the hot-button issues. Here's a roundup of legislative action taken in the last session and some of the bills now before legislators at the second session of the 106th Congress.

The Senate has approved digital-signature legislation that gives electronic contracts the same force of law as paper-and-pen contracts. This establishes a federal framework for accepting digital signatures and other electronic authentication within contract law. Consumer groups are concerned that this will infringe on state consumer protections. The House passed its own version of the bill last fall.

The Senate also passed a bill banning most Internet gambling, with exceptions for some fantasy sports leagues and lotteries. The bill also prohibits online advertising for some legal gambling and casinos. The House will take up its Internet gambling bill this year.

Although several bills on the table give federal funding to schools and libraries for Web filtering software, none have been enacted. The Juvenile Justice Reform Act, which also calls for filtering software for children, is currently stalled in a House-Senate conference. However, Congress isn't ignoring children's issues. The Children's Online Protection Act (COPA) Commission is studying ways to protect children from harmful online material. COPA is expected to conduct hearings and issue a report this year.

The final version of the omnibus budget bill Congress passsed last session outlaws cybersquatting—the practice of registering desirable domain names for future profit—by imposing a fine of up to $100,000 for the "bad faith" registration of domain names. Free speech advocates are concerned that this will harm small Web sites and undermine the Internet Corp. for Assigned Names and Numbers, a nonprofit corporation formed to assume responsibility for domain name issues. ICANN has been trying to institute dispute resolution policies.

Congress took no action last term to tackle junk e-mail, medical records privacy, and general online privacy. However, several bills under consideration call for regulating unsolicited e-mail and banning online alcohol and gun sales. Legislators are also working on a set of rules to protect the privacy of personal health records.

The Electronic Rights for the Twenty-First Century Act (introduced by Democratic senator Patrick Leahy of Vermont) is an effort to set standards regarding law enforcement officials accessing information about people's locations and regarding the right for people to use and sell encryption products. The Online Privacy Protection ➤

Small Biz Heads To the Web

SMALL BUSINESSES ARE FLOCKING to the Web in increasing numbers, with 37 percent having Internet presences in 1999, up from 10 percent the previous year, according to market research firm IDC.

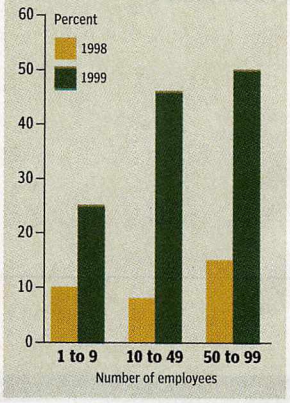
So why are so many small businesses holding off on building Web sites? According to a recent survey sponsored by Prodigy Biz, two-thirds of small business owners say the Web doesn't offer them significant opportunities for growth, because they're running local businesses.

But other factors are involved, too. Many small business owners say they have neither the staff nor the time to maintain Web sites. And the smaller the company, the less likely it is to have a Web site. One in four companies with fewer than ten employees is on the Internet, compared with 50 percent of those with ten or more employees, according to the Prodigy Biz survey.

When asked how they'd use the Internet, respondents said their primary activities would be promoting to prospective customers, conducting e-commerce, and providing better customer service.

Big Gains for Small Biz

Some 37 percent of all small businesses have Web presences, compared with 10 percent a year ago.



Source: IDC and Prodigy Biz, 1999.

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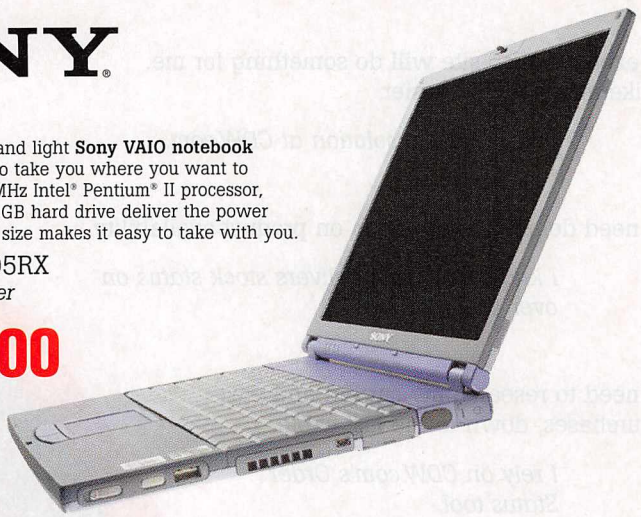

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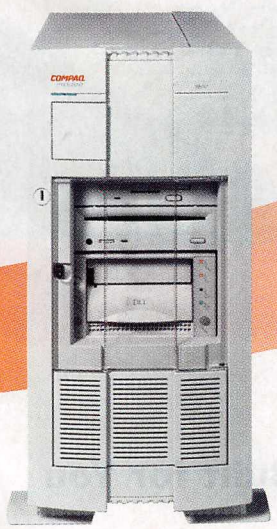

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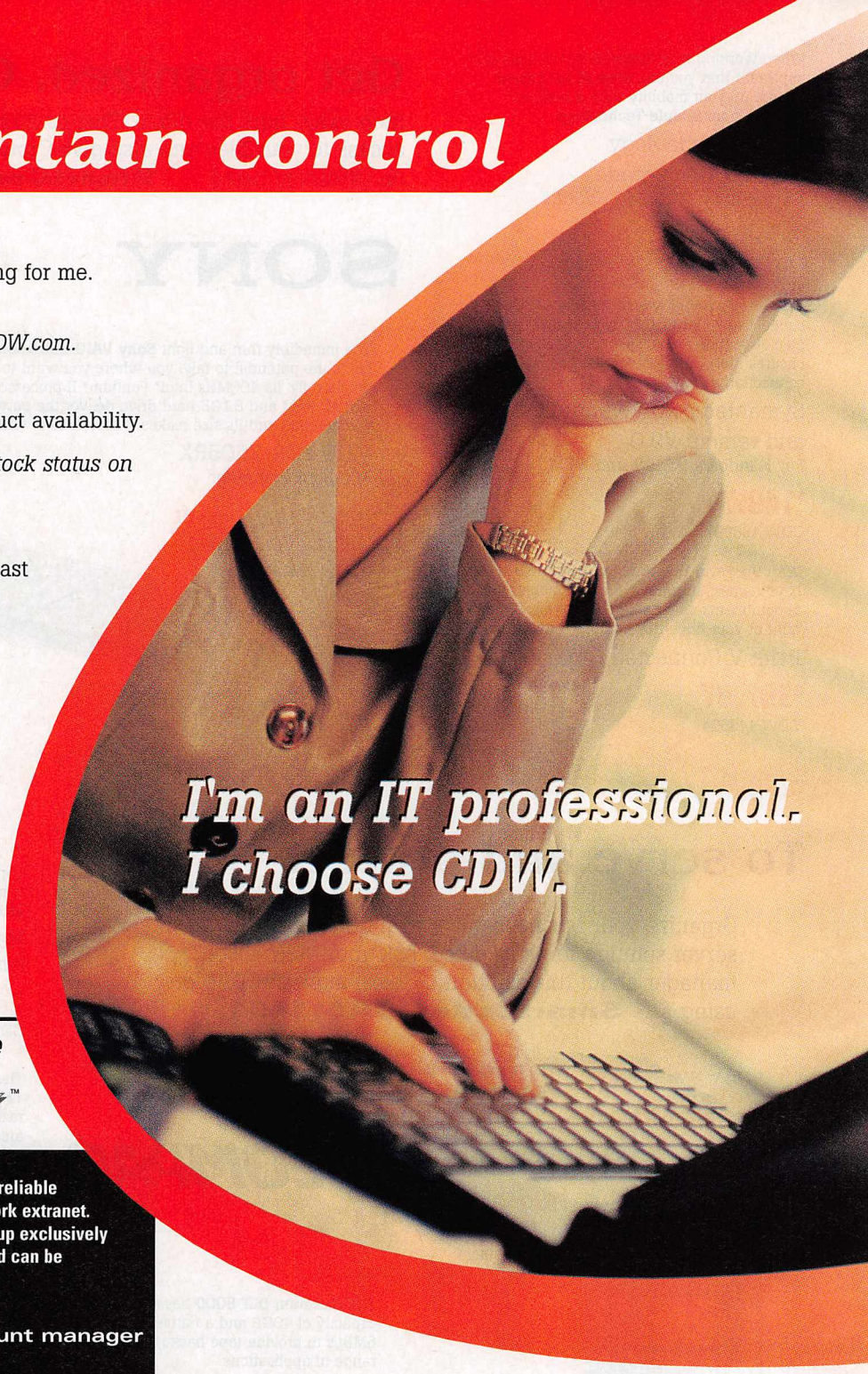

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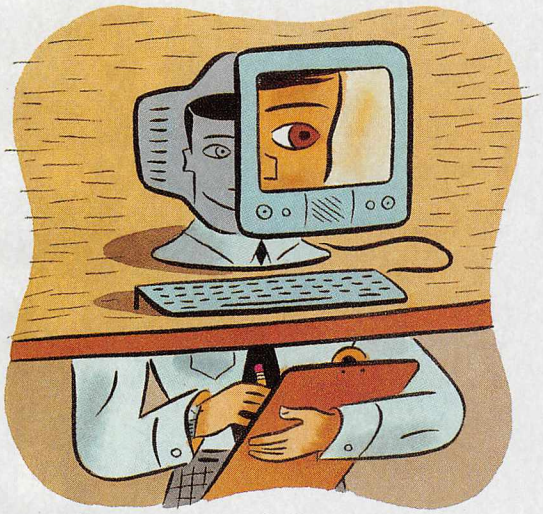
Legislation Continued

Act (introduced by Conrad Burns, Republican senator from Montana, and Ron Wyden, Democratic senator from Oregon) calls for posted privacy disclosures, gives consumers access to their personal data, and lets them choose not to release information to third parties.

The Center for Computers & Democracy maintains an up-to-date guide on pending legislation affecting the Internet at *www.cdt.org/legislation.*



Web Profiling

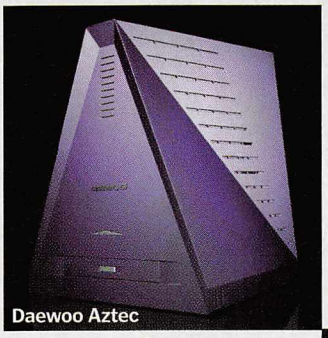
As online privacy issues have grabbed headlines in recent months, it's apparent that marketers are collecting far more information about our online shopping and surfing habits than most of us realize. A large group of companies, ranging from Compaq and Oracle to Net Perceptions and Andromedia, is working on a new standard, dubbed CPEX (Customer Profile Exchange), for how consumer information is collected and shared.

Unlike most of the current efforts to collect information about customers' surfing and shopping habits, CPEX is designed on an open-source model where customers may have new levels of control over what personal information they allow to be disseminated. In other words, the backers of CPEX claim they aren't saying, "We're secretly going to stash personal information about you." Instead, they claim they're saying, "We're going to collect the information, and you're invited to the party."

Internet privacy issues have been in the spotlight recently. Sony Entertainment recently had a problem when a glitch permitted advertisers to obtain the e-mail addresses of subscribers to its InfoBeat e-mail service. Likewise, RealNetworks got into trouble for capturing and tracking data about the music files (such as MP3 files) that its customers downloaded.

The newly proposed CPEX standard for collecting online surfing information is designed to integrate online and off-line customer data in an XML-based format for use by marketers. Without a doubt, the backers of CPEX are in the business of collecting and sharing information about shopping habits. At the same time, CPEX is unique among approaches to collecting consumer information on the Web, in that the open-source model for the proposed standard might allow consumers to take some control over what marketers collect.

ILLUSTRATION BY MICHAEL KLEIN



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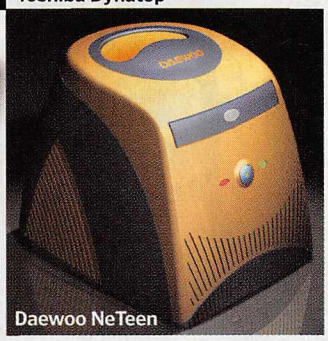

Daewoo NeTeen

Concept PCs Get Real

AT LAST SPRING'S INTEL DEVELOPER Forum, Intel showcased several concept PCs in an effort to shake up the world of computer design. Some of them are now in production, shipping initially in Asia.

Why now? Because all the pieces have fallen into place. They're built with compact motherboards, USB ports, and ease-of-use features geared for home users. Perhaps U.S. manufacturers will take note of these new eye-catchers. Can similar systems from Compaq, Dell, Hewlett-Packard, and IBM be far behind?

The Search Continues

AS THE WEB HAS GROWN, THE PATHS search engines take to retrieve information have proliferated. As a result, evaluating search engines has become increasingly difficult.

A number of criteria can be applied when analyzing a search site's performance. *PC Magazine*'s recent search site roundup (October 5, 1999) used several criteria to find the best sites for directory searches, research, and all-purpose searches. The search engines themselves have not been particularly helpful in providing regularly updated, reliable statistics about how they work.

Search engine	Number of Web pages indexed
Northern Light	200,352,984
Fast Search	192,647,990
AltaVista	191,213,426
Google!	126,264,723
Answers	78,739,024
iWon Inktomi	78,068,018
Excite	71,195,996
Yahoo!'s Inktomi	68,882,184
AOL Inktomi	68,002,936
Lycos	55,462,074
Infoseek	52,454,119
Snap	50,603,069
HotBot	39,334,805

Source: Search Engine Showdown, November 29, 1999.

Enter Greg R. Notess, a reference librarian for Montana State University. Notess has created a Web site called Search Engine Showdown (*www.notess.com/search*), which provides statistical analyses of the leading search sites. His methods involve examining the results of 25 different searches across each search engine.

Based on his most recent analysis (run on November 29, 1999), the current leader in number of Web pages indexed is Northern Light, followed by Fast Search and AltaVista.

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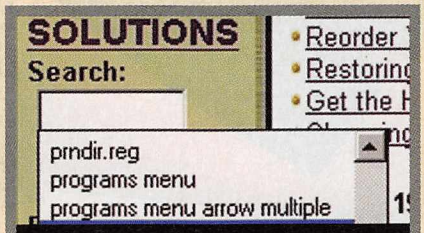
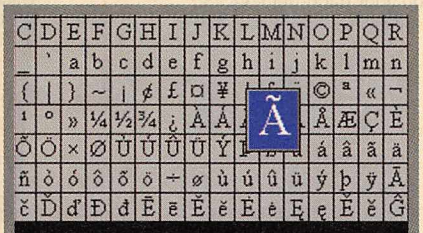


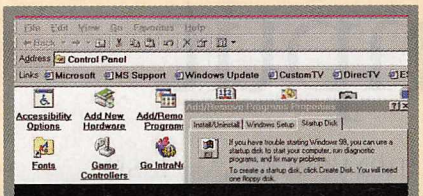
INTERNET

The pluses and minuses of Internet Explorer's Auto-Complete feature. 105



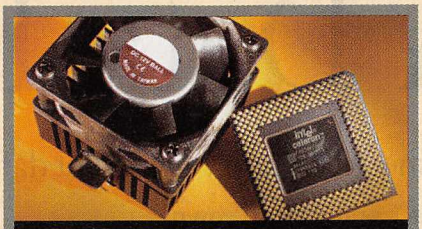
OFFICE

A quicker way to enter foreign characters and symbols in Microsoft Word. 111



DESKTOP

Windows 98's Emergency Start-Up Disk is an indispensable tool for recovering from system crashes. 113



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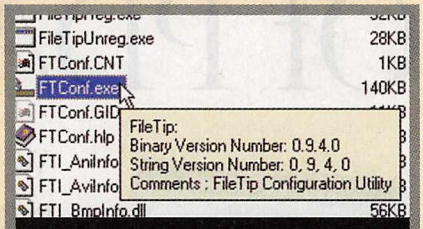

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www.pcmag.com/solutions

You'll find all of the articles, examples, and code files mentioned in this section at Solutions online.

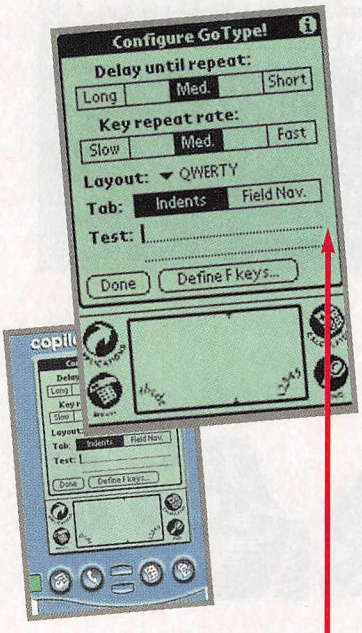
ILLUSTRATION BY CATHIE BLECK

Simplify text input on your PDA.
External keyboards like these offerings from LandWare and Hewlett-Packard take the tedium out of entering and editing data on your hand-held device.

Take the Tedium Out Of PDA Data Input

We show you two ways to get data into your PDA—fast!

By Bruce and Marge Brown



Customize the GoType! keyboard.
You can use the included application software to choose, for example, between QWERTY and Dvorak layouts.

One-handed PDAs like Palm organizers and Windows CE palm-size PCs are great for storing personal data and notes, but entering data can be exceedingly tedious. Devices in this category come with character recognizers for data input (Graffiti on the Palm devices and CIC's Jot on the Windows CE units) plus miniscule on-screen virtual keyboards on which you can tap single letters, but neither is great for rapid or lengthy entries. Fortunately there are alternatives to speed up data entry on both of the major PDA platforms, including both an external keyboard and a clever software-based data-input alternative.

No single input method appeals to every user, but external keyboards have the advantage of familiarity and speed. If using an external keyboard with a PDA sounds silly, adding convenience at the expense of portability, remember that you can always use the PDA's internal character recognizer while on the go and leave the keyboard in your hotel room or office for more extensive data entry and editing. LandWare sells two portable keyboards for Palm organizers: the LandWare GoType! ($80 direct, *www.landware.com*) for the PalmPilot, Palm III, Palm IIIx, and Palm VII, and the GoType! Pro ($90 direct) for the Palm V. The HP External Keyboard ($79 direct, *www.hp.com*) works with several HP Windows CE PDAs, including the palm-size HP Jornada 420 and 428 and the hand-held Jornada 680 and 680e.

If you don't want yet another piece of gear to lug around, Tegic Communications' program T9 Text Input ($40 direct, *www.tegic.com*), available for both Palm organizers and Windows CE devices (and also used on many smart digital cell phones), is a surprisingly easy alternative used with a PDA's touch screen. T9 is a trainable linguistic database application with an intelligent virtual keyboard that uses the alphabet character groupings on telephone keypads and guesses words and names quickly as you tap the character groups. A new utilization of a fairly familiar interface, T9 is fast and even fun to use.

Whether you stick with the standard entry methods or use an alternative hardware or software accessory, the variety of data input methods for PDAs should mean that everyone can find one or more ways to be more efficient and comfortable.

PHOTOGRAPHY BY THOM O'CONNOR

PALM ORGANIZER PORTABLE KEYBOARDS

The GoType! and Go Type! Pro keyboards are lightweight (11 ounces each) and share a sleek design with a fold-down lid for easy portability. The keyboards are nearly identical in size: The GoType! measures 0.8 by 10 by 4 inches (HWD), and the GoType! Pro measures 1 by 10 by 4 inches. With GoType! Keyboards, you have the option of entering data exclusively from the keyboard or in conjunction with the Palm organizer's virtual keyboard and Graffiti characters. The GoType! keyboards support Palm applications running on Palm OS 1.0 or higher. You cannot use either keyboard with a modem connection and the GoType! application must be disabled in order for a modem to operate.

The Palm organizer docks in the center of the keyboard, requiring no cables or separate keyboard batteries. The keyboard draws a low level of power from the Palm organizer's batteries. The GoType Pro! includes a serial port and cable for direct synchronization from the keyboard dock to a computer. The direct PC connection with the Pro! model is a plus, because you don't have to carry a cradle and a keyboard in your bag. Users can also recharge their Palm V batteries while the device is docked in the GoType! Pro keyboard.

The GoType! includes a 19K driver application for the Palm organizer, which is installed via the Palm Install Tool with a HotSync. To enable the GoType! driver, you tap the enable command on the GoType! screen.

Once the GoType! is enabled, you can start data entry via the keyboard. The sliding foot on the back base of the unit keeps the keyboard, with a Palm organizer docked, very steady for constant keying. The rectangular keys—spaced 17 mm, center to center—are comfortable and quiet (standard desktops and most notebook computers use 19-mm spacing). There is no perceptible delay between the keying action and the screen response.

The GoType! application provides a few settings for keyboard customization. You can select either a QWERTY or Dvorak layout, and the Tab key is configurable to either move to the next field or generate a tab space. The settings for key repeat rates and delays are less useful.

Productivity gains are possible if you take advantage of the GoType!'s function keys, which you can set to launch up to 24 Palm applications or functions with combinations of Shift and Alt keys. The keyboard has six prominent, green function keys—three on either side of its docking port—labeled Memo, Address, To Do, Date Book, Mail, and Find. You can use the keys as labeled or reprogram them; each key can launch four different commands.

There are useful GoType! shortcut key combinations for scrolling, selecting text, or exiting a screen. One of the most useful is combining the Command key with the key for the first character of a menu command. For example, if you are entering an appointment and you key Command-D, the *Event Details* screen appears. The GoType! also supports international characters and keying special characters like fractions and symbols. The GoType! Pro keyboard adds Caps and NumLock key enhancements.

The GoType! doesn't replace the need to tap the Palm screen for navigation, but with smart use of its function keys, you can transfer the bulk of your data input and navigation keying to its keyboard.

WINDOWS CE EXTERNAL KEYBOARD

The HP External Keyboard has a soft pouch, instead of a lid, to protect it for mobile use. It's a space- and weight-saver, at 0.9 by 9.8 by 5 inches, and it weighs only 9.8 ounces. The layout of the square, 17-mm–spaced keys in QWERTY format feels spacious and is quite adequate for rapid data entry. Like the GoType!, the External Keyboard requires no batteries; it connects to your HP device via serial cable.

Before you can use the HP keyboard, you need to install the driver program by downloading it from a PC to your PDA. As long as the keyboard driver is installed on your hand-held computer, the driver is automatically enabled any time you connect it to the External Keyboard. A keyboard icon in the status bar indicates whether the keyboard is operational. In keyboard "on" mode, you can leave the External Keyboard connected and still switch to an alternate input method such as the built-in virtual keyboard. *Sleep* mode displays when the serial port is being used for the PDA's PC connection and the External Keyboard is disabled.

You can either double-tap the keyboard icon or tap the top right key on the External Keyboard to launch the keyboard configuration screens for *Text Macros, Date and Time Stamp,* and *Function Keys.* Text macros are used for storing frequently used strings of text and symbols for insertion in documents with two keystrokes. You can program up to 26 macros of 1,026 characters each, using the input shortcuts Fn-A through Fn-Z.

Using the External Keyboard's function keys is a quick way to launch applications and program functions, such as Cut and Paste. You can assign 16 special functions with the F1 through F8 keys and Ctrl-F1 through Ctrl-F8 keys. There are eight default functions that match the icons on the eight keys on the top row of the keyboard, including *Launch Inbox, Calendar, Contacts,* and *Tasks.* You can customize any of the 16 functions and restore the eight default settings with a single keystroke. If you use the default settings, you get four bonus functions for creating new e-mail, a new calendar event, a new contact, or a new task.

Some of the additional External Keyboard

Double-Duty Devices

If you're getting tired of carrying too many electronic devices, each intended to enhance one part of your professional or personal life, combination electronics can cut your load. No single device has yet come to market that ably replaces a separate cell phone, pager, PDA, and voice recorder—but the Nokia 9000 Communicator series (*www.nokiausa.com*) comes the closest so far. The problem is that it's too heavy and bulky for general-purpose users. One recently introduced combination is the Motorola StarTac cell phone used with a Starfish TrueSync clipOn PDA (*www.motorola.com, www.starfish.com*), which combines the popular, tiny cell phone with a capable contact-reference and dialing device.

Another notable combination is the Palm organizer models used with Synapse Pager Cards (*www.palm.com*) that add paging and PDA functions. The QualComm PDQ, a combination cell phone and PDA based on the Palm platform, should come to market later this year, along with a number of cell phones that sport added smart features that mimic PDA functions.—*BB*

Lighten Up

Help! I have to carry around too many cables and connectors for my notebook PC and cell phone. What I hoped would be a convenience is turning into a hassle. How can I lighten my load?

BILL STROM
Chicago, Illinois

If you rely on your portable computer and your cell phone and take them with you everywhere, one way to simplify your cable hell is to get the PORT Universal Auto/Air Power Adapter ($120 direct, *www.port.com*), which can be used to power both notebooks and cell phones. This bimodal device plugs into the 12-volt cigarette lighter sockets found in most cars and boats and, when you remove an outer housing, into the Empower power jacks installed on some airline seats.

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The 6.4-ounce Universal Auto/Air Power Adapter comes with three power tips, enabling connections with many Compaq, HP, IBM, and Toshiba notebooks. Model-specific adapters are available for some Dell notebook models as well. PORT also sells a wide variety of tips ($10 each, direct) to fit cellular phones from Ericsson, Motorola, Nokia, and QualComm.—*BB*

Combo Cards for Notebooks

My notebook PC has only one PCMCIA slot, which I've been using for a modem card. But my company recently installed a network and now wants me to use a combo card. What is a combo card, and are there any drawbacks to using one?

ALBERT RHODES
via the Internet

A PCMCIA (or PC Card) combo card incorporates a modem and a network interface card (NIC) in a single unit. Such cards offer the advantages of both modem and network connections while using only a single slot, making them ideal for one-slot computers. They are also convenient for notebooks with two slots, as they let users keep the second slot free for other peripherals such as Flash RAM units and adapter cards.

Make sure the card comes with drivers for your notebook's operating system. If your notebook does not have a 32-bit CardBus PC Card slot, be sure that your company gives you a 16-bit combo card, because a 32-bit card (while capable of faster throughput) won't fit in a 16-bit slot. On the other hand, 16-bit cards work fine in 32-bit slots.

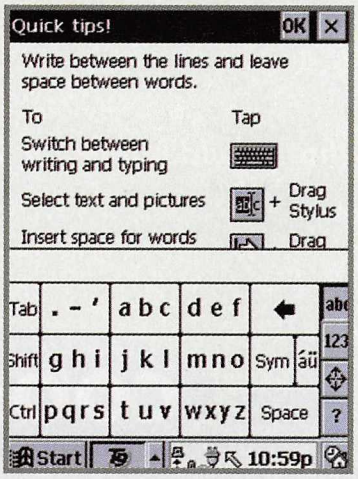
Combo cards are available from many manufacturers, and most use detachable short cables with industry-standard telephone and NIC ports on the ends. These cables, called dongles, are yet one more accessory to keep track of. This is probably the biggest drawback of using combo cards; integrated ports that don't require dongles would be an advantage.—*BB*

keys that simplify input include a Task Switch key to toggle to the next active application, an OK key to save content, a Cancel key to cancel content, and Num and Caps Lock keys. Two-key combinations are used for displaying Help screens, entering international characters and symbols, and accessing four character libraries—Math, Greek, Dingbat, and Miscellaneous.

The HP External Keyboard for PDAs is a useful tool for enhanced productivity when mobile or at the desktop.

T9 TEXT INPUT

Tegic's T9 Text Input (177K) installs via PC download on a Palm organizer with the Palm Install Tool and on a Windows CE P/PC with Windows CE Services. With surprising speed and accuracy, it converts ambiguous keystrokes to the most likely words and punctuations. The T9 program is also used on wireless telephones for entering text and will be integrated in other types of wireless devices, such as pagers and remote controls, so the time required to learn it will likely pay off in other areas. T9 Text Input is available in ten languages other than English and works with all Palm OS and Windows CE applications that accept text input.



T9 Quick Tips are available online for easy reference.

To enable T9 on a Palm organizer, you tap the *abc* dot in the Graffiti area, enter the Graffiti command */K,* or set the full-pen stroke to pop up the T9 keyboard.

On a Windows CE device like the Philips Nino 300, you select T9 from the menu of input options to the right of the *Start* button.

T9's keypad resembles a nine-key telephone keypad—hence the name, an abbreviation for *text on nine keys.* There is a key for quick entry of periods, dashes, or apostrophes; the Sym key leads to more punctuation marks and symbols. T9 has additional keypads for numbers, international characters, and navigation.

Above the keypad is the text-input field where words are formed. There are two user preferences, one for the font size (small or large) and one for the keypad size (minimum and maximum—actual size depends on the PDA operating system).

To input a word, you tap anywhere on the key for each letter in the word. T9 immediately displays possible letter combinations across the text input field. The letter combinations can look strange, as T9 narrows the word choices to one, which it displays on the left side of the input field. If it is correct, then you tap the Space key and move on to the next word. Deletions are fast with T9. Tap the back arrow to delete the previous letter. Tap the back arrow key and the Shift key to delete the previous word.

For example, to input the word *read* you tap the keys *pqrs, def, abc,* and *def.* T9 correctly displays *read* as the intended word and shows other four-letter combinations that are not actual words. (T9 has no spell-checker.) You simply tap the Space key to input *read.*

To input *cards,*you tap the *abc, abc, pqrs, def,* and *pqrs* keys. This time, T9 offers *cases* as its first word choice and displays *cards* as the second choice. It also offers other possible words on a list, such as *bases, cares,* and *acres.* To input your word, tap on the word *cards* and then hit the Space key.

If T9 cannot derive any word choices from your input, it beeps. T9 automatically recognizes more than 60,000 English words and provides space for you to add up to 2,000 additional words in its T9Words file. Adding a word to the database is a simple process. On the right side of the text-input field, T9 records your exact-letter choices, or the actual letter on a key that you tapped. For instance, if you want to add a specific URL to the database, you tap its exact letters until the entire Internet address appears on the right side of the text-input field. Tap the completed word and it is stored for reuse. The next time you want to input it, you do not need to type the exact letters. Just tapping on the associated keys will cause the URL to appear as a word choice for your selection. Infrequently used words are automatically deleted from the T9Words file to make room for new entries.

On a Palm organizer, you can use Graffiti and the virtual QWERTY keyboard in tandem with T9 Text Input. With T9 enabled, you can advance a line, delete and add characters, add a space, and use Graffiti shortcuts and commands. Words used with these other input methods cannot be added to the T9Words file, but the capability of combining tools provides maximum input flexibility.

With minimal practice, you can become facile with T9 Text Input as your primary data-input tool, even if you are not adept with a standard keyboard.

Bruce Brown is a contributing editor of PC Magazine. *Marge Brown is a frequent contributor.*

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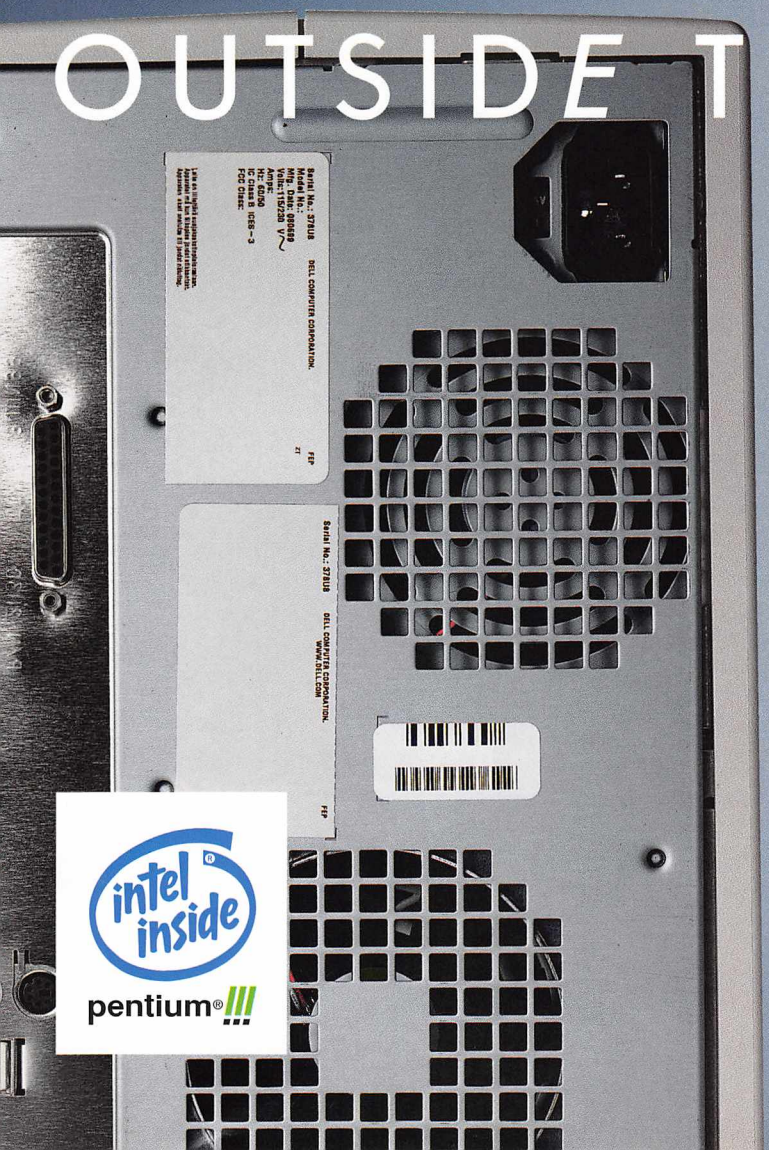

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AutoComplete for Web Forms—Is It Safe?

It's great to have your browser take over some of the burden of remembering your personal information—or is it? **By Neil J. Rubenking**

Picture this scenario. You visit *www.eDelicatessen.com* for the first time and put a case of Major Squiffy's Artichoke-Eggplant Relish in your shopping cart. You click the checkout button and note with relief that you have entered a secure Web site. You click on the credit card field, type the first digit of your credit card number, and recoil in horror! Your entire credit card number has suddenly appeared in a pop-up window! Has the site's security been compromised? Are teenage hackers even now ordering naughty videos using your credit card? Don't panic: You've just experienced Microsoft Internet Explorer 5's AutoComplete for Web forms.

HOW AUTOCOMPLETE FOR FORMS WORKS

The Web-based form you see in your browser is defined by commands in the page's source code. Each input field on the screen is defined and named by a command in the source code. The internal name is usually similar to the descriptive label that appears next to the input field, but without spaces. For example, a field labeled "First name" might be called `first_name` or `firstname` internally. IE5 uses the internal field names to index its repository of AutoComplete data. As long as AutoComplete for forms is enabled, IE5 notes the values you enter in each field when you complete a form, encrypts them, and records them in the Registry.

The next time you encounter a field with the same internal name, whether in the same Web form or a completely different one, IE5 readies the list of responses associated with that internal name. As you start typing, it pops up a list of all previous responses that begin with the letters you've typed so far. Each additional letter narrows the list of choices. You can click on one of the listed responses to select it, or you can press the Down Arrow to highlight the response you want and then press Enter.

If you click on a blank input field and press the Down Arrow immediately (before typing anything), IE5 will list all of the stored responses for that field, as shown in Figure 1. You may notice misspellings or other errors in this list, since IE5 stores whatever you've typed in that field, right or wrong. To remove an erroneous entry, press the Down Arrow to highlight it and then press the Del key.

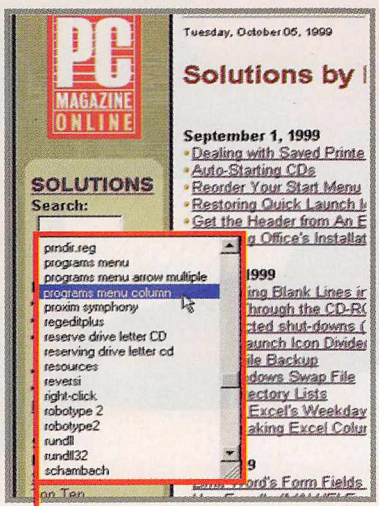

FIGURE 1: IE5 can help you fill in Web-based forms by displaying values you've entered previously.

OTHER TYPES OF AUTOCOMPLETE

IE5 also offers automatic completion of Web addresses. After you've typed a few characters in IE5's address bar, a drop-down list of matching addresses will appear. IE5 matches what you've typed, without regard to uppercase or lowercase, against the domain name and against the portion following *www*. Local filenames that you've loaded via IE5 can also match. For example, a lone *c* would match *http://www.city.davis.ca.us*, or *http://cgi.zdnet.com*, or *file:///C:\windows\temp\att-1.htm*. As you continue typing, the list shrinks to match. If the URL you intended to type appears in the list, just click it. AutoComplete for Web addresses draws the URLs for its list from your Favorites and History folders, as well as from recently typed addresses.

Slightly more alarming is AutoComplete for passwords. When this feature is enabled, IE5 remembers the user names and passwords you enter for password-protected Web sites. The next time you visit the same site and select the same user name, IE fills in the password for you. Most users will want to disable this feature.

CONTROLLING AUTOCOMPLETE

You probably don't remember this, but the very first time you submitted a Web-based form under IE5, it asked you a question: AutoComplete remembers entries in Web forms,

Back Up to the Internet

It seems as though I should be able to use the Internet to protect my data from disaster. Do you have any suggestions?

TOM CHANG
Tucson, Arizona

You'll probably want to continue with your local backups for the sake of convenience and price, but for extra data protection, check out Internet-based backup services. If you have a recent backup saved to an external site, you will be able to access your data even in the event of fire, flood, or vandalism. Companies such as Atrieva (*www.i-filezone.com*) and @Backup (*www.@backup.com*) provide Internet-based data backup services, with pricing based on total storage used. Current prices for storing up to 100MB of data are $9.99 a month with Atrieva and $99 a year with @Backup. Both companies also let you try their services at no cost, via 10MB free storage with Atrieva and a 30-day free period with @Backup.

With your data backed up remotely, you can recover quickly from PC or office disasters by logging onto the Internet from any new location to access your data. If the weather report for the next day is threatening, you can even prepare to work at home by backing up your most recent work files to the Internet.—*Bruce Brown*

Choose Your AutoSearch Provider in IE5

With Internet Explorer 4, if I typed keywords in the *Address* toolbar and pressed Enter, IE would automatically launch the search engine of my choice. That option doesn't work the same under IE5, and its default search engine is just not my favorite. After tinkering a bit, I found out that in IE5, the customization is in the *Search* bar. Just click the *Search* icon on the toolbar, then click the *Customize* button when the *Search* bar appears.

FREDERICK MICHAEL OUANO
Houston, Texas

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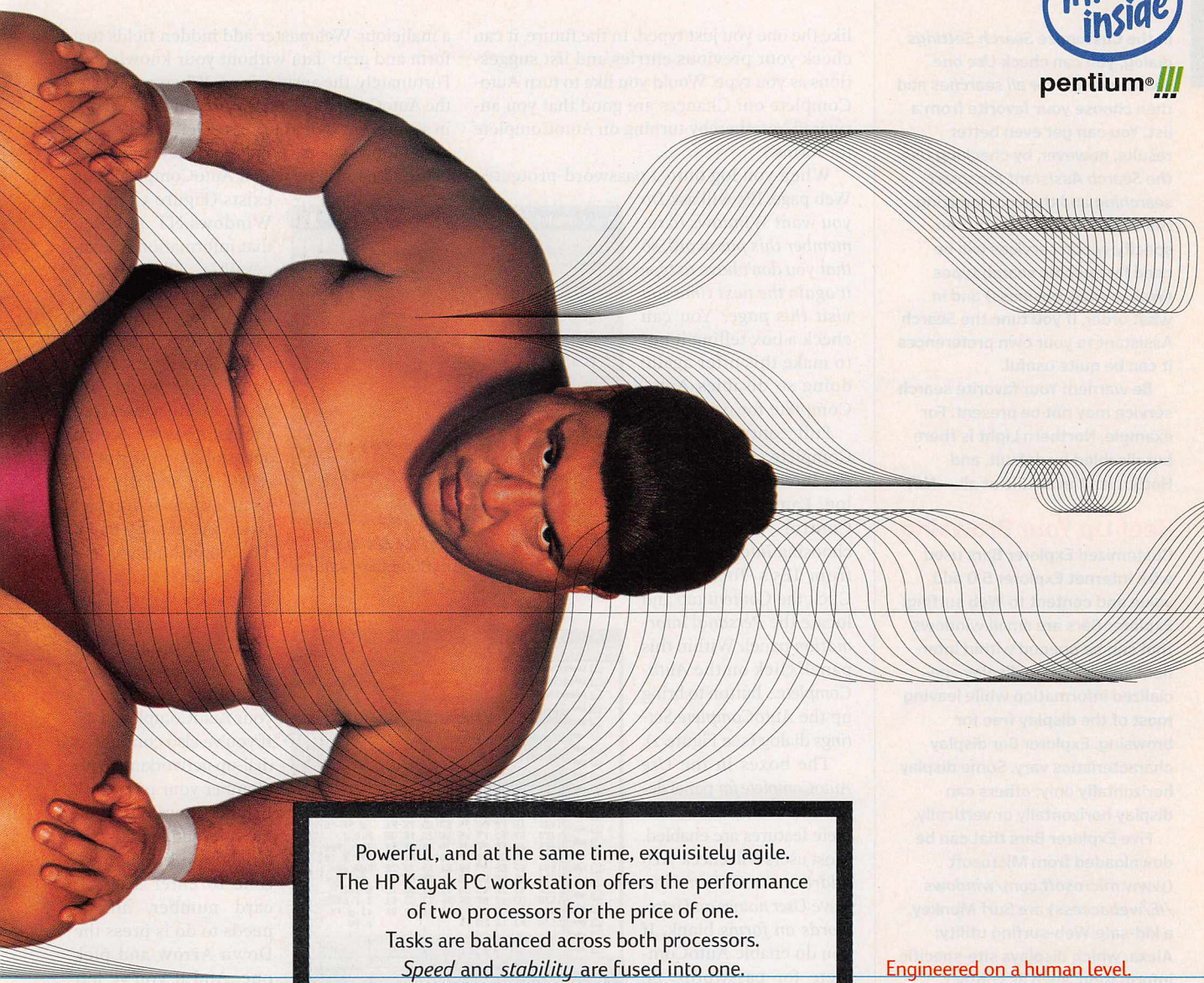

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In the *Customize Search Settings* dialog, you can check *Use one search service for all searches* and then choose your favorite from a list. You can get even better results, however, by checking *Use the Search Assistant for smart searching* and then customizing the Search Assistant. You can specify which services will be used for specific search types (Web, e-mail, business) and in what order. If you tune the Search Assistant to your own preferences it can be quite useful.

Be warned: Your favorite search service may not be present. For example, Northern Light is there but disabled by default, and HotBot isn't available at all.—*NJR*

Beef Up Your Browsing

Customized Explorer Bars used with Internet Explorer 5.0 add value and content to Web surfing. Explorer Bars are small windows that can be opened within Internet Explorer 5.0 to display specialized information while leaving most of the display free for browsing. Explorer Bar display characteristics vary. Some display horizontally only; others can display horizontally or vertically.

Five Explorer Bars that can be downloaded from Microsoft (*www.microsoft.com/windows/IE/webaccess*) are Surf Monkey, a kid-safe Web-surfing utility; Alexa, which displays site-specific information, such as contact information and links, for the Web site currently active in your browser; The New York Times, for news updates every 10 minutes plus market information and stock quotes; AltaVista, for AltaVista Power Tools including Search, Translate, and Tracker; and Bloomberg, for stock quotes and business news.

Once you've downloaded an Explorer Bar from the Microsoft Web site and restarted Internet Explorer, you can activate the Explorer Bar by selecting *View | Explorer Bar* and then clicking on the Explorer Bar of your choice.—*BB*

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like the one you just typed. In the future, it can check your previous entries and list suggestions as you type. Would you like to turn AutoComplete on? Chances are good that you answered Yes, thereby turning on AutoComplete for forms.

When you log onto a password-protected Web page, IE5 will ask *Do you want Windows to remember this password, so that you don't have to type it again the next time you visit this page?* You can check a box telling it not to make this offer again; doing so disables AutoComplete for passwords.

Full control of AutoComplete comes through the *Internet Options* dialog. Launch it from the Control Panel or by choosing *Internet Options* from IE5's *Tools* menu. Click the *Content* tab and locate the *Personal information* panel. Within this panel, click on the *AutoComplete...* button to bring up the *AutoComplete Settings* dialog (see Figure 2).

FIGURE 2: The *AutoComplete Settings* dialog controls IE5's AutoComplete features and lets you clear stored data.

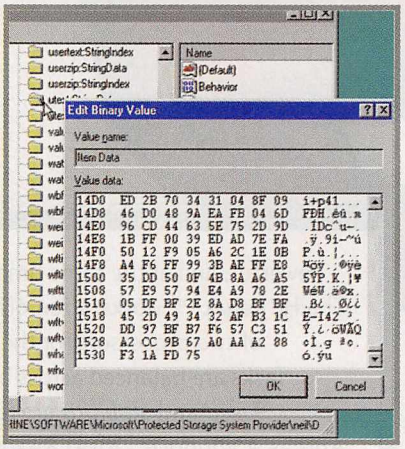

FIGURE 3: Though you wouldn't know it, this encrypted data represents the same AutoComplete list shown in Figure 1.

The boxes in the *Use AutoComplete for* panel determine which AutoComplete features are enabled. Most users will check *Web addresses* and *Forms* but leave *User names and passwords on forms* blank. If you do enable AutoComplete for passwords, be sure to check the *Prompt me to save passwords* box as well.

When you disable AutoComplete for forms or passwords, you cause IE5 to stop gathering that particular type of AutoComplete data. However, the existing data is not removed until you explicitly delete it. Click *Clear Forms* and *Clear Passwords* to delete the stored AutoComplete data for those two areas. The AutoComplete for Web addresses uses IE5's History list, so the only way to clear that data is to click on the *General* tab and click the *Clear History* button.

HOW SAFE IS AUTOCOMPLETE?

Watching AutoComplete in action is scary. Your computer is connected to the Internet, and your private information is popping up in the AutoComplete window. What's to stop a hacker from stealing your personal data? Could a malicious Webmaster add hidden fields to a form and grab data without your knowledge? Fortunately, the answer is no. When not in use, the AutoComplete data is stored in the Registry in secure, encrypted form. Under Windows 95 or Windows 98, it's possible to view the internal field names for which AutoComplete data exists (Figure 3); under Windows NT 4.0, even that information is inaccessible. The list of items displayed in the drop-down AutoComplete list is completely unavailable to a Web page. Only when you make a selection from the list does it become accessible via script or HTML, in exactly the same way as if you had typed the data by hand. The AutoComplete feature is designed to be completely safe from attack via the Internet.

On the other hand, anybody who uses your computer can access your AutoComplete data. If you've also configured dial-up networking to remember your password, that person can log onto the Internet and do a little shopping. When it's time to enter a credit card number, all he needs to do is press the Down Arrow and pick one. And if you've left AutoComplete for passwords enabled, he will be able to visit your password-protected sites as well. That's scary!

AutoComplete data is stored on a per-user basis, so if you're not logged in, your AutoComplete data should be safe. Log off any time you step away from your desk, use a password that isn't easily guessed, or keep the computer in a locked office. The danger in using AutoComplete doesn't come from the Internet; it comes from the next cubicle.

Further reading: If you'd like to learn a bit more about IE5's AutoComplete features, read Microsoft's Knowledge Base article Q217148, at *http://support.microsoft.com/support/kb/articles/Q217/1/48.ASP*.

Neil J. Rubenking is the contributing technical editor of PC Magazine.

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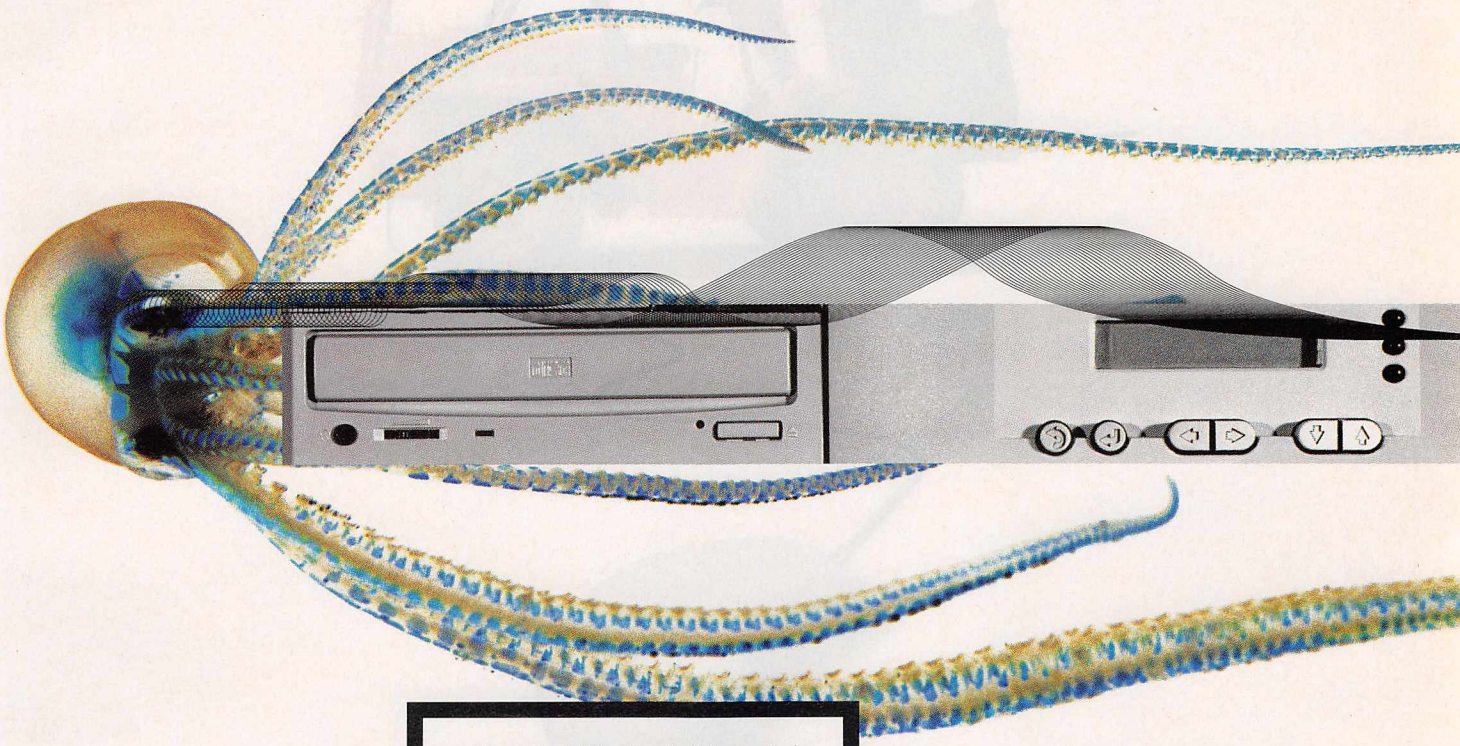

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Speed Up Symbol Entry

Word offers a dialog for entering foreign characters and symbols, but there's an easier way. **By M. David Stone**

Most Microsoft Word users know that they can enter foreign-language characters, such as È, É, Å, ¿, and Ç, as well as symbols like ¢, ®, and ™, using the *Insert* | *Symbol* command. But entering anything more than an occasional character with this feature quickly becomes tiresome. And the more installed fonts you have, the longer the *Insert* | *Symbol* dialog (Figure 1) takes to appear.

You may not be aware that there's a surprisingly easy way to enter these characters. Although it seems to be one of Microsoft's best-kept secrets, the default installation of Word offers a number of shortcut keys for entering the most common symbols and non-English characters. Next time you're sitting in front of your computer with Word loaded, try typing Ctrl-/ (that's Ctrl plus the slash character) followed by a lowercase c. Word will insert a cent symbol, ¢. (All the keyboard shortcuts mentioned here work in Word 7, Word 97, and Word 2000.)

Similarly, Ctrl-` (open quote) followed by the letters a, e, i, o, or u, in uppercase or lowercase, will insert the letter with a grave accent (falling left to right), and Ctrl-' (apostrophe) followed by any of the same letters (and y) will insert the letter with an acute accent (rising left to right).

Other key combinations enter specific characters with circumflexes (Ctrl-Shift-^); tildes (Ctrl-Shift--); umlauts (Ctrl-Shift-:); and rings (Ctrl-Shift-@, only for use with A or a). Figure 2 shows a complete list of the key combinations for non-English language characters.

Also well hidden in Word are a number of shortcut keys for common symbols. We've already mentioned Ctrl-/, c for the cent symbol, ¢. Other shortcut keys and key combinations include: Alt-Ctrl-t for the trademark symbol, ™; Alt-Ctrl-r for a registered trademark symbol, ®; and Alt-Ctrl-c for a copyright symbol, ©. Figure 3 shows the key combinations as shipped for these, and a few other common symbols and punctuation marks. As you may have noticed, most of the foreign-language characters and some of the common symbols in Figures 2 and 3 use a technique sometimes referred to as a *dead key*. That is, you first type one key combination, such as Ctrl-` (open quote), without inserting a character into your text. It's only after you type the next character—such as an a, e, i, o, or u—that Word inserts a character. And if the next character you type isn't one of the characters defined to follow the first combination, nothing is inserted.

In truth, however, this dead-key strategy hides the fact that these are simply standard Word shortcut keys. Word lets you define shortcut key combinations that include two keystrokes. Each of the dead key combinations is simply a shortcut key defined with two keystrokes. This means that if you find any of these shortcuts hard to remember, you can redefine them to taste.

For example, you may find that most of the shortcut keys in Figure 2 are easy to remember,

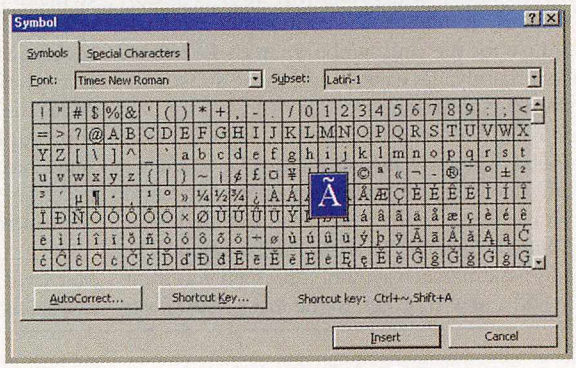

FIGURE 1: The standard way to enter symbols and foreign characters is through this dialog box.

FOREIGN-CHARACTER ENTRY

For	Enter
à, è, ì, ò, ù, À, È, Ì, Ò, Ù	Ctrl-` (open quote), then the letter
á, é, í, ó, ú, ý, Á, É, Í, Ó, Ú, Ý	Ctrl-' (apostrophe), then the letter
â, ê, î, ô, û, Â, Ê, Î, Ô, Û	Ctrl-Shift-^ (circumflex), then the letter
ä, ë, ï, ö, ü, ÿ, Ä, Ë, Ï, Ö, Ü, Ÿ	Ctrl-Shift-: (colon), then the letter
å, Å	Ctrl-Shift-@ (at sign), a or A
æ, Æ	Ctrl-Shift-& (ampersand), a or A
ã, ñ, õ, Ã, Ñ, Õ	Ctrl-Shift-~ (tilde), then the letter
ç, Ç	Ctrl-, (comma), c or C
đ, Đ	Ctrl-' (apostrophe), d or D
ø, Ø	Ctrl-/ (slash), o or O
œ, Œ	Ctrl-Shift-& (ampersand), o or O
š, Š	Ctrl-Alt-Shift-^ (circumflex), s or S
ß	Ctrl-Shift-& (ampersand), s
¿	Ctrl-Alt-Shift-? (question mark)
¡	Ctrl-Alt-Shift-! (exclamation point)

FIGURE 2: European-language characters available through Word shortcut keys.

Unique Counting in Excel

Many of the items in one column (*Facility Names*) of my spreadsheet are repeated, or nonunique. Another column lists the *Facility Type Code* (for example, A, or B, or 0). I want to count the number of unique facility names that have the code A. I can't use `DCOUNTA`, as I get a count of all the facilities in the column with a code of A. I only want to count each specific facility with an A one time, but it may appear several times. `COUNTIF` does not work. Do you have any suggestions?

TERRI JARUS
St. Louis, Missouri

You could use Excel's Advanced Filter command to copy unique records into a different section of your worksheet. Then you could use `COUNTA` to tally up the number of unique records that appear.

Advanced Filter requires that you set up a criterion range in a section of your worksheet separate from the input data. In your case, to get all the records with code A, your criterion range would consist of two cells, and look like this:

Facility Type Code
A

The first of these cells must exactly match the corresponding column heading in your input range.

To copy unique records that meet this criterion, you would select two options in the *Advanced Filter* dialog box: *"Copy to another location"* and *"Unique records only."*—*Craig Stinson*

WordArt Colors

I created a really dramatic headline using the WordArt tool in Microsoft Publisher 2000. But I have discovered that the color choices in WordArt don't match the color choices in the main program. How can I get my WordArt design to match the color scheme in the rest of my publication?

NANCY WARRENS
Concord, Massachusetts

The WordArt module, which is really an OLE application, was not

upgraded along with Publisher 2000. As a result, the more sophisticated color options found in Publisher, including RGB, CMYK, and Pantone colors, are simply not available within WordArt itself.

Both Publisher 98 and Publisher 2000, however, contain a nifty feature that can recolor the WordArt object. To use this feature, you must first exit WordArt—just click outside the WordArt frame to return to Publisher. Then single-click the WordArt object and choose the *Recolor Object* command on the *Format* menu. You can assign any color, tint, or shade to the object, using any color model that Publisher supports.

The WordArt object is still completely editable; just double-click it to invoke the WordArt module again. The color will revert to the old, incorrect shade while you are working in the WordArt module. Don't worry: When you exit WordArt, the new color you've chosen will be restored.—*Luisa Simone*

SYMBOL ENTRY

For	Enter
¢	Ctrl-/ (slash), c
©	Ctrl-Alt-c
®	Ctrl-Alt-r
™	Ctrl-Alt-t
… (ellipsis)	Ctrl-Alt-. (period)
— (em dash)	Ctrl-Alt-- (minus on the numeric keypad)
– (en dash)	Ctrl-- (minus on the numeric keypad)
«	Ctrl-` (open quote), < (left angle bracket)
»	Ctrl-` (open quote), > (right angle bracket)

FIGURE 3: Common symbols available through Word shortcut keys.

but you may like to change a couple. Perhaps it's easier for you to remember the combination Ctrl-Shift-" (quotation marks) for an umlaut dead key rather than Ctrl-Shift-: (colon). Similarly, it might be easier to remember Ctrl-Shift-o for the ring symbol than Ctrl-Shift @. Fortunately, it's easy to add these substitute shortcuts in Word.

To add alternative shortcut keys, choose *Tools* | *Customize*, then *Keyboard* (*Keyboard* is a tab in Word 7, but a button in Word 97 and Word 2000). In the *Categories* list, highlight *Common Symbols*. Then, in the *Common Symbols* list, find each symbol for which you want to add a new shortcut. In the *Press New Shortcut Key* text box, type the shortcut key combination you want to use (Ctrl-Shift-", then e for ë) and choose *Assign* to add the shortcut key.

If you find shortcut keys hard to remember, you can get the same results by defining the various common symbols as AutoText or AutoCorrect entries. In either case, you have to define an abbreviation, such as `e for è or (r) for ®. (Word comes with (r) already defined as an AutoCorrect abbreviation for ®.) The difference between the two is that AutoCorrect entries automatically convert the abbreviation to the character symbol, but for AutoText entries you have to type the abbreviation and then hit F3 to convert it to the character or symbol. In either case, you can use any abbreviation you like, no matter how many characters you need to make the abbreviation easy to remember.

Unicode support in Word 97 and Word 2000 makes many more symbols and non-English characters available in such fonts as Arial Unicode. You can attach any of these characters to shortcut keys or insert them as AutoText or AutoCorrect entries. This hint should be enough to get you started using shortcuts, AutoText, and AutoCorrect for more convenient symbol entry.

M. David Stone is a contributing editor of PC Magazine.

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Rescue Your System

An emergency start-up disk is vital for recovering from system crashes, but it can't help if you don't have it. **By Neil Randall**

Do you know where your emergency start-up disk is? Could you get at it without digging through piles of floppy disks? Or through the desk drawer that's crammed with manuals and disks and CDs and cables? Is it even labeled in any informative way?

If the answer is yes to all these questions, you have our admiration. But for many users, the ESD is a forgotten item if it was created at all. When installing Windows 98, the setup program prompts you to create the ESD, but you can simply skip the process. If you haven't already created one, do yourself a favor and make one now, using the Add/Remove Programs tool in Control Panel (see Figure 1). Label the disk and put it somewhere you can find it.

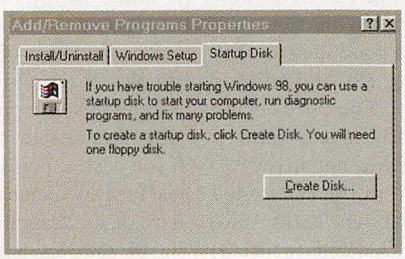

FIGURE 1: You can make an emergency start-up disk by opening the Add/Remove Programs utility from Control Panel and selecting the *Startup Disk* tab.

The ESD has one primary function: If you ever find yourself unable to load Windows 98 (and it can happen easily), put the ESD in the floppy disk drive and reboot. You'll end up at a command prompt, and from there you can run Windows, use utilities, edit the Config.sys and Autoexec.bat files, and more. The point is that even though you can't get into Windows 98's GUI, you can run the basics in order to attempt to repair your system.

The ESD isn't a new idea for Windows. Windows 95 had one, and in the Windows 3.*x* days, most users had a DOS bootup disk for a variety of reasons. But the Windows 98 ESD is the most useful, because it includes files you need to do any serious work toward getting the OS to work properly. Let's take a look at what's on the ESD.

THE BIG FIVE

DOS users won't be surprised by the three most important files on the ESD: Io.sys, Msdos.sys, and Command.com. These were the basis of all DOS systems, and were singlehandedly responsible for allowing DOS to run. That hasn't changed, not even with the release of Windows 98 Second Edition: Look in the root directory of your boot drive and you'll see Command.com; look at the hidden files—either via *Folder Options* or by typing `dir /ah` at the command line—and you'll find Io.sys and Msdos.sys. The ESD is designed to let you boot straight into command mode; like the same option in the Windows 95/98 start-up menu (available by pressing F8 before you see the Windows splash screen), the ESD dispenses with loading the GUI itself.

The other two files instantly recognizable to DOS users are Config.sys and Autoexec.bat. In DOS, these were the files that specified the programs, environment variables, and device drivers to load on start-up. The same files can start your Windows 98 system. Unlike DOS systems, which stored these files in the root directory of the boot drive, Windows stores them in the command directory of your Windows folder, and they're not necessary for Windows to load at all unless you're running 16-bit devices (real-mode devices instead of Windows' virtual devices). On the Windows 98 ESD, these files regain their status as important start-up files, holding the same information as they did before.

ACCESSING THE CD-ROM DRIVE

The Windows 98 ESD differs from the Windows 95 ESD in one crucial way: It solves the problem experienced by many users of not being able to use the CD-ROM drive after an ESD start-up. If you're using the ESD in the first place, chances are fairly good that you're going to want to reinstall Windows. Because Windows shipped primarily on CD-ROM, access to the drive was essential. For a CD-ROM unit to be available on a DOS system, the Config.sys file must specify where the device driver for the CD-ROM drive is located and then load that device driver into memory. The Autoexec.bat file has to tell DOS to run a program called Mscdex.exe (short for *Microsoft CD Extensions*). After this, the CD drive is assigned a drive letter and users can access it.

The Windows 95 ESD, however, did not contain either the device driver or Mscdex.exe. When installed over a Windows 3.*x* system, Windows 95 adopted the existing Config.sys and Autoexec.bat files, and if a CD-ROM unit was functioning under Windows 3.1, it would also function under Windows 95. Unfortunately, when Windows 95 created an ESD, it copied the start-up files but did not copy the actual

Clean Up the *Documents* Menu

The *Taskbar Properties* menu lets me get rid of all the documents that I can see when I click *Start | Documents*. What if I want to get rid of only some of the documents but not all of them?

J. HARTFIELD
via the Internet

The *Start | Documents* menu contains shortcuts to the most recently used documents. These shortcuts are stored in a folder called Recent, a subdirectory of the main Windows folder (usually C:\Windows\Recent). This is a hidden folder, so you have to unhide it to work with it. Do so by opening the My Computer folder, selecting *View | Folder Options,* then clicking on the *View* tab.

In the *Advanced* setting list, you'll see a heading called *Hidden Files.* Select the *Show All Files* radio button and click *OK* twice. When you're done, use My Computer or Windows Explorer to go to the C:\Windows\Recent folder. There, you can delete any shortcuts you want, and they'll no longer appear in the *Documents* menu.—*NR*

Suppressing Start-Up Logos

How can I boot my computer directly to the desktop? I'd like to eliminate the logos of the manufacturer and Microsoft, and cut the time spent waiting for these logos to display.

RAY SCHOEN
Cleveland, Ohio

You may be able to suppress the manufacturer's logo by pressing Esc during boot-up and invoking the BIOS setup program. The manufacturer's logo generally displays during the Power On Self-Test, so it doesn't actually waste any time.

To suppress the animated Microsoft logo bitmap, open an MS-DOS prompt and enter `C:`, then `CD \`. Type `ATTRIB -R -S -H MSDOS.SYS`, then enter `Notepad MSDOS.SYS`. When the file opens in Notepad, find the line `[Options]`

and insert `Logo=0` right after `[Options]`. If you find a line that says `Logo=1`, delete it. Now save the file and exit Notepad. Finally, enter `ATTRIB +R +S +H MSDOS.SYS`.

The Microsoft logo bitmap is displayed only while Windows is loading; removing it won't make Windows load faster. You can use *PC Magazine's* free LogoMania utility (*www.pcmag.com/pctech/content/16/06/ut1606.001.html*) to create an animated logo of your own and install it according to the instructions in LogoMania's help files.—*Neil J. Rubenking*

Keeping NumLock On in Windows NT

My CMOS is set to turn NumLock on; I have triple-checked it. The CMOS does so, but when Windows NT starts loading, it turns NumLock off. I've asked several tech-support hot lines and no one can seem to figure out how to stop this from happening. Can you help?

CARLIE MARRARO
Los Angeles

Microsoft's Knowledge Base has several articles about this problem. Windows NT is supposed to remember the NumLock state when you log off and restore it when you log on. In the Registry key `HKEY_CURRENT_USER\Control Panel\Keyboard`, if the value `InitialKeyboardIndicators` is `2`, NumLock is turned on. If that value is `0`, NumLock is turned off.

In Windows NT 3.5, the NumLock state isn't saved if you log off via Program Manager. The solution is to log off using Ctrl-Alt-Del. As explained in MSKB article Q123498, this problem was fixed in Windows NT 3.51.

Windows NT 4.0 has a different problem: The NumLock state is saved only if you're logged in as an administrator. The article at *http://support.microsoft.com/support/kb/articles/q231/9/44.asp* supplies a fix. Another MSKB article suggests simply changing the Registry value `InitialKeyboardIndicators` from `0` to `2`. If you're comfortable editing the Registry, that's the simplest solution.—*NJR*

CD-ROM device driver. Typically, the Config.sys file would direct Windows 95 to a separate subdirectory to find the driver, and this subdirectory would not be copied to the ESD. As a result, the device driver did not load, and the CD was invisible to the operating system. Even if a user copied Mscdex.exe to the ESD, it still did no good, because Mscdex.exe depended for its operation on the device driver being loaded into memory. If you couldn't access your hard disk at all, or if you deleted Windows completely for the purpose of reinstalling from scratch, unless you remembered to copy the CD-ROM driver to the ESD you couldn't access the CD-ROM unit, and so you couldn't install Windows from a CD.

Windows 98 corrects the problem of CD-ROM access by including real-mode CD-ROM device drivers on the ESD itself. These driver files are Aspicd.sys, Oakcdrom.sys, Btcdrom.sys, and Flashpt.sys, and together they allow the majority of CD-ROM drives to function. (Just to be on the safe side, it's a good idea to copy your current driver to your ESD and edit the Config.sys file to point to it.) The ESD's default Config.sys file loads these drivers into memory. The DOS program mscdex.exe is not on the ESD per se, but it is contained in the file called ESD.cab, which is on the disk. The ESD's Autoexec.bat file establishes a RAM disk (a virtual disk drive contained entirely in system memory), then extracts the Mscdex.exe file from the ESD.cab file, loads Mscdex.exe onto the RAM disk, and launches it. Once in memory, Mscdex.exe combines with the CD-ROM driver to allow access to the CD.

UTILITIES AND OTHER FILES

In addition to start-up files and files for accessing the CD-ROM, the Windows 98 ESD contains other utilities and system files previously available in DOS. Fdisk.exe lets you repartition your hard disk. Setramd.bat establishes the RAM disk and allows you to extract a variety of files from ESD.cab and store them in the RAM disk. These include Format.com, used to format floppy and hard disks; Help.bat, which gives you online help; Chkdsk.exe, the old DOS program for checking disks for errors; Scandisk.exe, the newer version of Chkdsk; Sys.com, to copy the operating system (the files Io.sys, Msdos.sys, and Command.com) to another drive; edit.com, a text editor used here primarily for editing the contents of Config.sys and Autoexec.bat; and Attrib.exe, for changing the attributes of a specific file. Together with the operating system and the configuration files, these comprise pretty much all you need to get the computer up and running.

The Windows 98 ESD is an indispensible tool simply because Win 98 is not flawless. It crashes, and at some point, it may well leave your computer unable to boot. The ESD is also useful if you wish to perform some DOS-based file special functions such as partitioning or formatting hard disks, changing file attributes, or examining directories, without waiting for the entire GUI to load. Whatever the case, this is as good a time as any to make one.

Neil Randall is a contributing editor of PC Magazine *and is the coauthor of* Special Edition Using Microsoft FrontPage 2000 *(Que).*

USING THE ESD

What will you typically do from the emergency start-up disk?

- **Install a clean copy of Windows.** If Windows 98 is giving you a number of problems, your best bet may well be to simply start over. Insert your Windows disk into your CD drive (typically D:) and type `SETUP`. When you're asked for a folder in which to install Windows, don't accept the default (which is probably your current Windows folder, usually C:\WINDOWS). Type a new folder (such as C:\WIN98) and go from there. Note that if you do a clean install, however, you'll have to reinstall all your applications, such as Microsoft Office, as well.
- **Reformat your hard disk.** You can clean everything off of your hard disk by using the `FORMAT` command on the ESD. This is sometimes a good idea, because various important files can become corrupted and starting over may be easier than figuring out what's wrong.
- **Repartition your hard disk.** You can use `FDISK` to divide your hard disk into different partitions. This is most useful for installing additional operating systems.
- **Extract a file from the Windows CD-ROM.** If you know that a specific file installed by Windows has disappeared from the hard disk or become corrupted, you can use the `EXTRACT` command to restore that file. This is especially useful if Windows stops while loading and tells you that it's missing a file.
- **Check your hard disk for errors.** The ESD contains two programs, `SCANDISK`, and the older `CHKDSK`, to let you check the integrity of your drives and repair problems.
- **Work with new hard disks.** If you've installed a second hard disk, you can partition and format it using the ESD. You can do so from within Windows itself, but the ESD loads more quickly and formatting tends to be faster.

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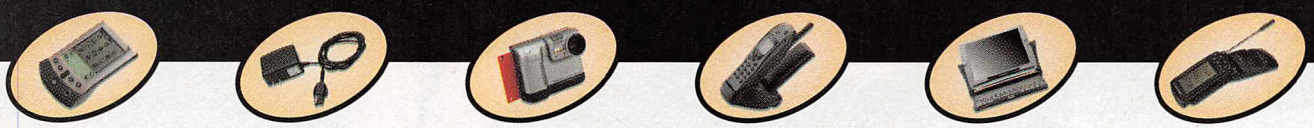

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Break the CPU Speed Limit

Overclocking is one way to get better performance from your machine, but there are risks. **By Neil Randall**

Your CPU may be an underachiever on a fundamental hardware level, but there may be something you can do about it. That Celeron/366 may actually be able to run at over 400 MHz, and possibly even up to 550 MHz! Your PII/300 could be speeding along at 450 MHz. And you may be able to accomplish the performance jump without shelling out for new hardware or software.

That's what overclocking is all about. *Overclocking* is a term most readers of computer magazines have heard, and you may have even heard that it's a near-underground activity. Less clear is exactly what takes place during overclocking, and what results. Basically, overclocking is a process in which you adjust two configuration settings related to your CPU (microprocesor), and if everything works out, you'll end up with a faster processor. But it doesn't always work, and it is not without risks.

Overclocking your CPU can damage it. *PC Magazine* does not recommend this practice; we merely wish to let you know of the possibility. If you attempt overclocking, you do so entirely at your own risk. Our advice is to try it on an old, little-used computer rather than on your main system.

So why is overclocking appealing? Because the speed rating that the CPU manufacturer supplies is a conservative one. The manufacturer produces batches of CPUs (of a specific type) and assigns the speed ratings only in postmanufacturing testing. The testing simulates the worst conditions the chip is expected to endure. The Pentium 150 you had in your old machine was likely manufactured to be a P/166. But torture testing at 166 MHz produced flaws, while testing at 150 MHz did not. Hence, it was rated at 150 MHz to be on the safe side.

In other words, the processor inside your computer has had the brakes applied. By overclocking the CPU, you can let it reach its greater potential. And (often) with no extra costs involved.

The speed of a CPU is determined by two variable measurements: the setting of the clock multiplier (the CPU clock speed), and the speed of the front-side bus. Also called the *system bus,* the front-side bus lets the CPU communicate with peripherals and main memory, while the back-side bus is responsible for communication with the CPU's secondary (L2) cache. Multiplying the clock multiplier setting by the front-side bus speed gives you the speed of the CPU. Overclocking is the process of changing either the multiplier or the front-side bus speed and therefore changing the speed of the processor.

BEFORE STARTING

The two most important considerations when overclocking are the motherboard and the CPU. The motherboard contains the jumper or switch necessary to change the clock multiplier and front-side bus speeds. You'll need your motherboard manual (often online at your system manufacturer's Web site) to determine how to adjust these; the methods differ from system to system. But there are some motherboards that don't provide this capability.

Typically, however, overclocking is a matter of changing the pin covered by the jumper, or changing the on/off status of a set of switches. As for the CPU, the primary issue is whether or not it has already been overclocked. If you bought your CPU independently of the computer (especially if you bought it used), or if you're not sure of the trustworthiness of the store that sold you your system, check the CPU. One way to tell if a CPU has already been overclocked is to look for a peel-off sticker on the chip giving the CPU's speed. But you may need to get your hands on some testing software to determine if overclocking has already occurred.

Some motherboards (especially jumperless ones) let you control all these settings through the BIOS. A section of BIOS settings called CPU Softmenu, included on motherboards manufactured by ABIT (*www.abit.com*), is the most use-

CLOCK AND BUS SETTINGS

Multiplier	Bus speed	CPU speed
4	66 MHz	266 MHz
4.5	66 MHz	300 MHz
4.5	75 MHz	338 MHz
5.5	66 MHz	366 MHz
6	66 MHz	400 MHz
4	100 MHz	400 MHz
4	112 MHz	448 MHz
4.5	100 MHz	450 MHz
5.5	83 MHz	457 MHz
4.5	112 MHz	504 MHz
6	100 MHz	600 MHz

Is This Thing On?

The other day, my microphone suddenly quit working. I have tried different applications, reinstalled the sound card driver, and even removed and reinstalled the sound card. I have double-checked the volume controls, and the microphone works fine on another computer. All other sound card functions seem to be okay. What could be the problem, and how do I check?

CHERYL CUTRIGHT
via the Internet

There are two leading suspects. The problem is either the physical jack on the sound card or the microphone input circuitry on the card itself.

If you have an ohmmeter or continuity tester, take out the board and test the microphone jack connections to see whether one of them is broken. Also, insert a plug and see that it makes a good connection with the jack's contacts. If the problem is the jack—and you're competent with a soldering iron—then you can try to find a replacement jack and swap it yourself. Whether the time and effort are less costly than buying a replacement sound card is up to you.

If the jack checks out okay, then the problem is almost certainly in a component on the card. It is entirely possible for one portion of a sound card to fail without affecting the rest of the card's operations. To make sure, you can try a different sound card in your system. If the problem disappears, your best bet is to replace the old card.—*Alfred Poor*

Fax Modems and DSL

I am getting a DSL connection and I want to know whether I will be able to use a fax modem on the same line.

KEITH SMITH
via the Internet

DSL is a digital connection (available in some areas) that sends and receives digital data on an existing, standard, voice telephone line. In addition to offering constant high-speed connections to the Internet, DSL also supports simul-

taneous use of the same line for standard voice calls. Fax transmissions are analog transmissions—as are standard modem transmissions—designed to work in the same way as voice signals. As a result, you should have no problems sending or receiving faxes on the same line that carries your DSL connection.—*AP*

Mouse or Trackball? How 'bout Both!

I like to use both a mouse and a trackball at my computer. How can I easily switch between the two?

M. CARLONE
via the Internet

You can install a Y-Mouse dual adapter from P.I. Engineering (*www.ymouse.com*) to configure various pointing devices for greater flexibility and less strain. Two models, the Dual P/S2 Adapter and the Dual Serial Adapter (each $50 street) support mice, trackballs, and touch pads.

You can use either adapter to connect two mice or a mouse and a touchpad, place them on either side of your computer, and switch between them as you navigate. Both adapters support a daisy-chain set up for connecting more than two pointing devices to a single computer. Individual users can gain flexibility by using Y-mouse dual adapters, and the products are also ideal for training and gaming use.

Switching pointing devices is a good idea, because overuse of a computer mouse can strain or injure muscles or tendons. It's a good idea to check the position of your mouse periodically to be sure that you don't have to reach too far to use it and that your wrist isn't bent back. When using it, don't hold it too tightly and take frequent breaks.—*Bruce Brown*

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ful for overclocking procedures, but other BIOSs have them as well. If you have this capability, overclocking becomes much easier.

The other major issue is cooling. The higher the CPU's speed, the greater the heat it generates, and the greater the chance the system will crash. The little plastic fan that often ships with the computer might not be enough to handle the heat; you'll need a more powerful cooling system, such as a large fan-and-heat-sink combination (see the photo). Go to an electronics supply store to find one.

Finally, there's voltage. More speed requires more power. Your motherboard or your BIOS may let you adjust the core voltage of the CPU beyond its default setting. But increasing voltage is not to be taken lightly. It can burn out your CPU. If you choose to increase voltage to provide more juice to the CPU, do so one setting at a time.

Obviously, you want to overclock as a way to get something for nothing, so purchasing new motherboards and cooling systems isn't something you want to do right off the bat. Try a small overclock (increase the multiplier or the bus speed by the lowest possible amount). If it works, try a higher set of numbers. If you like the idea and you want to get serious about overclocking, then purchase a motherboard that allows multiple settings and a cooling unit that will let you experiment fully.

THE PROCEDURE

Okay, you're ready to try it. Start by determining whether you can perform the overclocking through the BIOS or you have to work directly on the motherboard. Here, we'll assume the latter, since it's the most common scenario. Turn off the computer and unplug the power cord from the case, then open the case and grab your motherboard manual. From the manual, determine the location of the jumpers or switches that set the clock multiplier and bus speeds, and the jumper that controls the core voltage. Note all three settings on paper so you can reset them if necessary.

Now, ground yourself by touching something metal (to avoid destroying the motherboard with a static shock) and then change the clock multiplier or the bus speed by adjusting the appropriate jumper or switch. Don't change both settings at once; try one at a time, and then if everything's okay, try either the next CPU multiplier or bus speed setting. With the setting changed, plug in the power cord and try to boot the machine. If it gets as far as the BIOS setup (which will likely appear automatically), change the CPU's settings in the BIOS, if you can, and then boot into Windows.

If Windows loads properly, work with applications for a while and see that all's well. You might notice strange behavior, application crashes, or even Windows crashes, in which case there's a problem. Try a better cooling system and boot again, changing settings each time, until you arrive at a workable new clock speed. Note, however, that you might never do so, in which case your processor simply isn't overclockable.

THE RESULTS

There are no set results you can expect. Everything depends on the individual CPU, the clock and bus settings you choose, whether the CPU allows you to change clock settings in the first place (the faster PIIs and all PIIIs have locked settings), and whether the bus speed can be set to produce a worthwhile effect. The 100-MHz bus, for example, can be changed to 112 MHz, but there may not be enough of a benefit to make doing so worthwhile. The table on the previous page shows the most common settings and their resulting CPU speeds.

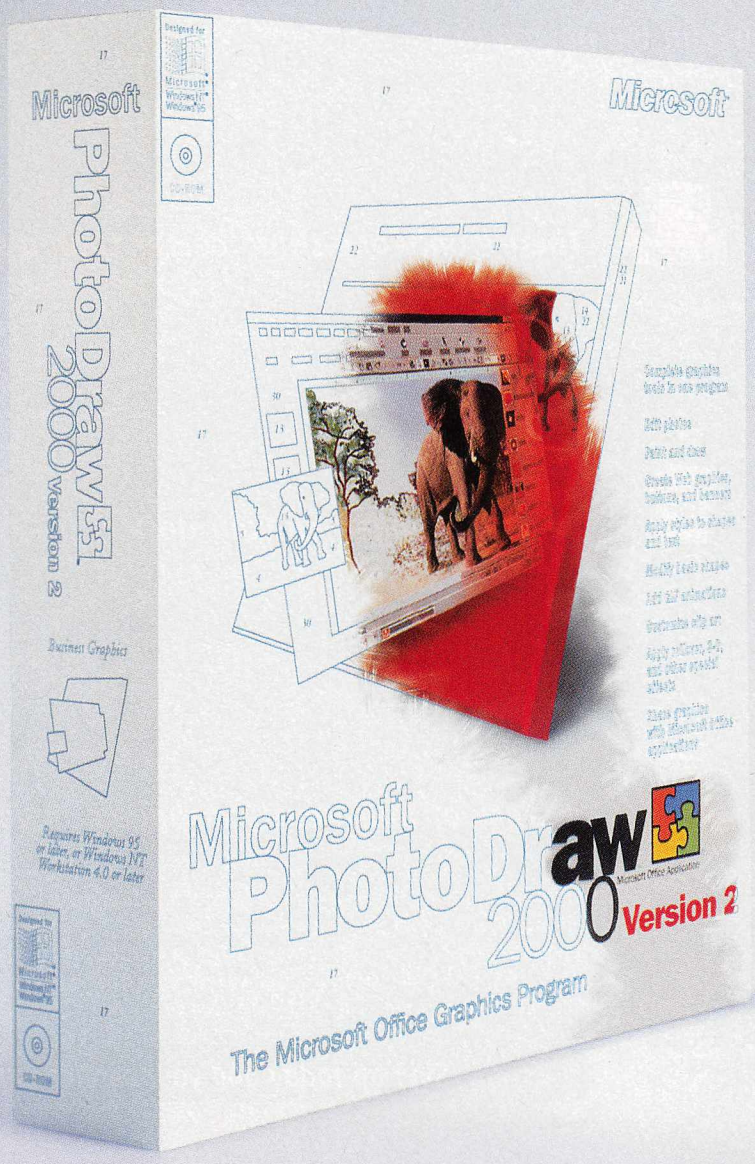
CRIB SHEET OVERCLOCKING RESOURCES

- You've overclocked successfully, you've enjoyed it because it feels as if you've gotten away with something, and now you're hooked. What's next?
- There's a ton of overclocking information on the Web. If you have a Celeron processor, for example, start with the Overclocking FAQ at *www.ars-technica.com/paedia/celeron_oc_faq.html.*
- Use the Web to find reviews of motherboards, cooling systems, and processor overclocking. An example is BXBoards at *www.bxboards.com.*
- Buy a motherboard that lets you specify all CPU parameters, including core voltage. ABIT and AOpen offer such boards. The review sites will help you.
- Learn everything you can about applying increased voltage levels. The sites will help, but you can also contact a reliable electronics supply store.
- Be sure to have an additional computer available so you can work even if bad things happen to your overclocked machine. If you're working on an overclocked machine, set autosave settings in your applications to save frequently, and back up important files often.

Refuse to overclock your friends' and relatives' computers, unless you want to become a full-time technical-support person.

Ultimately, the question is whether overclocking is worth the effort, but that's a purely individual decision. Don't expect the IT people in your company to approve of it, and indeed, don't try it at work at all. But at home, overclocking might well give an old computer some new life; and trying it makes sense, especially if you're not using that old computer much anyway. Besides, despite the potential danger, overclocking is just plain fun.

Neil Randall is a contributing editor of PC Magazine.



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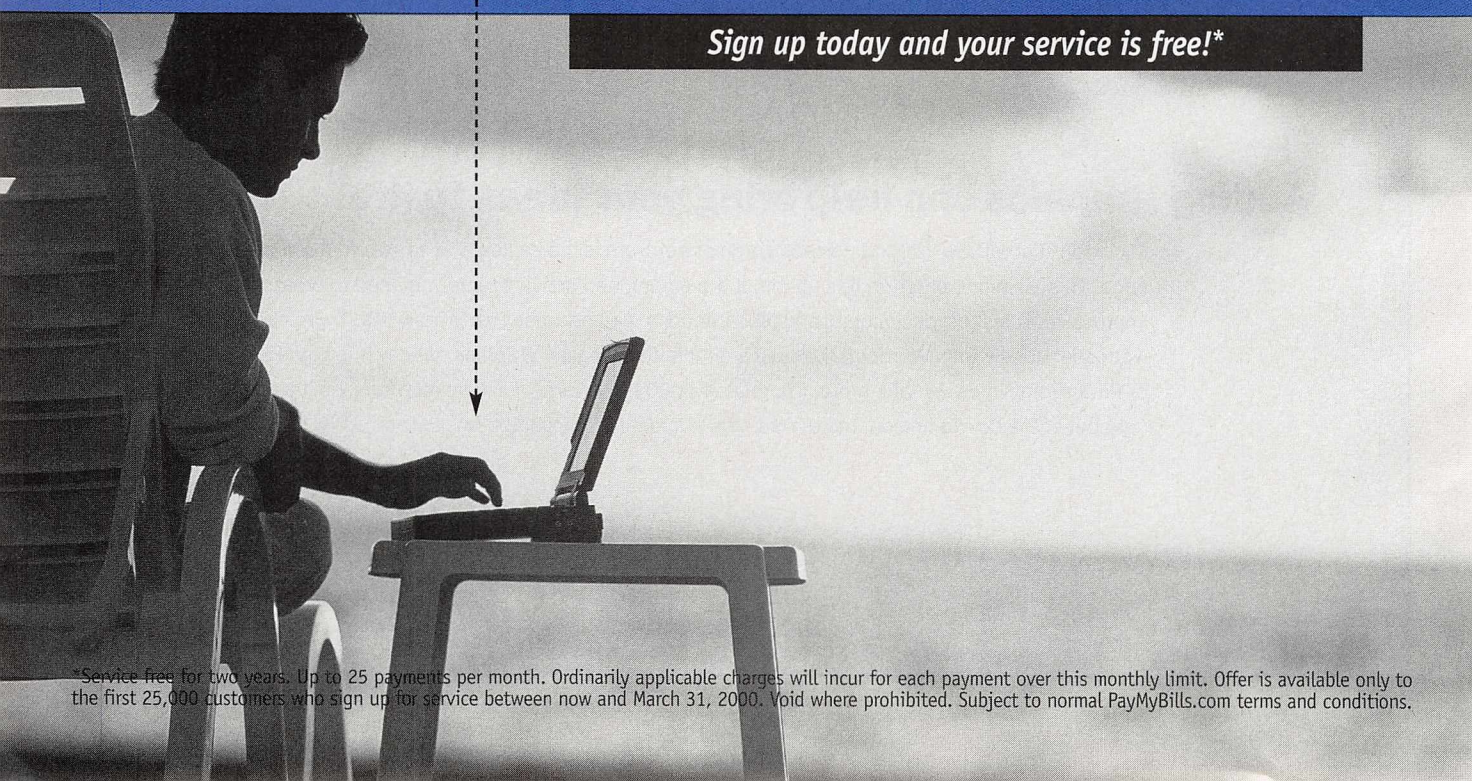

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Instant File Information

Get quick file information in ToolTips at the mouse pointer with FileTip. **By Patrick Philippot**

When you park your mouse pointer over filenames in Microsoft Office, ToolTips pop up with pertinent file information. Wouldn't it be nice to see such tips for other types of files on your PC? This issue's utility, **FileTip,** is an extension to Microsoft Windows Explorer that does just that. **FileTip** works with file types including text files, executables, shortcuts, ZIP files, bitmaps, icons, animated cursors, AVI files, and HTML files. The tips will appear for icons in any Explorer window, as well as those on the Desktop.

Different types of information are provided for each file type. For example, the ZIP file ToolTip displays the contents of the ZIP file, and the shortcut ToolTip gives the path to which the shortcut points. For program files, the ToolTip displays the version and comments. For text files, FileTip displays the actual text in the file. A configuration utility lets you add extensions to different file types.

FileTip runs under Windows 95, Windows 98, and Windows NT 4.0, and requires the Windows Desktop Update. It has also been tested with the latest beta version of Windows 2000. An article about how to use FileTip and how it was written is available on our Web site, at *www.pcmag.com/utilities.* A link to download the utility and its source code can also be found there.

Patrick Philippot is a developer based in Draveil, France. Sheryl Canter is the editor of the Utilities column and a contributing editor of PC Magazine.

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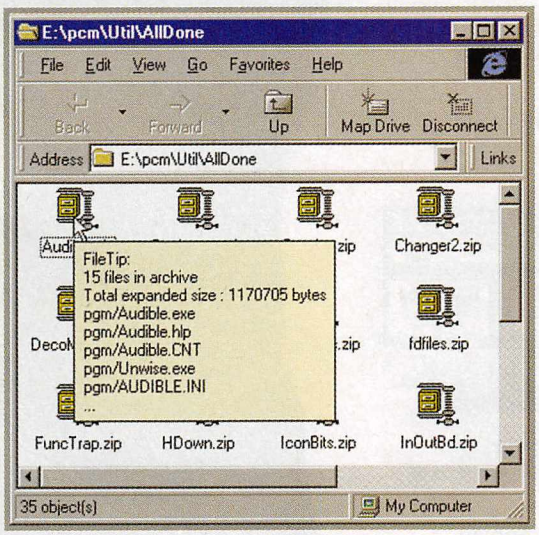
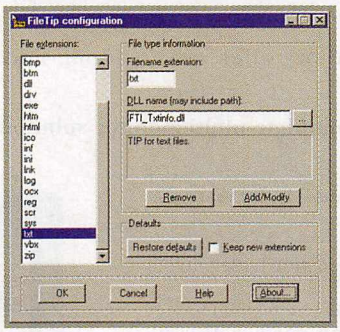
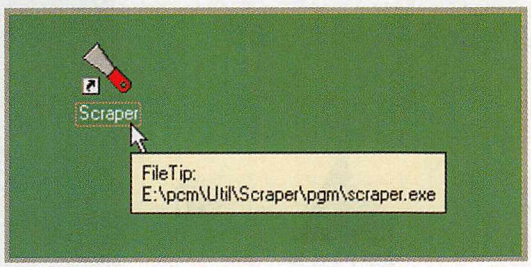


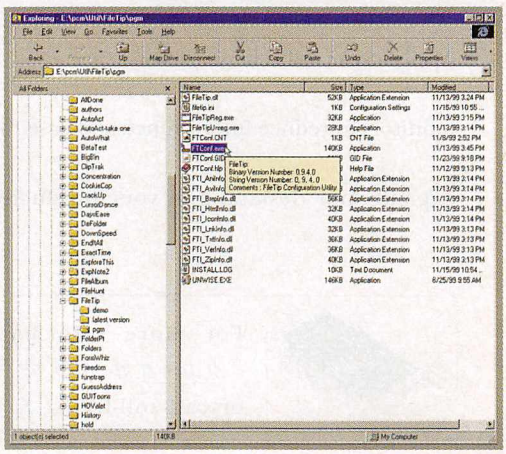
For ZIP archive files, FileTip displays information about the contents of the archive. The ZIP files shown here are displayed in a single-pane Explorer window.



Associate additional extensions with a file type using this dialog box. By default, the text file type is associated with the file extension .txt. You may, for example, wish to associate .prn files with the text file type as well.



Desktop icons are displayed after you click anywhere on the Desktop to make it the active window. Place the cursor over a shortcut and FileTip displays the path to which the shortcut points.



For program and DLL files, FileTip will display version information along with the internal *Comments* field.

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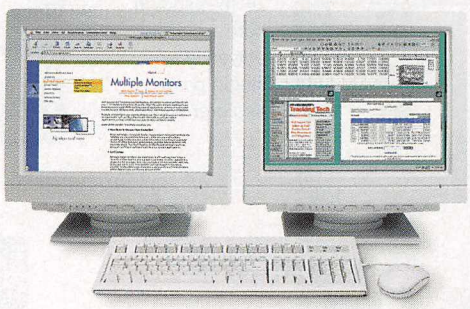

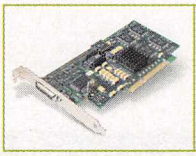

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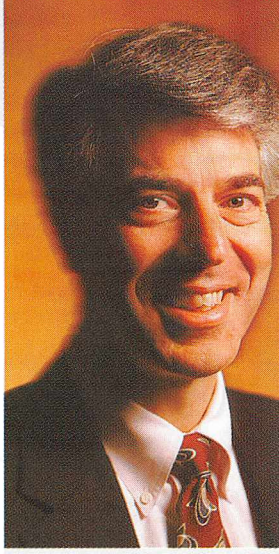

E-Mail Paranoia

My friend Susan once observed, "E-mail is like a postcard, not a letter." And then she proceeded to convey her company's secrets and her innermost thoughts in her business and personal e-mail. We all know that e-mail is a highly insecure medium, but we choose to ignore that fact, figuring that nobody could be interested in our messages, much less find them in the colossal Niagara Falls of packets rushing over the Internet. I do it. Virtually everyone I know does it. And we're wrong.

Somebody is interested in your messages. Even paranoids have real enemies. But you don't need someone intent on investigating you or settling some old score to have your e-mail snooped. More than a quarter of companies scan employee e-mail as a matter of course. (Don't get outraged; they're generally within their legal rights, just as they can log and listen to your telephone conversations.) Employers are looking for trade secrets, non-work-related traffic, harassing messages, and conflicts of interest. Then, of course, there are bored-to-tears system administrators on the third shift, who start browsing the mail files for anything of interest—and sometimes someone gets an eyeful!

Your messages are depressingly easy to find. Copies are laying about on the sending server, on the receiving server, and in your ISP's backup files—not to mention on your machine and the recipient's machine. If you use a Web-based mail system, you've probably heard about (and ignored) the vulnerabilities of some of the largest services.

Also, the vast majority of e-mails travel over the Internet as unencrypted plain text. Any hacker with the proper access, knowledge, and tools can trap your packets and read your messages. This is even easier on your office network: Putting the NIC into promiscuous mode allows it to watch all the packets going by. Capturing yours is a piece of cake. As I mentioned in my December 1 column, "How Do I Hack Thee?", Lopht's AntiSniff is a good way to detect unauthorized NICs in promiscuous mode.

Some e-mail systems, such as Lotus Notes, are able to encrypt messages sent to other Notes servers, which keeps your corporate communications private. A simple click encrypts the mail, and decryption is automatic for the recipient. The feature, however, often goes unused. Some readers tell me that each company is provided a master decrypting key that opens all employee mail, but I have not substantiated this rumor.

If you want to secure Outlook- or browser-based e-mail, you generally have to obtain a certificate, which costs $10 or $15 per year. The certificate has an encryption key for your e-mail and is maintained at a central authority. Users who want to decrypt your mail get an unlocking key from the certificate authority. The process is fairly automatic once you've signed up for a certificate. Once you've done this, you've entered the public key infrastructure, or PKI. Some security experts are concerned about vulnerabilities in central signing and certificate authorities. (For a detailed discussion, see *www.counterpane.com*.)

You can also secure most mail systems, including Lotus Notes, with Pretty Good Privacy (*www.nai.com*), a leading public-key/private-key system. The common practice with PGP is to post your public key on your Web site and append the URL to all your messages, so anyone who wants to send you an encrypted message can do so. Unless you tell users where to look for your certificate or public key, they can't send you encrypted mail.

Any hacker with the proper access, knowledge, and tools can trap your packets and read your messages.

Although the process sounds straightforward, there are plenty of concepts, installation questions, and puzzling dialog boxes that will confound the uninitiated user. The originating and received messages are stored in encrypted form on your disk, but some require a password to read, and others decrypt automatically when you view them through the mail program. Anyone with access to your system can then read the messages. But while the messages traverse the Internet, they're secure.

Remember that *secure* is a relative term. People who try to pick off your messages will have their work cut out for them if they attempt to decrypt your messages, which could take years. But if these people have access to your system, they don't need to decrypt at all. Access may not be physical access. A monitoring program or a Trojan, whether it's Microsoft SMS, Back Orifice 2000, WinWhatWhere Investigator, or any of several remote-control packages, can record (and transmit) all of your keystrokes, long before the message is ever encrypted. The same packages can capture a decrypted screenful on the receiving end.

For true security, you've got to consider every point of vulnerability. Feeling paranoid yet?

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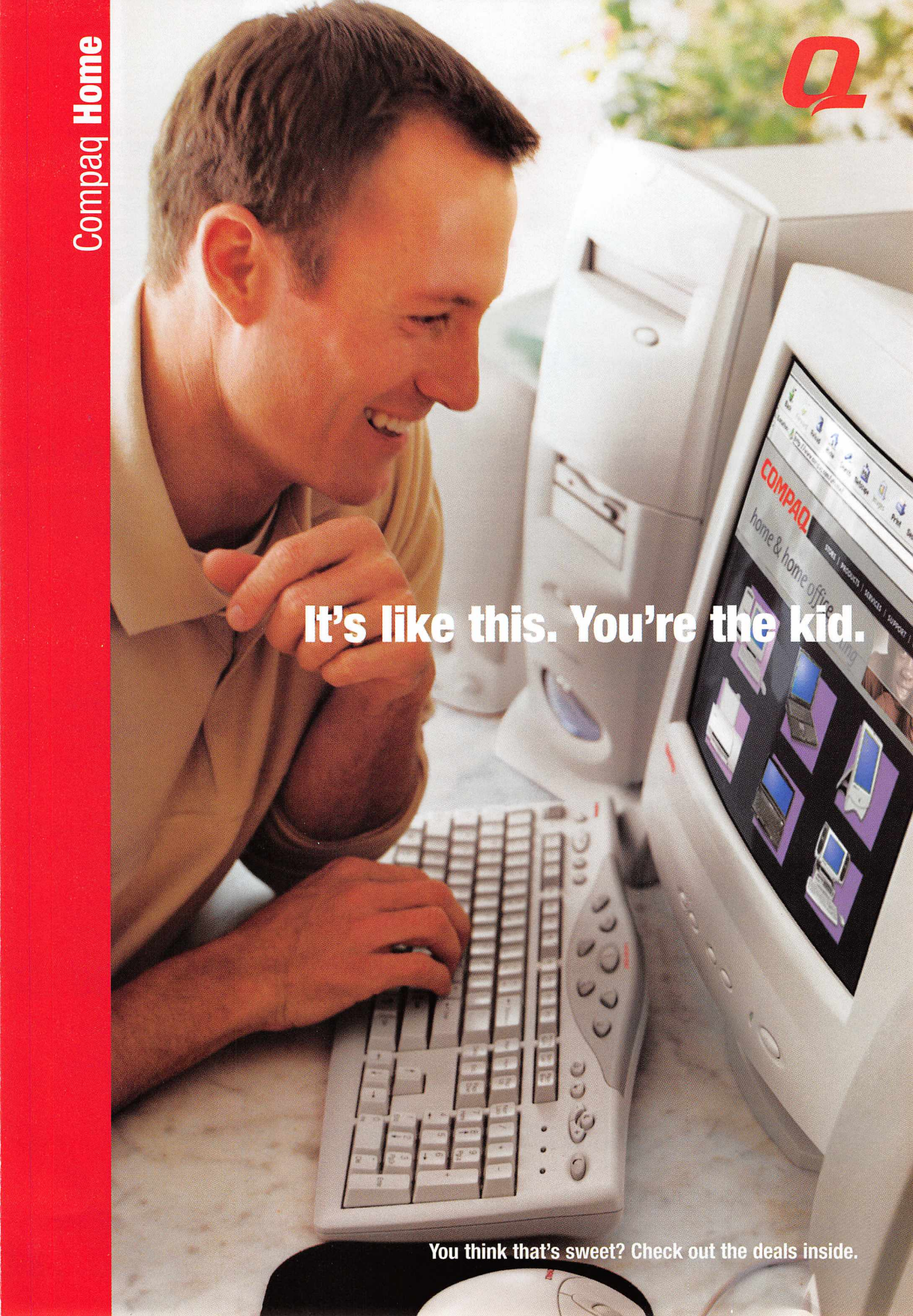
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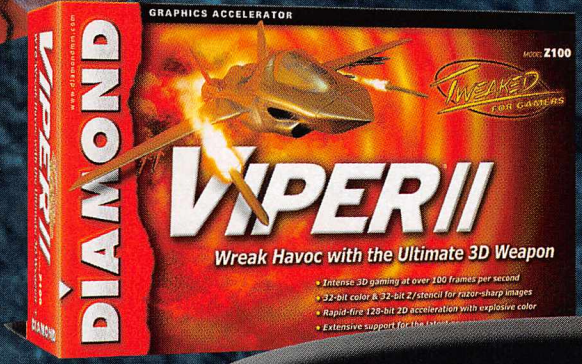

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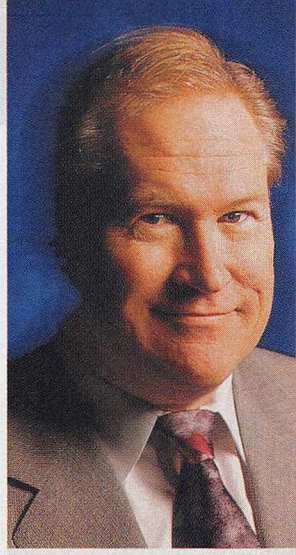

PC Death, Greatly Exaggerated

Editor-in-chief Paul Somerson, in the November issue of *PC/Computing*, is the one who made the blanket statement that computer magazines are dead. This was a marketing ploy that explained that his magazine was changing its focus away from computers towards business, presumably to take advantage of higher ad rates. Perhaps he actually believes that computer magazines are dead.

Whatever the case, this essay didn't go over too well with anyone at *PC Magazine*. Worse, it reflected a widely held attitude among those susceptible to anticomputer propaganda, much of which was started by Scott McNealy and his stooges at Sun Microsystems. It's rubbish.

This all began with the concept of the so-called "post-PC era," which was an invention either of McNealy or some speaker at one of those groupthink social events, such as DEMO, Agenda, or PC Forum. This was a jazzy catch phrase that could be incorporated into the business plan du jour, and before you knew it, the dopey pundits were all over the term as if the existence of such a term made the concept true.

And then the counter-term "PC-plus era" emerged, but it was too late, and *PC-plus* just sounded like old thinking. Surprise: PC-plus *is* the era we are entering. New peripherals will make the PC even more the center of attention. You need a PC to edit those digital photos and to synch that Palm Pilot. Above all, you need it to develop that personal Web page you and everyone else will eventually have. I'm convinced that the PC will also become a personal server on the desktop, serving Web pages for individuals on that 24/7 connection coming soon. The "post-PC" era concept doesn't address any of these trends.

Historically, when a unique device enters society and quickly becomes popular, people take decades to admit that it's here to stay. The car was a hot item in its early days, but there was always a contention that public transportation would be the true future of personal travel or that the car itself would give way to little airplanes we'd all be flying.

So too do we see this kind of wishful thinking amongst that segment of the community that just can't accept computers as everyday devices. These people argue that eventually there will be no PC. Instead, there will be little computers distributed everywhere, which will be transparent. We will not need to suffer with crashes—oh, horror of horrors. These people see PCs not a convenience but as a nuisance that will go away.

But the car never went away, and people got used to certain problems cars had. They crash too—big-time. Tires go flat. Cars are hard to operate, and you need a license. They have to be washed, and they have to be tuned up all the time. How can we put up with this? Perhaps we can have a post-automobile era. Yeah, right.

The PC has become as important as a car. If you don't have a PC, you're perceived as an idiot or a Luddite. If you can't use one, people wonder what rock you've been under. There are bragging rights involved. You are a classier person if you have a 21-inch monitor or large flat-panel. People feel sorry for you if you use a 14-inch monitor. "Poor thing, can't afford anything better." Megahertz count too. Certain pundits try to deny this to no avail. "I get along just fine with my 90-MHz Pentium," said one pundit on a TV show. He seemed pathetic, broke.

The PC has become as important as a car. If you don't have a PC, you're perceived as an idiot or a Luddite. There are bragging rights involved.

To really understand the nature of computers, observe the Mac users out there who drool over the ownership of the fabulous-looking G3 and G4 machines. Mac users love having a hot-looking machine show off.

And have any of the post-PC people paid any attention to the sociology of the physical machine itself? It's a big box that people want. Not too big, but big enough to see. Since the invention of the Altair in 1975, the relative size of the machine has stayed within a certain range.

I do not see this ever changing. Again, take the car: There have been various three-wheel and other offbeat designs, but the basic car with a front and back seats, four wheels, and a trunk seems to be the most desirable. Things get into society and stick there for a reason: practicality. The PC, as it now exists, is incredibly practical. It's repairable in this form. It's upgradable. You can program it to do anything. It's here to stay. Get over it!

As for computer magazines, they represent the best in push technology. Here to stay too. Perhaps the golden age of computer magazines has not yet begun. Look how long it took car magazines to reach their zenith.

MORE ON THE WEB: *Read John C. Dvorak's news, views, and snide asides every Monday at PC Magazine Online. And don't miss Dvorak's "Silicon Spin" every day on ZDTV. You can also view past shows at* **www.zdtv.com/siliconspin.**

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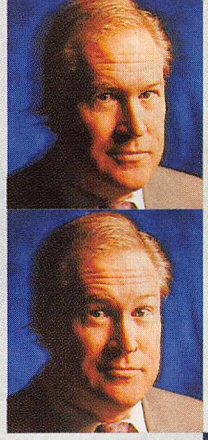


This is **the year of the gigahertz chips,** as AMD and Intel will spend the rest of the year trying to outdo one another. Hopefully, they won't be too cavalier about the quality of their products. When the recent news broke about the Intel Coppermine chip frequently not booting I was a little disturbed. Apparently the chip was not going to be recalled, and people would have to keep hitting Reset until the chip jumped to action. If Intel can get away with this—and there has been little public outcry—then **we're all doomed** to a life of **misery** as buggy products take over.

Oh, Brother, Now What? Dept. A report from Washington says that the Pentagon has jumped into the act regarding digital broadcasting methodologies. The **military and security** agencies want the FCC to **reopen the debate** regarding the technology used to send and receive the signals. The method to be employed is called *vestigial sideband modulation* (8-VSB), and **they want it replaced** with *coded orthogonal frequency division multiplexing* (COFDM). The 8-VSB technology requires large directional antennas to get a good signal. The agencies argue that in the case of a national emergency, the antennas can get **skewed and useless.** Do they know something we don't know? My question: Can't they come up with a technology that works fine with rabbit ears?

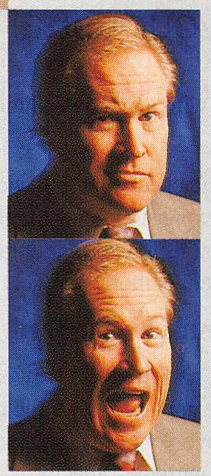
Meanwhile, the DVD community is upset over the cracking of the copy protection scheme used in those devices. This has caused a **delay** in the audio version of DVD and has made the release of upcoming DVD-RW devices, which can do the full 4.7GB, iffy. Pioneer plans to release such a device in Japan for about $2,500. It should be able to **copy a full DVD movie.**

Nobody knows what to do about this thing. I say ignore it. I've said this before, and I'll say it again: The number of people who want to dub and sell bootleg movies is **too small** to worry about. People tend to use such things for time-switching a movie rental or for multiple viewings. I personally can barely watch a movie twice, let alone dozens of times, but I know people who do. I suppose they **should pay for ten rentals** if they watch ten times rather than dub off a copy and watch the copy over and over.

China Syndrome Dept. They do things differently in China, where people typically do not have the same disposable income that those in Western nations have. So things have to be done **on the cheap side.** For example, there are few DVD players, as the Chinese market utilizes the cheaper V-CD technology, which shows movies in a fuzzy MPEG-1 format. Now **the Net PC** seems to be gaining a foothold in China in various forms. The models hitting the market now, which are designed for light computing and Web surfing, are mostly Windows CE units. **The most interesting** is the Microsoft Venus project, which is now in production. It looks like a silver VCR with a 3.5-inch drive in front as well as a CD drawer and drive. It runs Windows Chinese CE and is bundled with a so-called mini-Office suite and fax software, as well as browser software. It has VGA and S-Video I/O and can play those V-CDs and karaoke disks too. It's manufactured by TCL, China's largest TV maker, and **costs the equivalent of about $300.** My thanks to Dennis Chang for sending me a picture and specifications for the device.

Microsoft is going to make a sustained effort to flood the market with devices like this and other kinds of equipment to stave off AOL from taking over the online world. The way things are going, AOL is executing the plan originally established by MSN: to circumvent the Internet and become the everyman's portal.

The **recent saber rattling** by AOL regarding its entry into DSL services and very-high-speed access has Microsoft looking for a more interesting play: **satellite uplinks and downlinks.** The typical satellite downlink speed is minimally 40 Mbps. Various vendors of uplink equipment are in talks with Microsoft for the possible **national rollout** of a satellite solution for a targeted $50 a month. For the past few years I've heard of various consumer satellite schemes, none of which have **ever panned out.** If you go on the Web today and query a good search engine on *Internet satellite* or *satellite modem,* you'll see activity all over the place. A sudden emergence of an inexpensive satellite Internet uplink system with good downlink speed would sure get the cable and DSL folks scrambling.



The DVD community is upset over the cracking of the copy protection scheme used in those devices. It's caused a delay in the audio version of DVD.

The earliest satellite **downlink schemes,** which peaked with the DirecTV/Hughes system that limited total bytes to something too small to be practical in today's age of MP3, have not fared well, especially at the paltry 400-Kbps maximum speed. And all these lash-ups have been kludges with a phone line out of the computer hooked to an uplink station somewhere. The system needs **uplink capability** built into the dish to be complete. The Teledesic network of 288 satellites is part of a future scheme that will use two-way systems and provide 64-Mbps downloads, which actually may be relatively slow by the time they launch these things. Meanwhile, we should see various announcements throughout the year for different satellite ISPs, as the world pushes broadband and universal access.

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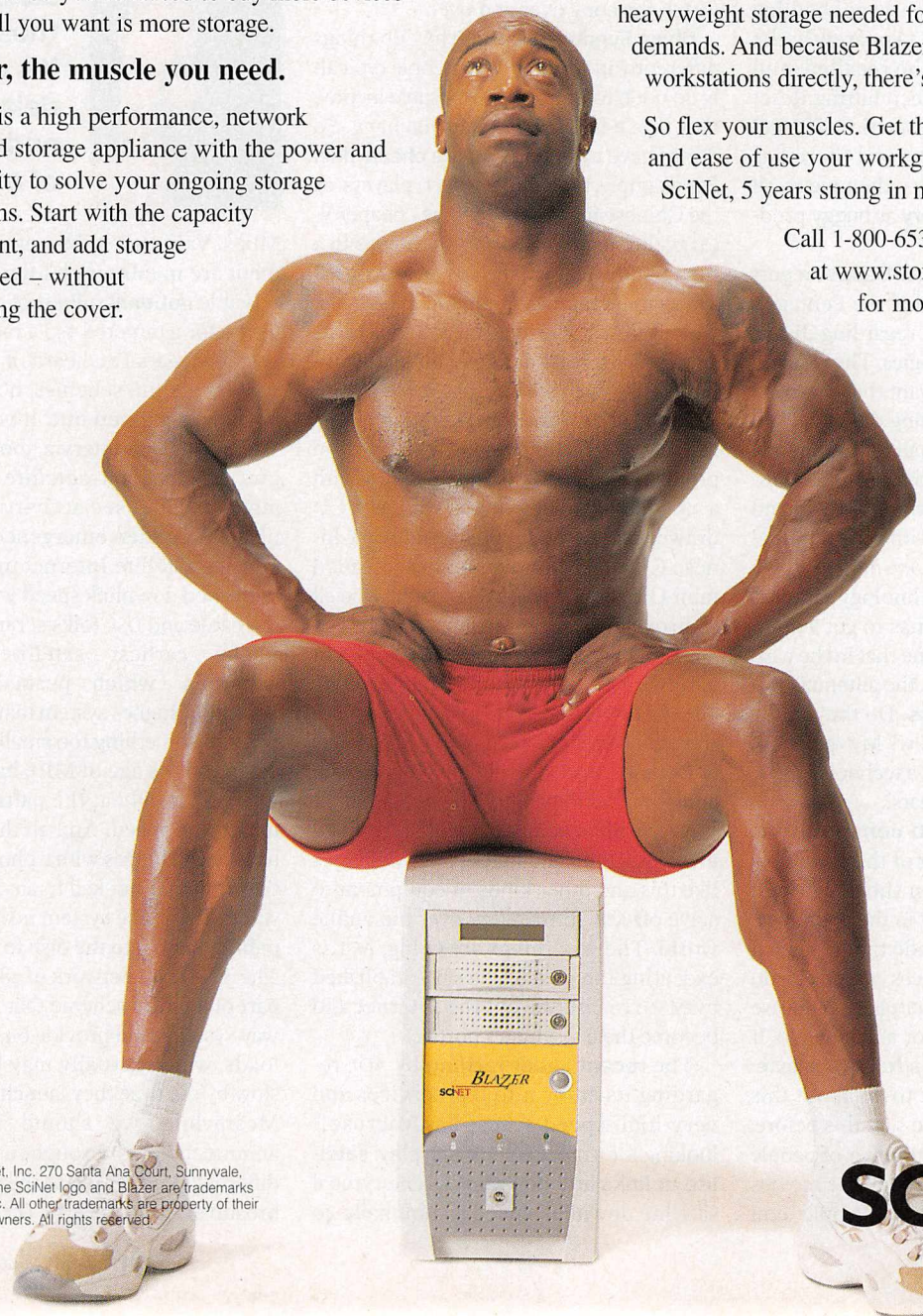

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SCINET™

Time for an "Envelope Server"

The printer vendor that gambles on an envelope server will earn the undying thanks of business people.

Will you join me in a crusade? I've been fighting this alone since 1992, and I'm getting fed up. Maybe if enough of us make enough noise, we'll finally get some action.

The goal is simple: to get one or more of the laser printer makers to produce what I've been calling an "envelope server"—a printer optimized for standard #10 commercial-size envelopes. It should either work as a standalone printer or—this makes more sense—be attached to a network. It should take a stack of 200 or more #10s, print them nice and straight, and collect and stack them when finished.

Envelopes are critical to paper correspondence. Yes, we use more and more e-mail every day. But for nearly every business, plain old #10s are going to remain a key part of its communications with prospects, customers, suppliers, and others, for a long time to come. Yet today we really have only a few choices, all bad, for producing addressed envelopes: using window envelopes, which put unreasonable demands on the formatting of the letter or other contents of the envelope and often messup printer drums; using stick-on labels, which look like hell and shout "tawdry mailing-list-produced commercial pitch enclosed!"; stuffing envelopes into conventional printers, which then slew, smear, and finally jam; or hand-addressing. Or turning to—*gasp!*—a typewriter.

Well, there are other choices. Hewlett-Packard has for years made the only add-on envelope feeders I know of that work reliably for its 3Si, 4Si, 5Si, and 4000 printers. These are nice, and they can convert printers into ones that accept many sizes of ordinary paper and auto-feed up to a hundred or so envelopes. But these are big, expensive beasts.

We need something about the size of an NEC SuperScript 870 or 1800. It should work fine with electronic postage, and it should sell for under a thousand bucks. (Sure, I wish they could do it for $299, but that's unlikely, in part because of the modest volumes they'd expect to sell.)

Actually, I don't think a good envelope server printer would sell in low numbers. Only one maker is likely to gamble on this, and that vendor will earn the undying thanks—and the purchase orders—of hundreds of thousands of harried businesspeople. And because a successful design wouldn't need to be replaced (or "refreshed") every few months, the machine would have a long, profitable life.

Interested? Want one?

Then speak up. Send letters to the major printer manufacturers: Brother, Hewlett-Packard, Lexmark, Minolta, NEC, Oki Data, Panasonic, Xerox, you name 'em—demanding an envelope server. Tell 'em you're ready to buy today.

And let's see if we can get a good answer to an infuriating problem.

Hot Tip: If you still have some of that cash your Uncle Earl sent you for Christmas—or if you're feeling flush and want to give yourself a nice little present—consider the Diamond Rio 500, by far the most appealing of the current crop of pocketable MP3 players. (By the way, it won the Editors' Choice award in this issue's After Hours roundup of portable MP3 players, "MP3 to Go.")

I've seen it priced on the Web from around $200 to $275 or so. You can use a shopping bot, of course, such as mySimon (*www.mysimon.com*), to track down a current low price and its availability.

The Rio 500 is smaller and lighter and more practical than anything else I've seen. (That includes Sony's clever and appealing pen-shaped MP3 player seen at Comdex.) I've gotten more raw pleasure from my Rio 500 than from anything computerish I've bought in years. For portable use, the "earbud" headphones delivered with just the Rio 500 make the most sense, but you won't realize how good its playback is until you plug in studio-quality headphones (such as Sennheiser 580s or Sony 7560s). Awesome.

By the way, a tip on MP3 files: I'm a lot more interested in making my CDs portable than in stealing music off the Web. I get the best results from RIPing and saving cuts from CDs twice: one at 96K, for use in the Rio 500, and again at 192K, for sound I find indistinguishable from CDs when played over a good desktop PC sound system.

Quick correction: I recently raved about the aftermarket close-up system produced by Susan Doel for some recent Kodak digital cameras. Unfortunately, I misidentified the Kodak cameras with which her gizmo works. Susan makes two different adapters, one for the Kodak DC220 and one for the DC260/265/290 (all of which share the same body). Unfortunately, there isn't one for the DC240/280 cameras, because there isn't enough room on each camera's lens barrel to attach an adapter. Interested? You'll find more at *http://home.earthlink.net/~crowboy/closeup.html.*

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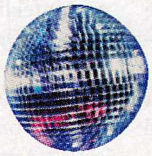

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RIP, Notebook FDD

Few things are more useless than a floppy disk drive built into a portable PC. On the other hand, there's nothing so bothersome as a zealous manufacturer leaving it out of the shipping carton entirely. An external floppy disk drive adds maybe $20 to the system cost but costs $100 if bought separately. The only reason to leave it out entirely is if you want to make a political statement and don't mind annoying users in the process.

In looking over the dozen corporate notebooks sitting on PC Magazine Labs' test benches (see page 192) and in talking with several of the leading notebook vendors, it's clear that we're going to see considerable change over the next 12 months. Including, I hope, the demise of most three-drive notebook computers.

The SpeedStep (originally called Geyserville) version of the 600-MHz Intel Mobile Pentium III, expected to be announced in mid-January, stops desktop PCs from pulling too far ahead on performance. Windows 2000, due in mid-February, gives corporate users a robust operating system that doesn't cripple notebook peripherals and power management the way Windows NT 4.0 does. On-board graphics chip sets have real memory—8MB now and 16MB shortly—so you can make presentations on an outboard monitor at high resolution and full color. Battery life is holding its own.

Over the next year, I believe you'll see two-drive notebooks dominate. Hardly anybody needs a floppy disk drive anymore. On the other hand, if you downsize further and buy a single-drive notebook with just a hard disk, you save only a few ounces and a quarter-inch of height compared with a two-drive notebook with a plastic modesty panel covering the second bay, and about a pound if there's a DVD, CD, or CD-RW drive installed. The difference isn't really 4 pounds versus 5 pounds but more like 10 pounds versus 11 pounds, which is what your shoulder bag weighs when you include your cell phone, transformer, and newspaper, along with the weight of the bag itself.

I can think of half a dozen easy workarounds for data transfer if you don't have a floppy disk drive at hand. On the road you can use one-inch-square Compact Flash (CF) memory cards mounted in PC Card holders (they're up to 160MB now), PC Card hard disks (up to 1GB now), or CD-RW drives, Iomega Zip drives, or Imation SuperDisk (LS-120) drives in the CD/DVD bays of two-drive notebooks. You can transfer files by e-mail or over the network. If you want serious backup capability, consider external hard disks such as the new 12-ounce IBM Travelstar 8GB and 10GB external drives ($430 and $530 street; *www.ibm.com/harddrive*); they draw power from the PC Card socket rather than requiring a bulky transformer. One floppy disk drive alternative for file sharing that I don't like is infrared (IrDA). The technology never took off for lots of reasons, including all the printers and 3Com Palms that don't have IrDA and the fact that the IrDA port sometimes conflicts with other I/O devices on notebooks. In about a year I expect that Bluetooth, the short-range, medium-speed RF wireless protocol, will begin to supplant IrDA.

There are two—perhaps three—types of users for whom three-drive notebooks make sense: home or SOHO users who hardly ever travel, users of notebooks with 15-inch displays (they are beasts already with or without floppy disk drives), and possibly the corporate users who are prone to lose anything not bolted to the PC. For the third group of users, even built-in transformers would make sense.

Over the next year, I believe you'll see two-drive notebooks dominate. Hardly anybody needs a floppy disk drive anymore.

A year from now you'll see notebook makers start to drop parallel, serial, mouse and keyboard ports in favor of USB. There needs to be overlap, because USB accessories are only just now becoming widely available. For instance, we expect that virtually every Epson and HP printer due out this year will have USB; last year, there were only a handful. In the meantime, I hope more vendors put two USB ports—not one—on the notebook itself (putting one on the port replicator doesn't count), and eventually I'd like to see four. To support more than two USB ports, Intel needs to update its chip set to support more USB connectors directly.

If the floppy disk drive shouldn't be integrated, what should? I'd vote for the modem and Ethernet adapter, along with their RJ11 and RJ45 jacks. In other words, no external dongles. Jointly fitting modem and Ethernet on the mini-PCI slot found on many notebooks is possible. For corporate notebooks, the antenna for wireless Ethernet should be built in; Apple already does this.

That said, there still are times when you want to get a single file off a floppy disk, and that's why having a floppy disk drive available is handy. A few dollars extra for convenience is a small price to pay. The greater convenience is never having to lug the drive around involuntarily.

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Guaranteed Annual Premiums/Guaranteed Level Term Period

Female Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 103	$ 125	$ 145	$ 183	$ 205
40	$ 123	$ 158	$ 185	$ 238	$ 260
45	$ 190	$ 215	$ 253	$ 330	$ 385
50	$ 253	$ 290	$ 363	$ 490	$ 495
55	$ 365	$ 413	$ 550	$ 835	$ 1,015
60	$ 503	$ 615	$ 845	$ 2,135	$ 2,400
65	$ 775	$ 975	$1,593	$ 3,900	$ 3,900
70	$1,338	$ 1,600	$2,970	$ 7,220	$ 7,220
75	$2,275	$ 4,870	$5,820	$10,370	$12,420

Male Premiums

Age	10 YEAR	15 YEAR	20 YEAR	25 YEAR	30 YEAR
35	$ 123	$ 138	$ 165	$ 223	$ 253
40	$ 148	$ 183	$ 225	$ 288	$ 335
45	$ 225	$ 300	$ 360	$ 450	$ 513
50	$ 338	$ 455	$ 525	$ 743	$ 828
55	$ 500	$ 670	$ 768	$ 1,640	$ 2,330
60	$ 783	$ 990	$1,335	$ 3,630	$ 3,630
65	$1,330	$ 1,650	$2,693	$ 5,250	$ 5,250
70	$2,473	$ 3,175	$4,860	$ 8,790	$ 8,790
75	$4,400	$ 7,443	$9,600	$13,260	$15,030

"Quotesmith provides a list of all insurance companies & plans that match specific needs. The first to make available this new custom -search service." - *Nation's Business*

"Get quotes on the spot. New source for best buys in insurance. One way to get to know the market. " - *Kiplinger's Personal Finance*

"Quotesmith.com provides rock-bottom quotes. - *Forbes*

"Quotesmith keeps a database of about 350 insurance companies." - *Good Housekeeping*

"Quotesmith offers particularly thorough searches." - *Los Angeles Times*

"Quotesmith will scan the insurers and provide a list of different policies suited to your needs." - *Money*

"This solution has value for those who value immediacy and privacy." - *U.S. News & World Report*

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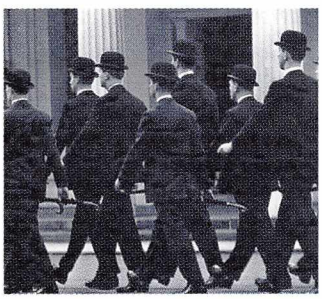
Final premiums and coverage availability will vary depending upon age, sex, state availability, hazardous activities, personal and family health history. The non-tobacco use premiums shown above may include: Banner Life Ins. Co., Rockville, MD, form RT-97; Empire General Life; Brimingham, AL, form TL-06; Jackson National Life, Lansingm MI, form L1665; First Penn-Pacific Life, Hoffman Estates, IL, form BT-1002AA(2-96), Control #B98-198(3/98); General Life, Edwardsville, IL , form 70006; Midland Life, Columbus, OH, form T376 & T678; Ohio National Life, Cincinnati, OH, form 92-TR-1; Old Line Life, Milwaukee, WI, form 80-RCT 79D; Old Republic Life Ins. Co., Chicago, IL, form 8-1077; Valley Forge/CNA, Chicago, IL, form V117-333-A Series; Premium rates shown are not applicable to residents of FL, NJ & NY. Policy forms vary by state. $500 lowest price guarantee not available in SD and has specific terms and conditions detailed at www.,quotesmith.com. California and Utah dba Quotesmith.com Insurance Services: CA #0827712, #OA13858; UT #90093. Some premiums shown are graded premium life policies and/or term-like universal life policies. Term life premium rates always escalate after initial rate guarantee period.

Point. Click. Hire.

BY MICHAEL E. RYAN



Posting a help-wanted ad in the local newspaper is one way to build a workforce, but it may not be effective or flexible enough to suit your needs. Fortunately, you have a number of online options for finding new employees—part-time, full-time, or contract—and managing your workforce. Whether you plan to manage the recruiting campaign yourself, farm it out to a professional recruiting agency, or just keep up to date on the latest topics and employee incentive programs, you'll find all the information you need with just a few mouse clicks.

RECRUIT A STAFF

The Editors' Choice in our roundup of job-hunting Web sites (May 25, 1999) and a member of our Top 100 Sites list, **Monster.com** (*www.monster.com*) is still the best of the category. With easy-to-use job-posting features for employers and a massive library of over 1 million online résumés, Monster provides all of the resources most HR professionals will ever need. Articles and tips for effective recruiting help round out the site.

HotJobs.com (*www.hotjobs.com*), which is also on our Top 100 list, also offers a wealth of recruiting tools and information. Best of all, HotJobs lets employers monitor how often their job postings are viewed and how many résumés have been submitted for each opening. A chat feature lets you link up with recruiter colleagues to discuss the latest HR issues.

JobOptions (*www.joboptions.com*) is another solid job-hunting site with intuitive features for posting and managing job ads. The slick interface is one of the site's strengths, along with the extensive index of HR-related informational Web links.

HIRE A RECRUITING FIRM

If you don't have the resources to launch a full-fledged recruiting effort of your own, you can always outsource the work to a recruiting firm. **Top Echelon** (*www.topechelon.com*) can help you find one that meets your criteria. This Web-based firm maintains a network of recruiters so employers can quickly find one in their area or one that specializes in their field. Just one of many recruiting firms with Web presences, Houston-based **Aapex** (*www.aapex1.com*) specializes in nationwide telecommunications and information technology placement as well as international executive recruiting.

One of the most recognizable companies in online recruiting, **iSearch** (*www.isearch.com/index.htm*) offers services that drive many companies' recruiting efforts. With powerful text analysis tools and applicant-tracking features, iSearch lets companies easily receive, organize, and review applicant résumés. You can also post jobs painlessly through iSearch, spreading the word on the Internet and the major job-search engines quickly.

Career Central (*www.career-central.com*) is a nicely designed site that employers can use to track down the perfect employee. The site provides access to a hefty database of passive job seekers, primarily in the business and software-development arenas. Candidate searches aren't cheap—$3,495 a pop—but to get results quickly, many companies probably won't mind footing the bill.

AUTOMATE YOUR WORKFORCE

Specializing in workforce automation, **Vivant!** (*www.vivant.com*) is an online service that helps companies tackle the entire process of finding, recruiting, managing, and assessing contract IT workers. The entire service is browser-based and easy to use.

A similar service, **Icarian** (*www.icarian.com*), offers a suite of Web-based applications that streamline the process of finding, hiring, and retaining contract employees. The software lets employers manage résumés received from various sources (e-mail, fax, and mail) and track every significant aspect of the hiring process.

Though it doesn't provide the workforce features offered by Vivant! or Icarian, **Workforce Online** (*www.hrhq.com*) is an excellent resource for HR professionals. This one-stop repository offers articles on human resources issues as well as an extensive index of links to product and service providers. Global HR, software, relocation, health benefits, and consulting services are just a few of the topics covered. This is also the online home of *Workforce* magazine.

PROVIDE EMPLOYEE INCENTIVES

Once you hire employees, you'll want to make sure they stay happy. **RewardsPlus** (*www.rewardsplus.com/index.cfm*) provides an array of discounted benefits for employers to pass on to their employees, including health, automobile, pet, and life insurance packages. Other perks include home security discounts and legal services.

For a somewhat simpler approach to employee incentives, try **e-Perks** (*www.eperksbusiness.com*). This site is free to employers and provides various discounts to your employees as they browse around and use e-Perks' many features: free Web-based e-mail, banking and trading, daily headline news, and shopping and travel arrangements through Travelocity.

Netcentives (*www.netcentives.com/crw*) offers a similar service through its ClickRewards@Work program, which lets you award ClickMiles as incentives for any number of tasks or accomplishments, such as employee referrals and sales goals. The ClickMiles are redeemable for frequent-flyer miles on ten major airlines and can also be exchanged for merchandise at CDNow.com, barnesandnoble.com, and other sites.

Flooz (*www.flooz.com/b2b*) provides an online gift-certificate program that simplifies sales incentives, promotions, corporate gifts, special events, and charitable donations. The free service lets you just buy a set number of "flooz" dollars and send them to whomever you wish. Flooz is accepted by several major retailers, including Godiva Chocolatier, Tower Records, and Whole Foods.

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www.lycos.com
McAfee.com
www.mcafee.com
Mercata
www.mercata.com
MindSpring Biz
business.mindspring.net
Monster.com
www.monster.com
MP3.com
mp3.com
MSN.com
www.msn.com
MSN MoneyCentral
moneycentral.msn.com
MyHelpdesk.com
www.myhelpdesk.com
mySimon
www.mysimon.com
myTalk
www.mytalk.com
NECX
www.necx.com
Netmarket.com
www.netmarket.com
Networker.com
www.networker.com
Northern Light
www.northernlight.com
Outpost.com
www.outpost.com
The Palace
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PowWow
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Productopia
www.productopia.com
Quicken.com
quicken.com
Real.com Guide
www.real.com
Reel.com
www.reel.com
RemarQ
www.remarq.com
Scour
www.scour.net
seeUthere
www.seeuthere.com
Service911.com
www.service911.com
Slashdot
slashdot.org
SmartAge
www.smartage.com
Stamps.com
www.stamps.com
TheStreet.com
thestreet.com
SuperFamily.com
www.superfamily.com
SurfMonkey Kids Channel
www.surfmonkey.com
Talk City
www.talkcity.com
TD Waterhouse
www.tdwaterhouse.com
Topica
www.topica.com
Travelocity.com
www.travelocity.com
WebFlyer
www.webflyer.com
Webmonkey
www.webmonkey.com
Web Site Garage
websitegarage.netscape.com
World Wide Web Consortium (W3C)
www.w3c.org
XpertSite.com
www.xpertsite.com
Yahoo!
www.yahoo.com
Yahooligans!
www.yahooligans.com
ZDNet
www.zdnet.com
Zkey.com
www.zkey.com

Web Survey Software

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PRODUCTS REVIEWED

EZSurvey 99 for the Internet
www.raosoft.com
MarketSight 2.5
www.decisionarc.com
Survey Select 2.1
www.surveyselect.com
SurveySolutions for the Web 2.0
www.perseus.com
WebSurveyor 2.0
www.websurveyor.com
Zoomerang
www.zommerang.com

HOT LINKS

American Statistical Association
www.stat.ncsu.edu/info/srms/srms.html
Quirk's Marketing Research Review
www.quirks.com/index.html
Survey Development Guide
www.surveyselect.com/dev_guide.htm
Survey 101
www.perseusdevelopment.com/surveytips/Survey_101.htm
WWW Survey Assistant
www.groupweb.com/download/survey/statsft8.htm

Power Portables

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PRODUCTS REVIEWED

Compaq Armada E700
www.compaq.com
Compaq Armada M700
www.compaq.com
Dell Latitude CPx H500GT
www.dell.com
Dell Latitude CS R400XT
www.dell.com
Gateway Solo 9300XL
www.gateway.com
HP OmniBook 4150
www.hp.com
IBM ThinkPad 390X MNU
www.ibm.com/pc/us
IBM ThinkPad 600X 9EU
www.ibm.com/pc/us
NEC Versa LXi
www.nec-computers.com
Toshiba Portégé 7140CT
www.computers.toshiba.com
Toshiba Tecra 8100
www.computers.toshiba.com
WinBook XL^3 500
www.winbook.com

HOT LINKS

Batteries and more
www.igo.com;
www.3klix.com
Laptop bags
www.port.com;
www.targus.com
Mobile drives
www.micro-solutions.com
Hand-helds
www.casio.com;
www.handspring.com;
www.palm.com

Portable MP3 Players

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PRODUCTS REVIEWED

Audiovox MPDj MP-1000
www.audiovox.com
Diamond Rio 500
www.diamondmm.com
HanGo Personal Jukebox
www.pjbox.com
I-Jam
www.ijamworld.com
Pine D'music SM-320V
www.pine-dmusic.com
RCA/Thomson Lyra
www.lyrazone.com
Sensory Science raveMP 2100
www.sensoryscience.com

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Audiogalaxy
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Emusic.com
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Epitonic.com
www.epitonic.com
Internet Underground Music Archive
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Listen.com
www.listen.com
Lycos Music
mp3.lycos.com
MP3.com
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Riffage.com
www.riffage.com
RioPort
www.rioport.com
SpinRecords.com
www.spinrecords.com
ZDNet Music
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tion
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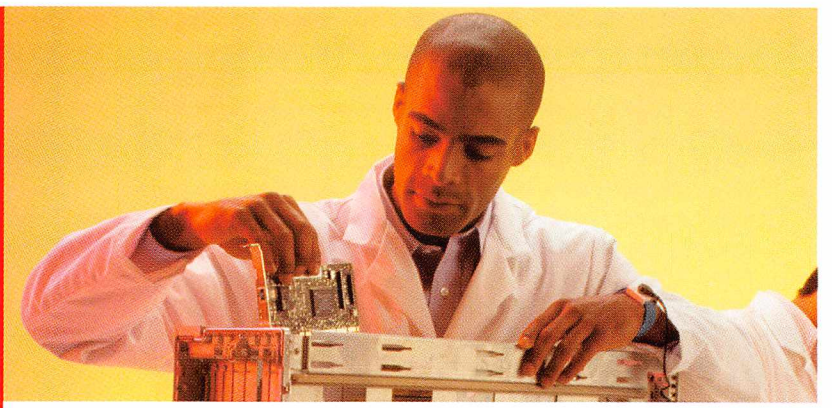
Name brands
SmartCodes
Order status
Same day shipping
Custom configuration
24 x 7 technical support
actory trained technicians
ortune 1000 company
y-side comparisons
se search engine
ole advice
ons



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www.compaq.com/athome
DealPilot
www.dealpilot.com
Dreamweaver 3 Fireworks 3 Studio
www.macromedia.com
Epson PowerLite 710c
www.epson.com
FastSite Release 3
www.lotus.com/fastsite
IBM Travelstar 10E
www.ibm.com
Labtec ClearVoice Digital Microphone
www.labtec.com
NEC MultiSync LT140
www.go.nectech.com
Now You're Talking on the Web
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R U Sure
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SkyMap 2000/GPS
www.etak.com
Sony VAIO XG9
www.sony.com
Sony VPL-CS1 SuperLite
www.sony.com
TripMaker Deluxe 2000
www.randmcnally.com
ViewSonic PJL1005 LiteBird
www.viewsonic.com
Zinnote 2000
www.zinnote.com

Pipeline

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HOT LINKS

AMD
www.amd.com
AT&T Wireless Services
www.attws.com
Bell Atlantic Mobile
www.bam.com
Better Business Bureau Online
www.bbbonline.org
The Center for Computers & Democracy
www.cdt.org/legislation
Consumer.Net
www.consumer.net
Daewoo
www.daewoo.com
Dimensional Media Associates
www.3dmedia.com
E-Color
www.ecolor.com
IBM
www.research.ibm.com
Intel
www.intel.com
Internet Fraud Watch
www.fraud.org
KryoTech
www.kryotech.com
Motorola
www.motorola.com
NEC
www.nec.co.jp/english/today/newsrel/9909/0201.html
net.Genesis
www.netgen.com
Net Perceptions
www.netperceptions.com
Pantone
www.pantone.com
Personalization.com
www.personalization.com
Prodigy Biz
www.prodigybiz.com
Scambusters
www.scambusters.com
Search Engine Showdown
www.notess.com/search
SpringPCS
www.sprintpcs.com
Toshiba
www.toshiba.com

The Top 100 Web Sites

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PRODUCTS REVIEWED

About.com
www.about.com
AltaVista
www.av.com
Amazon.com
www.amazon.com
Andale
www.andale.com
AnyDay.com
www.anyday.com
AOL Instant Messenger
www.aol.com/aim
Ask Jeeves
www.ask.com
Ask Jeeves for Kids
www.ajkids.com
auctions.com
www.auctions.com
Bigstep.com
www.bigstep.com
BizRate.com
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Biztravel.com
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Britannica.com
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CBS Sportsline
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CenterBeam
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Charles Schwab
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Furniture.com
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Garden.com
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Gateway
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Google
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GuruNet
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Hifi.com
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HotBot
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HotJobs.com
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HotOffice
www.hotoffice.com
ICQ.com
www.icq.com
InfoSpace.com
infospace.com
The Internet Movie Database
www.imdb.com
iQVC
www.iqvc.com
iWant.com
www.iwant.com
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Lonely Planet
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AND LINKS

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First Looks

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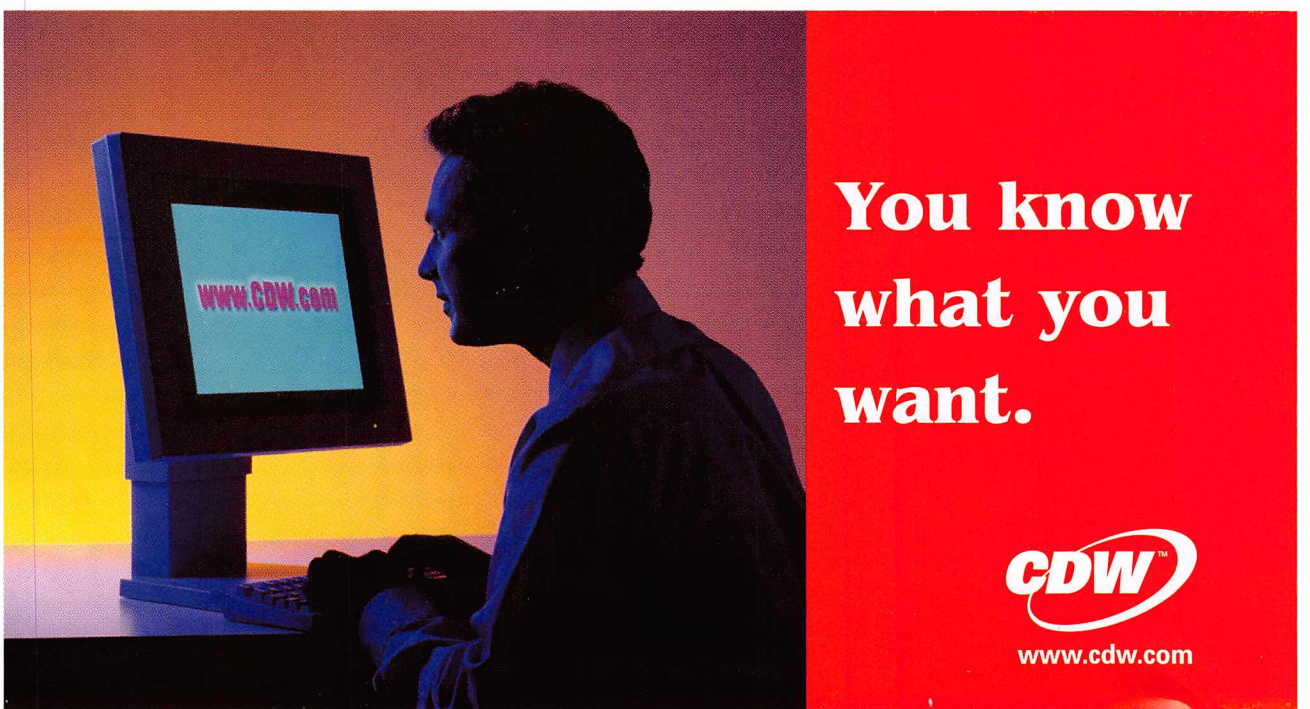

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THE TOP 100

Surfing? How nineties! Don't waste time; use the Web to get things done.

AS WE ASSEMBLED THE LATEST LIST OF OUR FAVORITE destinations on the Web, we began to ask ourselves if a better title for the story might be "The Top 100 Web Services." Have you noticed that the newest and most interesting arrivals online are companies that don't build sites per se, but rather provide compelling services—everything from online postage sales and small-business assistance to party planning and expert advice on a profusion of topics? Yes, most of us shop and pay some bills online today, but our list of sites hints at a not-so-distant future in which much more of our daily lives moves online, and we get things done faster and more conveniently.

In each of the 20 categories you'll find sites and services we feel are especially useful and well designed and that deliver on the promises they make. Some of

BY DON WILLMOTT

WEB SITES

And the Technologies That Make Them Work

the selections are recent Editors' Choice winners, while others are subjective choices made by *PC Magazine* editors who spend copious amounts of time analyzing the Web. We've added several shopping categories to our list, and we've expanded our coverage of Web-based services targeted at small businesses.

We've also asked some of the biggest and most successful sites to tell us about the technologies behind their sites. What tools do they use to build such large and complex Web destinations? Check out the interesting mix of off-the-shelf products and custom solutions that they depend on.

As you look all these sites over, see if you agree with our assessment that the Web has become a truly useful daily companion in countless (or at least 100) ways.

MORE ON THE WEB: Get easy, one-stop access to all the sites in our list, talk back and give us your opinion of our selections, and nominate your own favorite sites for our next list. For a printed list of all 100 sites, see Site Finder. **www.pcmag.com/special/web100**

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152 Lonely Planet Online
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158 Surf Monkey Kids Channel

Our contributors: **Don Willmott** is executive editor of PC Magazine Online, and **Cade Metz** is a senior writer at *PC Magazine*.

CAREERS

EXP.com
www.exp.com

This intriguing site offers benefits to both casual visitors and independent businesspeople looking for a place to market their expertise. On the one hand, it's a place for Web surfers to find experts who can answer their questions; on the other hand, it's a place for experts to sell advice or consultations, or to offer their services for a fee.

FreeAgent.com
www.freeagent.com

The nature of work is changing. If you've struck out on your own and are now selling "the brand you," you'll find lots of help at this home base for freelancers and e-lancers of all kinds. You can find services such as insurance and retirement plans that are sometimes hard to get when you're self-employed.

HotJobs.com
www.hotjobs.com

This job-hunting site has about 3,000 registered recruiters looking over the résumés of over 300,000 people who have listed themselves. What's different and interesting here is that headhunters aren't allowed, and you can block your résumé from being seen by companies you specify.

Monster.com
www.monster.com

The most compelling addition to this massive job-hunting site is the Talent Market, a place where 97,000 e-lancers have put their skills up for bids. In case you'd rather find a more traditional job, you can search the database by location and company, create a résumé, apply online, and research companies.

Networker.com
www.networker.com

Much of your professional success comes through the people you know and the people you meet. But where can you find them? Networker.com has editors in 21 major cities whose job it is to alert you to events, trade shows, and association meetings in your areas of expertise. Just sign up and tell the site where you live and what you're interested in.

CHAT/INSTANT MESSAGING

AOL Instant Messenger (AIM)
www.aol.com/aim/

AOL Instant Messenger is the most popular instant-messaging (IM) client around, and it's a good place to start. The download is fast and easy, and if you're already an AOL user, you can use your current screen name and password. Within office workgroups, IM is taking off as a faster and easier method of communication than e-mail.

ICQ.com
www.icq.com

Long before latecomers like Microsoft tried to muscle in, ICQ was the tool Web users downloaded to handle instant messaging. The latest addition: a feature that lets you create ICQ communities around special interests.

The Palace
www.thepalace.com

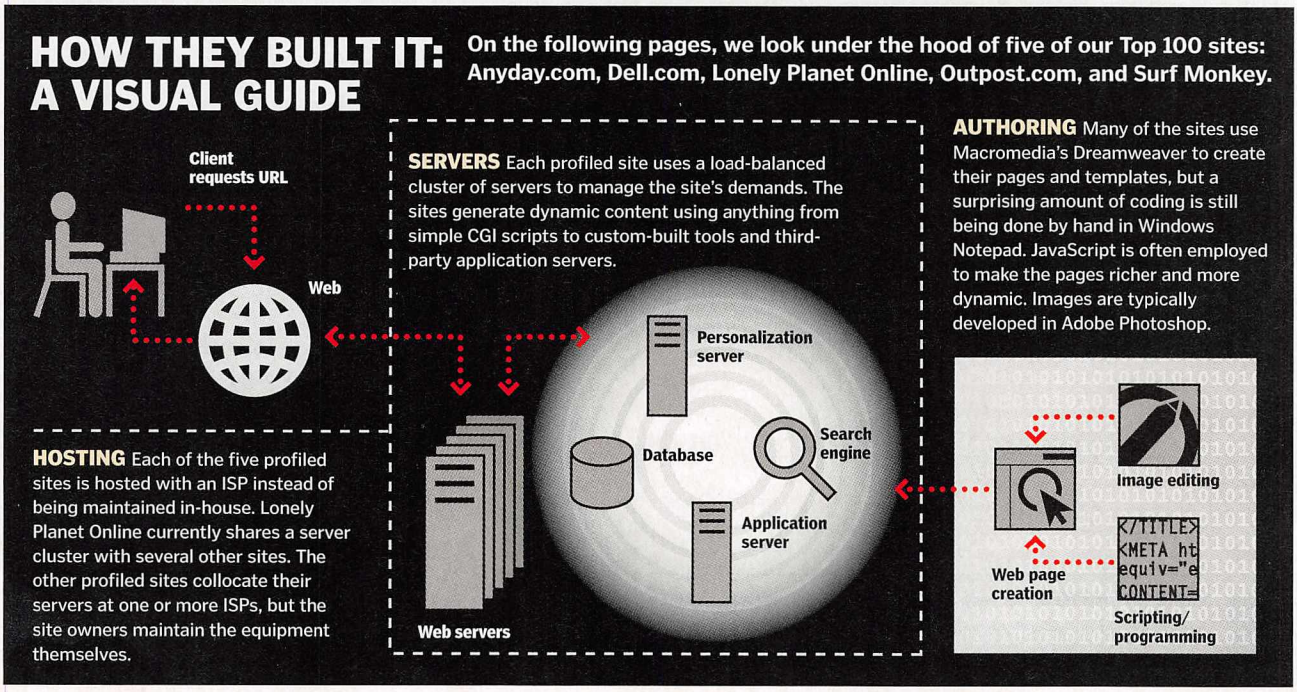
More than a million users are fiercely loyal to The Palace's world of avatar-driven communities, some of which even intermingle live streaming video. Want to give your avatar a voice? No problem. That's the newest enhancement to the software.

PowWow
www.powwow.com

This instant-messaging client isn't nearly as well known as those from AOL, MSN.com, or Yahoo!, but it will be, given the ability of Version 4.0, which won our Editors' Choice ("Chat Goes to Work," 1/18/99), to intermingle messages from AIM, MSN Messenger, and PowWow

HOW THEY BUILT IT: A VISUAL GUIDE

On the following pages, we look under the hood of five of our Top 100 sites: Anyday.com, Dell.com, Lonely Planet Online, Outpost.com, and Surf Monkey.



users. Now everyone you know who uses instant messaging can show up in one very full-featured PowWow window, and you can keep track of who comes from where. The window is also a minibrowser, with its own search tool and tabs that deliver Web-based information.

Talk City
www.talkcity.com

This chat site is more than just a hangout for a million people chatting under the watchful eyes of 2,000 moderators. It also farms itself out to other sites, providing community and home-page services to the likes of Amazon.com, MSN.com, and NBC.com. Businesses can hire Talk City to run online focus groups and conduct research.

COMMUNITY/OPINION

Deja.com
www.deja.com

This site is something of a consumer free-for-all, where people come to rate their favorite things in countless categories, take polls, and share opinions. It's a big and boisterous community with plenty of commerce links, so you can chat about Jodie Foster movies, rate them, and then buy them easily.

Epinions.com
www.epinions.com

Nothing will inspire you to buy a particular product, read a particular book, or see a new movie faster than positive word of mouth. Epinions.com collects people's opinions about the things they buy, and as you read them (and share your own opinions), you flag the people and the opinions that you find most useful. The site pays you from 1 to 3 cents per page view if people read the reviews you write.

RemarQ
www.remarq.com

This site offers more than 30,000 discussion forums that are easier to navigate and search through than traditional newsgroups. You can search for messages within a specific forum, keep track of your favorite discussions in a separate area within a forum (and on your personalized home page), and find the best discussions by taking advantage of the site's four-star rating system.

Topica
www.topica.com

Often overlooked in the online discussion and community hubbub are special-interest mailing lists, which were actually one of the Internet's first tools for letting like-minded people communicate with each other. Topica hasn't forgotten: The site gives you the tools you need to manage your participation in several mailing lists (there are more than 40,000 to choose from) or to set up your own.

XpertSite.com
www.xpertsite.com

Sites that offer experts who are willing to answer your questions are popping up all over the Web. At XpertSite.com, most experts participate for love, not money. They want to share what they know, build reputations as experts (you can rate your experiences with an expert), and maybe drum up some business along the way.

HOW THEY BUILT IT

AnyDay.com

AnyDay.com has been around for only a year but has already made significant changes to the development process and hosting of its Web site. It's an online PIM (personal information manager), providing day planners, contact databases, and alerts to public events that may be of interest, including sporting events, book releases, and movie premieres. Created by three developers, AnyDay.com was initially a Microsoft-centric site, hosted on Windows NT servers rented from an Internet service provider. Today, AnyDay.com has a development staff of 20, relies on Linux and Solaris, and rents nothing more than rack space and bandwidth from its service provider.

AnyDay originally developed its site with Windows NT using Microsoft Active Server Pages, JavaScript, and an Oracle database. Developers coded most of the pages by hand and used Adobe Photoshop for creating graphics. During an initial beta phase, Digix, an ISP in Washington, D.C., hosted AnyDay.com. Digix owned the site's servers and insisted on managing those servers.

IN CONTROL

AnyDay.com maintains its own servers at its ISP, preferring the control that collocation affords.

Within months, this situation proved untenable. Based in Boston, AnyDay.com's developers felt that the servers were too far away and found Digix's efforts at management—meant to help—a hindrance. "An Internet site is always developing and changing rapidly," says Greg Arsenal, vice president of technology at AnyDay. "We ended up needing to have a geographic proximity."

So the company bought its own HP servers, started managing them, and set them up at a Boston branch of Exodus, AnyDay's new service provider. Today, the site is hosted on several systems: a few Windows NT servers, a Solaris database server, and several Linux machines. Only recently did AnyDay move into what Arsenal calls "a Linux-based, more Java-centric space."

The company has made an effort to use the right platform for the right task. "We try to do best-of-breed rather than one-stop shopping," says Arsenal. AnyDay uses Windows NT because it can accommodate portions of the site developed in the past; Linux for several new services, including Web-based and content-based services running behind the Web servers; and Solaris and Oracle because of their perceived scalability. "Our application has to be extremely responsive," says Arsenal, "and it has to very scalable—to millions of customers."—*Cade Metz*

COMPUTING

CNET
http://cnet.com

This well-designed technology portal reports on computing products and trends and discusses living with the technology around us. You'll find technology news, product reviews, and links to its TV shows. Head to Download.com for free software and to Gamecenter.com for fun and games.

McAfee.com
www.mcafee.com

You probably know McAfee for its antivirus tools, but its site offers much more for the conscientious PC owner. For $29.95 a year, you can subscribe to the McAfee Clinic, a collection of Web-based apps to keep your PC tuned up and virus-free.

MyHelpdesk.com
www.myhelpdesk.com

At MyHelpdesk.com, 1,500 products are covered: You get quick access to vendor resources and phone numbers; chat rooms and message boards related to each product; instant access to the latest tips, updates, and news about the applications you use; and FAQs for each application and product.

Service911.com
www.service911.com

This new and rather remarkable site wants to help you solve your computing problems, and it's willing to provide real live human beings to help you get the job done. Have a question? Check out a video tutorial. Not good enough? E-mail your question and an expert will answer within a day. Not fast enough? Chat live with an expert who will tackle your questions. Still stumped? Ask an expert to come to your home or office (for a fee).

ZDNet
www.zdnet.com

This massive technology portal—and *PC Magazine*'s home on the Web—underwent a redesign in October to bring its many resources to the surface. The site offers a seemingly endless supply of breaking news, analysis, and product and game reviews (with links to current prices), and the huge Software Library continues to add dozens of downloads each day. At SmartPlanet.com, you can choose from among 350 computing courses, and the recently added Updates.com lets you register for automatic notification when your software needs a fix.

ENTERTAINMENT

CBS SportsLine
www.sportsline.com

Though ESPN.com has been on our Top 100 list many times, CBS SportsLine is catching our eye these days with its elaborate, statistics-filled, and visually appealing live broadcasts for sports such as baseball and basketball. The SportsPlayer download mixes a small streaming video image with all sorts of stats, and if you're truly addicted, drop the Newscenter ticker onto your desktop for frequent updates.

The Internet Movie Database
www.imdb.com

The IMDB, owned by Amazon.com, is a longtime member of our list. Use it to find information on more than 216,000 movies; it will never let you down. But that's just the start. You'll also find local movie times, entertainment headlines, reviews, and columns.

MP3.com
mp3.com

1999 was a wild year for the MP3 music format. More PC users (and more record companies) now understand that MP3 is the future of music delivery. MP3.com is the place to get your MP3 collection started and to learn what you need to know. You'll also get access to thousands of legitimate song downloads.

Real.com Guide
www.real.com

This site is nothing less than a streaming media portal, guiding you to all the best the Web has to offer in audio and video, including MP3 downloads. You'll also find links to online radio stations and to Take5, the site's daily index of fun streaming Web content, selected each night by a team of RealNetworks editors.

Scour
www.scour.net

As the Web's most complete guide to broadband content, Scour feels a little ahead of its time, though those with fast access will certainly flock to its 900 movie trailers, 1,200 music videos, and its collection of online radio stations. Its search engine specializes in hunting down multimedia content.

FAMILY/EDUCATION

Ask Jeeves for Kids
www.ajkids.com

Like its big brother Ask Jeeves, Ask Jeeves for Kids lets you frame your Web search queries in plain English. Having been vetted by editors, all the results are deemed to be child-friendly. AJKids has also found a place in the classroom.

Disney.com
www.disney.com

Oh, Pooh! Disney.com, part of the GO Network, is a very interactive site, with many different activities for kids and lots of content for parents, most of which, of course, is geared toward marketing Disney's abundance of products and characters.

Discovery Kids
www.discoverykids.com

This spin-off of the Discovery Channel will captivate any curious child with its supply of projects, adventures, and articles about the world around us. Don't miss the Automatic Adventure Personality Profile, which lets kids personalize the site.

SuperFamily.com
www.superfamily.com

Want to set up a Web site so your extended family can exchange photos, news, and calendars? This is the place to do it, where free sites are a breeze to set up and maintain. (You get 15MB of storage and can pay for more.) The photography tools are most notable here, but you can also create a family newspaper, share shopping and wish lists, hold discussions, and trade e-mail messages. Also

check out SuperFriends.com, for groups of friends.

SurfMonkey Kids Channel

www.surfmonkey.com

Parents who worry about where their kids go on the Web

should take a look at this fun and family-friendly Web directory. Every link is guaranteed to be great for kids, and you can add the SurfMonkey Bar for safer surfing.

FINANCE/INVESTING

Charles Schwab

www.schwab.com

Schwab doesn't offer the cheapest rates for online trading, but in our survey of Web site satisfaction ("Readers Rate the Web," November 16, 1999) it gained high marks for research tools and customer support.

MSN MoneyCentral

http://moneycentral.msn.com

All of MSN MoneyCentral now lives up to the excellence of the Investor portion of the site. You'll find subsections devoted to every aspect of your financial life. Recent additions to the site include electronic bill payment, limited real-time stock quotes, a revamped portfolio manager, and a new 401(k) planner.

Quicken.com

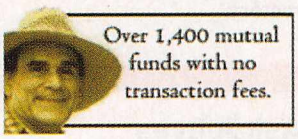
http://quicken.com

Investing, mortgage, insurance, taxes, banking, and retirement: You'll find services related to all of these at this financial portal. The goal is to aggregate everything having to do with your finances into one site. Every service at the site, be it an getting an insurance quote, finding a mutual fund, or planning retirement, is easy to use, with lots of drop-down menus and step-by-step instructions.

TD Waterhouse

www.tdwaterhouse.com

This online stock-trading site was lauded in our November survey of Web site satisfaction for its low rates—typically just $12 per trade. You'll find extensive amounts of free research, 24-hour customer service and technical support, and a real-world network of 160 branch offices. The site also offers access to 8,900 mutual funds and free IRAs.



TheStreet.com

http://thestreet.com

TheStreet.com has the best online financial journalism around. You'll have to pay for it, though: The service costs $9.95 per month or $99.95 per year. Try it out first with a 30-day free trial, and even if you don't end up paying you'll still be able to access some of the site's great information.

LIFESTYLE

AnyDay.com

www.anyday.com

AnyDay.com is the best non-portal-based online calendar. Designed by Lotus Organizer alumni, the site includes an integrated calendar, address book, reminder service, and task manager with an event directory that lets you blend in your favorite sports events or TV shows.

HOW THEY BUILT IT

Dell.com

In 1996, Michael Dell asked his Web development team to build an e-commerce site that could handle 50 percent of all Dell computer sales. "At the time, we thought that was quite a stretch," says John Zogland, Dell's director of online technology, "but now we're getting very close to reaching that goal." The success of Dell.com happened with help from Microsoft software and Dell PCs and servers. Dell still relies on that combination, but the company recently added its own XML publishing tool.

From the beginning, Dell.com relied on Microsoft's Internet server products, including ISS (Internet Information Server), Commerce Server, and SQL Server. "We were one of the first [major PC sales sites]," says Zogland, "so we've had to build a fair amount of things on our own using the core tool set from Microsoft." First hosted only in Austin, Texas, the site now resides on Windows NT–equipped Dell servers in many more locations. "Globally," says Zogland, "we have multiple ISPs, and we have redundant geography—servers in Austin, the U.K., Japan, and others."

THINK GLOBAL

Dell built its own tools to preserve a consistent look across all versions of its Web site while incorporating the latest, region-specific content.

In the past, Dell would hand-code or build Web pages using standard authoring products such as Microsoft FrontPage, but such methods soon became inadequate. The content Dell wanted to have on the site was changing faster than people could code. In addition, Dell.com expanded, and content was starting to vary from country to country. "Historically, even in the major regions," says Zogland, "they would have a lag time getting content out, because the new product information would be out, but they would have to wait for someone to rebuild the pages and retranslate a lot of the material."

Dell found the answer in XML (eXtensible Markup Language). Making extensive use of XML, Dell created a customized publishing tool that let all Dell developers in all parts of the globe use the same predefined set of scripts to create all new Web pages. Each page retained the site's familiar appearance while dynamically drawing content from an independently updated database of models, components, prices, and so on. "The real advantage of this tool," says Zogland, "is that our customers around the world have access to data in real time." Now, though the core of the Web site is maintained primarily in Austin and the U.K., pages are created in more than 80 different countries.—*CM*

eHobbies
www.ehobbies.com

Here's a really good example of a *vertical portal,* a site designed to serve all the needs of a particular niche—in this case, the millions of people obsessed with model trains and rockets, radio-controlled vehicles, and so on. There are articles and tips on every relevant topic, sensible shopping that

covers all the categories, lively communities full of aficionados, and an online magazine.

eHow
www.ehow.com

How do you set a table? Treat a cold? Ask for a raise? You can find detailed responses to thousands of questions at eHow, and each answer is accompanied by a list of items you may want to buy to help with the task you're trying to accomplish. Though the shopping side of the site needs work, the answers to the questions are fun and sometimes educational.

Evite.com
www.evite.com

When you have to organize any kind of event for 6, 8, 20,

50, or even 100 people, you've got to call or e-mail everyone, collect RSVPs, give directions, and make sure you don't end up with 20 bowls of potato salad. Evite.com automates everything. You fill out a form that describes all the parameters of the event and all the invitees get an e-mail directing them to the Web, where they encounter a mini-Web site devoted to your event.

seeUthere
www.seeuthere.com

Like Evite.com, seeUthere helps you organize events online, but it also tackles larger-scale meetings and includes tools for ticketing. That means you can use it for things like charity fund-raisers, conferences, and reunions, and you can make contact with your list of invitees via fax, letter, postcard, or e-mail. People can RSVP by phone, and the site can handle credit card transactions. (There are fees for all these services.)

- Association meetings
- Awards dinners
- College reunions
- Conferences
- Conventions
- Fundraisers
- Holiday galas
- Seminars
- Speaker events
- Training classes
- And more ...

PORTALS/START PAGES

About.com
www.about.com

At first glance, About.com looks like any other directory or portal, but who are those people on the home page? They're a few of the site's 650 *guides,* people who have signed up to take responsibility for a particular subcategory within the site's 18 major categories. Anyone with a particular area of expertise is invited to apply.

Lycos
www.lycos.com

In the past, we've questioned Lycos's strategy of letting each addition to its network (Angelfire, HotBot, Tripod, and the rest) keep its distinct identity. But now that Lycos has universal registration across all its sites and an omnipresent channel bar, things are better. Meanwhile, the site has beefed up its searching, with tools that scan thousands of non-Web-based resources.

MSN.com
www.msn.com

MSN.com is now a highly evolved portal competitor with a brand-new interface, featuring a universal in-box

that handles both e-mail and chat threads; MSN Mobile, for sending news headlines and stock quotes to wireless gadgets, including cell phones; free home-page building; a vastly improved search engine; and a new shopping directory.

Yahoo!
www.yahoo.com

Yahoo! is now the center of many people's Web experiences. It includes auctions, shopping, Web store setup, chats, and instant messaging. It was our Editors' Choice pick for portals ("Start Here," 10/5/99), and in our November survey of Web site satisfaction, readers gave the site the only A grade awarded to a portal.

Yahooligans!
www.yahooligans.com

Kids use the Web, too, and they deserve their own portal to guide them to appropriate content. The editors who put together Yahooligans!, a kid-friendly subset of the massive Yahoo! directory, have done a great job of creating a useful window into the Web for children.

REFERENCE

Ask Jeeves
www.ask.com

Like Ask Jeeves for Kids, Ask Jeeves lets you do your Web research by asking questions in plain English. Then it scours the Web for the answers and provides you with links to the information. In practice, the system works reasonably well, although it can disappoint at times.

Britannica.com
www.britannica.com

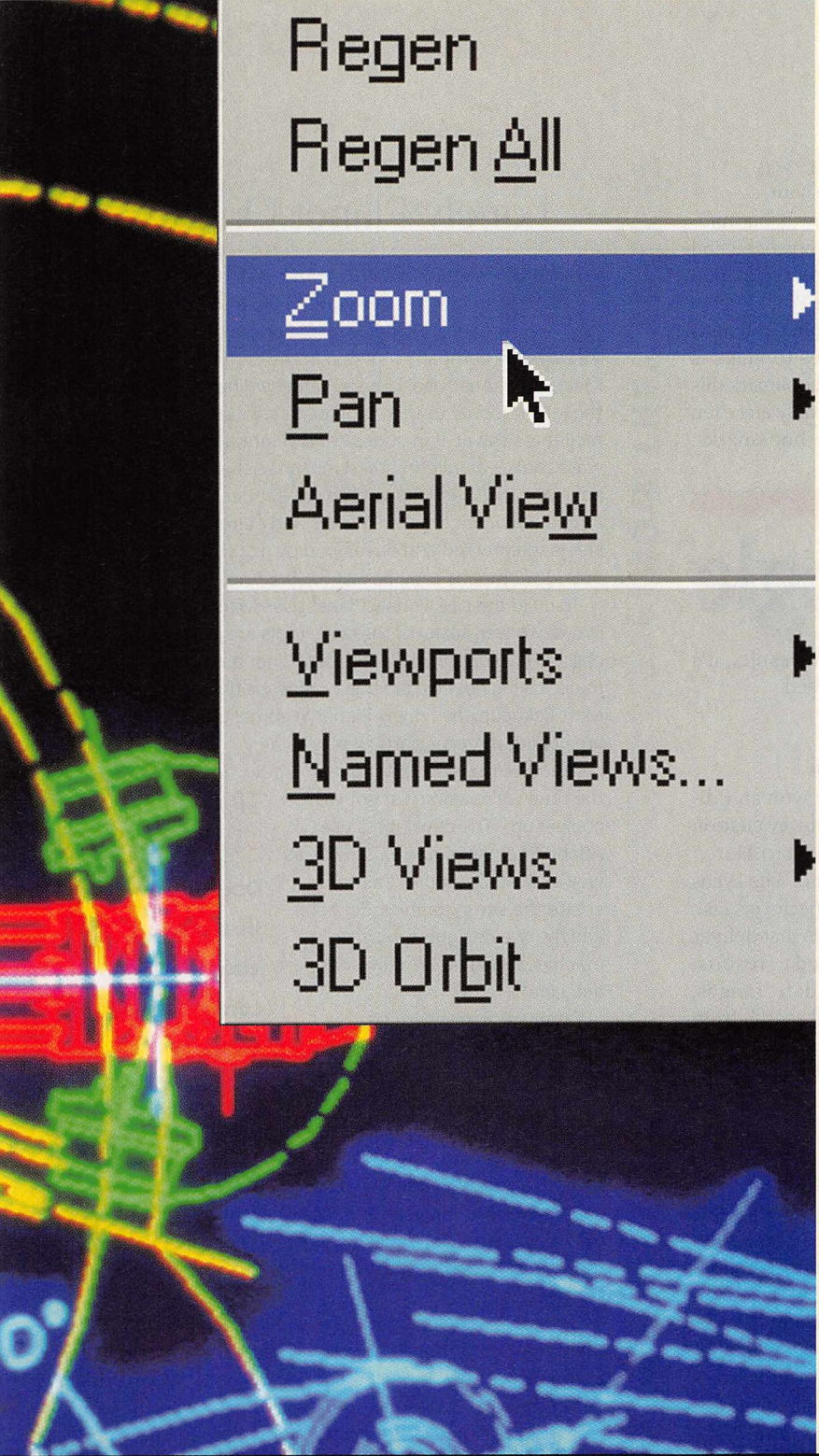
Unbelievable. The contents of the *Encyclopædia Britannica* are available online free, along with related articles from 76 top magazines and links to 125,000 Web sites. It's a remarkable research tool, and when you think about it, it's probably worth the cost of a computer to have such a resource available.

DeepCanyon
www.deepcanyon.com

This spin-off from Hewlett-Packard is a research site targeted at computer and Internet marketers. It aggregates all sorts of industry research, making some available free and some for a fee. The result is a remarkably useful and informative site.

GuruNet
www.guru.net

GuruNet isn't a site but rather a free download that takes advantage of the power of the Web to perform instant, one-click research on any word you read or type. Click on the word *Ford* and if it's before the word *Motor,* GuruNet gives you a brief company profile, a stock chart of the past year, a chart



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of the current day's stock activity, and links to recent news stories on Ford Motor Co. Click on *Ford* when it follows *Henry* and GuruNet retrieves a biographical profile from The Concise Columbia Electronic Encyclopedia.

InfoSpace.com
http://infospace.com

You may not know it, but InfoSpace.com is the power behind many of the directories you find all over the Web. Everything from people finders to the Yellow Pages to maps is here, so you can bookmark this one site and probably erase ten other reference bookmarks.

SEARCH

AltaVista
www.av.com

Too many ownership changes have left AltaVista struggling for an identity, but its latest look, unveiled last fall, sends it in the direction of portals. It's more like Yahoo! than ever and includes a customizable home page for the first time (featuring audio and video), along with more direct links to Shopping.com (which the site owns), discussions, and even the promise of free Internet access.

Direct Hit
www.directhit.com

Like Google, Direct Hit, which is integrated into such sites as HotBot, LookSmart, and Lycos, is a relevance engine that analyzes the activities of millions of previous Internet searchers to determine the most relevant sites for your search request.

Google
www.google.com

This unique search engine started out as a Stanford University project designed to find the most relevant Web pages (those with the most inbound links) and run searches against them. Since February 1999 it's been a commercial venture, and given its uncanny knack for returning extremely relevant results, it's destined to succeed.

HotBot
www.hotbot.com

This search site won an Editors' Choice in our evaluation of search sites ("Start Here," 10/5/99); it's part of The Lycos Network, and it performs fast, accurate searches that deliver relevance-ranked results. Search within date ranges, then do a second search from the results of your first search. The results: better search returns.

Northern Light
www.northernlight.com

This two-time winner of our Editors' Choice for Web searching puts your search results into folders based on their sources, making it easier for you to figure out which results you should focus your attention on. The site also provides access to non-Web-based information from over 5,400 magazines, newswires, and academic journals that you can't find anywhere else online. New to the site is SearchAlert, which e-mails you when an item in a category you've specified is added.

HOW THEY BUILT IT

Lonely Planet Online

You don't need a staff of hundreds to create a successful Web site. Operated by Lonely Planet Publications, a travel book company founded in the early 1970s in Melbourne, Australia, Lonely Planet Online speaks to the international tourist, profiles destinations, and facilitates travel. It includes several interactive software tools—a bulletin board for those seeking travel advice, e-mail services, and so on—but consists mainly of text and iconography. Writers and editors aside, the site is maintained and developed by a staff of three; an outside company provides all the hosting.

To build the site, Lonely Planet uses Macromedia's Dreamweaver. Many of the site's tools are run by specialized CGI scripts written in Perl. "I get quite a few e-mails asking how we did this or how we did that," says Matt Eckhaus, the Lonely Planet Webmaster. "People are hoping there's a particular product we're using, but most of the time we're using a script we cooked up." The developers use Adobe Photoshop and Illustrator, as well as MetaCreations' Painter, to create the site's graphics. Eckhaus and his two designers work on machines running Windows 98 and Linux.

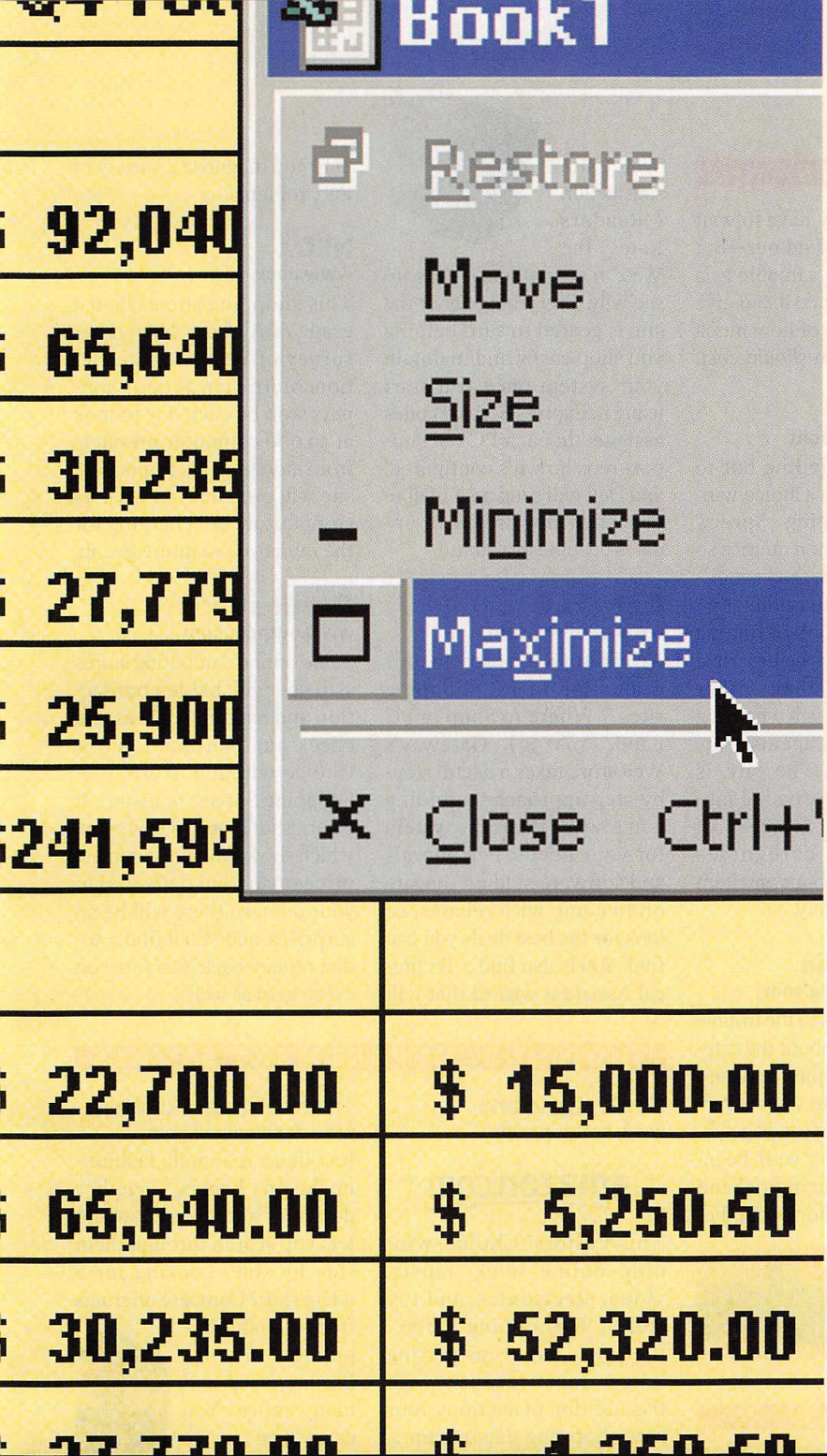
IT DOESN'T TAKE A VILLAGE

One of the best travel sites around, Lonely Planet Online is run by just three staffers.

Connect.com, a service provider in Melbourne, hosts Lonely Planet's site. Connect.com shares space with several other Australian Web sites on a cluster of four or five Sun Solaris machines running Apache, the open-source Web server. Lonely Planet Online is staged and tested on servers at Lonely Planet's offices, then transferred via FTP and Async, another open-source tool, to Connect.com.

Lonely Planet has recently moved its Web development team to Oakland, California to achieve smoother interaction with companies, such as Yahoo!, that license the site's content. Soon, the company will chose a new service provider and also move the site stateside. "We're moving not because we're unhappy with our service provider in Melbourne," says Eckhaus, "but because nine-tenths of our traffic comes from the States, and bandwidth is cheaper."

Increasingly popular, Lonely Planet Online receives over 350,000 page views a day (according to the company), but content is meant to supplement the company's travel book business. Eckhaus does anticipate significant improvements to the site, including more interactive tools and automation. You can do much more on the Web than you can in a travel book.—*CM*



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SHOPPING ASSISTANTS

BizRate.com
www.bizrate.com

Which online stores really know how to serve their customers? The answer is at

BizRate.com, a site that compiles information from satisfaction surveys attached to over 1,700 stores. The result: ratings of up to five stars that reflect how shoppers feel about a store's ordering process, selection, and prices.

DealTime
www.dealtime.com

This shopping bot is unique. Unlike its competitors, it stays on the case even if you can't find the item you want at the price you want. Just give it those two pieces of information and it will continue to search the Web for you until it finds the item. Then it will notify you in the downloadable Desktop Notifier and you can go make the purchase.

Mercata
www.mercata.com

The concept here is simple: If a gang of people can get together to make a volume purchase of laptops, VCRs, or anything else, they'll get a better deal. This method of shopping isn't for everyone—you can't be sure how low the price will go, and you may have to wait several days to find out—but Mercata is also valuable as a research site, since it can give you a good idea of how much a particular item *should* cost.

mySimon
www.mysimon.com

This is the shopping bot to beat. An Editors' Choice winner ("E-Shopping Spree," 11/16/99), mySimon queries so many sites (more than 1,700—it looks at 15 for tea alone) that it does a better job of finding the best deal than other shopping agents do. The site is divided into dozens of categories that cover just about any item you're likely to buy.

Productopia
www.productopia.com

Productopia goes to the trouble of teaching you about the category you're shopping in before it sends you off to shop at recommended stores (or dispatches a bot to shop for you). Be informed: Read the tutorial and visit the discussion group before you decide which watch, pants, or garden tractor you want.

SHOPPING: COMPUTING

Chumbo.com
www.chumbo.com

This online software superstore was awarded our Editors' Choice for the second time in our most recent shopping evaluation ("E-Shopping Spree," 11/16/99). The site is arranged by six easy-to-browse main categories, and the posted reviews from users and ZDNet give it a sense of community. Meanwhile, the excellent downloadable software section points users toward the future.

Dell.com
www.dell.com

This PC shopping site earned a grade of A in our survey of Web site satisfaction ("Readers Rate the Web," 11/16/99), and it's easy to see why. Everything about the site is geared toward helping you shop easily and maintain your system once you start using it. Express Service codes assigned to each PC tell support reps how it's configured, and Dell will send an e-mail to you when new drivers or updates become available .

Gateway
www.gateway.com

An Editors' Choice in our evaluation of PC shopping sites ("Where to Shop in PC Land," 9/1/99), Gateway's Web store takes a useful step-by-step approach to guiding you toward the right system for your needs. Peripherals and software sold on the site often come with rebates, so look for the best deals you can find. You'll also find a Technical Assistant wizard that will help you diagnose a variety of PC problems.

NECX
www.necx.com

This shopping site earned a grade of A in our November survey of Web site satisfaction. More than 25,000 shoppers stop by each day to look at 30,000 computer products from 1,100 manufacturers. The site will even tell you what its competitors are charging for the items you're interested in.

Outpost.com
www.outpost.com

Some online computing stores slap you with hidden transaction and handling fees as you check out. Not this Editors' Choice-winning store ("E-Shopping Spree," 11/16/99). It offers the TruePrice system, which shows you the complete price of an item delivered to your door, so there will be no surprises, and you'll find a 30-day, money-back guarantee on every item as well.

SHOPPING: DEPARTMENT STORES

Amazon.com
www.amazon.com

This Editors' Choice–winning online book, music, video, electronics, and toy store ("E-Shopping Spree," 11/16/99) just keeps getting bigger, most recently with the addition of auctions, four new shopping departments, and the daring zShops, which gives any retailer willing to fork over a portion of the proceeds the ability to use Amazon.com's infrastructure (Amazon.com takes responsibility for customer service). Our readers like it, too. The site received a grade of A in our survey of Web site satisfaction ("Readers Rate the Web," 11/16/99).

fashionmall.com
www.fashionmall.com

Just like a real mall, fashionmall.com brings together dozens of stores you know and lets you search through them side by side. Looking for a white shirt? Compare offerings from Banana Republic, Brooks Brothers, Gap, and many more. You can shop in as many stores as you like, but you'll only check out once: Watch for the free deals at the bottom of the home page.

FreeShop.com
www.freeshop.com

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com, the directory lists over 1,000 freebies you can find online. True, most of them are catalogs, newsletters, coupons, and sample magazines, but you may find something in a category that interests you, and you can use the site as a jumping-off point to the areas you care about most.

iQVC
www.iqvc.com

Among online department stores, iQVC received the highest ratings in our November survey of Web site satisfaction. Years of experience in television sales have equipped the site well for services such as merchandise returns and exchanges. The site is organized into seven sections that include the Last Clicks outlet, a bargain bin.

Netmarket.com
www.netmarket.com

This Editors' Choice–winning superstore offers all the essentials, such as detailed, department-specific search engines and one-click product comparisons. Members (who pay $69.95 per year) can find a wide variety of deals on all sorts of merchandise that is loosely categorized into seven "stores," along with the close-out-oriented "Flea Market."

SHOPPING PERSON-TO-PERSON

Andale
www.andale.com

Did you know that some people have built entirely new careers out of online auctioneering? Andale provides a tool for aggregating all your auction activity into one interface, helping you automate your buying and selling and generating useful reports along the way. Sellers can even use the site to pool resources by having other sellers with more established online reputations sell their merchandise for them.

auctions.com
www.auctions.com

Formerly known as Auction Universe, auctions.com is a slightly more calm and coherent buying and selling venue than eBay. Though the market may be smaller, the site is no less well equipped: It offers escrow service from BidSafe, pager notification, and most of the other bells and whistles that you'd expect from a fully evolved auction house.

eBay
www.ebay.com

The Editors' Choice–winning eBay ("E-Shopping Spree," 11/16/99), which also received a grade of A in our survey of Web site satisfaction ("Readers Rate the Web," 11/16/99), has become a cultural phenomenon as millions have raced into their attics to dig up "precious collectibles" to sell.

eWanted.com
www.ewanted.com

At this shopping site, you describe exactly what you're looking for and how much you'll pay. Those requests are then read by registered dealers, stores, and individual sellers who have expertise in a particular category of merchandise. If they have a match, they contact you (usually by e-mail).

iWant.com
www.iwant.com

Like eWanted.com, iWant.com brings together individuals looking for specific items with individual sellers

or stores that have what they're looking for. Once the two parties connect, they can discuss final price and shipping arrangements privately via the site. This is a great way to find a particular back issue of a magazine or a unique collectible.

SHOPPING: SPECIALTY

Furniture.com
www.furniture.com

The smartest furniture shoppers are heading to Furniture.com, where 50,000 items from 150 manufacturers are available for your perusal. The site's customer service really shines. You can call to talk to an expert or chat online with one. Fabric swatches are available via mail, and personal shoppers will e-mail you with a list of suggestions.

Garden.com
www.garden.com

This store was one of the earliest successful online stores, and its reputation for excellence has only grown over time. Besides offering a mind-boggling number of products, it features an online magazine, active gardening chats, an online garden-design tool, and even a garden doctor who will tackle your questions.

Hifi.com
www.hifi.com

How is Hifi.com different from other online consumer electronics stores? We like the high-end selection, the 45-day free home trial (the site will even pay return shipping), the excruciatingly detailed component setup and connection guides, the online experts who field your questions, the free shipping, and the price protection.

Lands' End
www.landsend.com

This well-known company has extended the catalog-shopping experience by taking advantage of all kinds of online technologies (most notably, 3-D models that you configure to your body type and then dress to see how you look). Live customer-support representatives can chat with you online to help you find the items you want.

Reel.com
www.reel.com

Need to buy a video or DVD? Reel.com is the place for movie lovers to shop. It earned a grade of A in our survey of Web site satisfaction ("Readers Rate the Web," 11/16/99) and is widely regarded as one of the best-designed shopping sites in all of cyberspace.

SMALL-BUSINESS SERVICES

CenterBeam
www.centerbeam.com

You're building a business, but you don't know how to build a LAN and you can't afford to hire an IT manager. Why not outsource absolutely everything? For a cost as low as $169.95 per user per month, CenterBeam will ship you preconfigured PCs and servers (including software) and then troubleshoot and manage them remotely.

eFax.com
www.efax.com

A free service, eFax.com has already given over 500,000 people their own private fax numbers. When someone sends you a fax, you receive it via e-mail, which means you'll never miss a fax or suffer with a malfunctioning machine again.

myTalk
www.mytalk.com

This free service lets you call a toll-free number, hear and respond to your forwarded e-mail using voice commands, and make local and long-distance calls of up to 2 minutes within the United States. Recently, voice mail features have been added. That means people can call your myTalk number, enter your PIN, leave you a message, and give you their phone numbers. And after listening to the message, you can simply say, "Call him back," and away you go on a free 2-minute call.

Stamps.com
www.stamps.com

A software-only solution, Stamps.com delivers on-demand purchasing and printing of first-class, priority, and express-mail postage for U.S. addresses. Stamps.com users receive free software and pay a monthly charge for postage purchases, plus a monthly usage fee that ranges from $1.99 to $19.99. The company's recent purchase of iShip.com for coordinating all your shipping means that this is a true one-stop postal solution.

Zkey.com
www.zkey.com

This Editors' Choice–winning free service (First Looks, 11/16/99) has a number of features that can help small businesses. Most useful is the Zkey, an online identity containing as much public or private information as you choose to list. When you update it, it's automatically updated for anyone who knows you by your Zkey ID. Zkey also includes lots of well-integrated PIM applications, 30MB of storage space for files, and private conferencing for virtual workgroups.

SMALL-BUSINESS SETUP

Bigstep.com
www.bigstep.com

This Editors' Choice–winning Web storefront service (11/16/99) has excellent setup features including a convenient to-do list, and its design flexibility more than makes up for its biggest shortcoming: forcing users to sign up for a merchant account through the site if they wish to process credit card transactions.

freemerchant.com
www.freemerchant.com

As its name suggests, this Editors' Choice winner ("Setting Up Shop Online," 11/16/99) is totally free. The trade-off is that you must display ads on your Web site. Fortunately, freemerchant.com will let you choose the advertisers that best suit your site. You also get top-notch importing features and exporting to Intuit's QuickBooks, a secure shopping cart, store-building tools, unlimited catalog listings, traffic logs, and an e-mail account.

HOW THEY BUILT IT

Outpost.com

Selling consumer electronics and tech gifts to Internet users since 1995, Outpost.com has grown along with the Web. It began as a fairly simple site, coded by hand and hosted on a small cluster of servers, and has expanded, like any successful e-commerce site, into a complex operation relying on several specialized tools. It's not nearly as large or complex a site as Dell.com, also profiled here, but Outpost.com employs more than 20 developers and requires a collection of more than 20 Sun SPARC host servers.

Like so many early Web sites, the developers built Outpost with HTML code, CGI scripts written in Perl, and an Oracle database back end. For coding, they always used standard text editors, rather than authoring tools such as Macromedia's Dreamweaver or Microsoft FrontPage, and they used applications such as Adobe Illustrator and Adobe Photoshop to create graphics. From 1995 to 1997, developers replaced much of the Perl code with code written in C, ostensibly to gain better performance, and they added a search engine; but essentially they continued with the same simple architecture.

GETTING PERSONAL

Outpost.com uses BroadVision's application servers and iContact's live support tools to get closer to its customers.

In 1998, the company moved the site to Exodus, a well-known hosting service with facilities nearby. Ever since, Exodus has provided rack space and bandwidth for a large cluster of Outpost.com-owned servers. Currently, the site uses 22 Sun servers, running Solaris. "The price/performance ratio from Sun beats similar products out there," says Ken Issacson, director of systems operations. "And we felt that there we had more people who were familiar with the Sun architecture." The back end still runs Oracle, and Netscape Enterprise Server handles the Web serving. "When we started," continues Issacson, "Netscape was the most commercially supported package."

In 1998, Outpost changed the site's core software framework, adopting BroadVision's One-To-One Commerce Server, a Web development application for large e-commerce sites. "BroadVision provides content management and personalization, and it's a lot more scalable than what we were using before," says James Kindred, Outpost.com's director of development. The company has also introduced a new search engine, Verity, part of the Verity Information Server, as well as iContact, a tool that lets you have text-based conversations with Outpost.com customer-service representatives without leaving your browser.—*CM*

HOW THEY BUILT IT

Surf Monkey Kids Channel

The Surf Monkey Kids Channel, an animated portal for children, began life as a Web browser for kids. It has a colorful, easy-to-use interface and passes all site requests through a back-end filtering server, keeping users away from inappropriate content. In essence, the two parts of this solution—the browser client and the server—gave rise to the current Surf Monkey Web portal. SurfMonkey.com offers its own content, a new, downloadable version of the original browser.

Surf Monkey developed the browser and back-end server using Microsoft Visual C++. The core of the site was then built using Microsoft Internet Information Server, Active Server Pages, Visual InterDev, Visual Basic, and Java scripting languages. Besides IIS, the site also uses Microsoft SQL server and Microsoft Site Server, which includes Exchange Chat Service, Personalization and Membership Server, and other tools for monitoring.

A MONKEY ON YOUR SCREEN

SurfMonkey.com's namesake, built using Microsoft Agent, runs around the screen helping kids navigate the Web.

For page authoring, the company uses Microsoft Windows Notepad and Macromedia's Dreamweaver. Typically, a group of designers will create a few pages in Dreamweaver and give them to a group of programmers, who then integrate these pages with the site's back end. Originally, Microsoft FrontPage was used for the initial design, but the HTML it produced wasn't as flexible as Dreamweaver's code. "FrontPage is more for designers," says Scott Jarol, director of advanced technology at Surf Monkey. "You end up with HTML that's very difficult to read and then deconstruct if you want to insert scripted elements." Surf Monkey's programmers like to use straight text editors on the Dreamweaver HTML.

Jarol and his programmers initially built the site for a wide audience, making sure it supported Internet Explorer 3 and Netscape Navigator 3. But since discovering that many visitors use a Version 4 or later browser, they have begun adding extensive animation and sound effects. They code the Surf Monkey avatar with Microsoft Agent, and its chat client is a Shockwave application.

Roughly 15 Pentium III–based Windows NT servers located at Exodus, a hosting service, host the site. Surf Monkey provides all the hardware; Exodus provides rack space and bandwidth. Soon, Surf Monkey will add a second point of presence (POP) on the East Coast and several other POPs as well.—*CM*

HotOffice

www.hotoffice.com

Want to set up a virtual office without walls? Try this Editors' Choice winner (10/24/99). At $12.95 per user per month, it's the least expensive of the services we've tested. It includes a document library for storing your shared files, discussions for exchanging ideas, and a shared calendar for tracking meetings and tasks.

MindSpring Biz

business.mindspring.net

As a leading ISP, MindSpring is in a good position to provide Web-hosting services as well. At MindSpring Biz, anyone can take a shot at setting up an online store by going through the process of site creation, site publishing, traffic building, and performance evaluation with tools that are relatively easy to use. Consultants are also available. The cheapest e-commerce plan, $79.90 a month (plus a $50 setup fee), offers limited back-office features and space for selling up to 50 products.

SmartAge

www.smartage.com

SmartAge is sort of an à la carte e-business builder, letting you use as few or as many of its several services as you need. It's built around an ad banner exchange system (SmartClicks). But many other tools for building, promoting, and analyzing your site are available, too.

TRAVEL

Biztravel.com

www.biztravel.com

Business travelers come to this site to find an automated upgrade system to help them fly first-class more often, flight-status updates that can be sent to pagers, exclusive travel deals, and frequent-flier mileage tracking. The site has also recently announced live online customer service via instant messaging.

Expedia.com

Expedia.com

The newest features at this huge site include a Family Travel section, a Fare Compare feature that tells you what other people are currently paying for the flights you want, seat pinpointers to help you get the perfect seat, a place to save your previous search queries, vacation and cruise wizards, and express service for frequent users. You can turn to its 250-person customer-support staff if you have a question.

Lonely Planet Online

www.lonelyplanet.com

How refreshing: a travel site that actually gives you insider insight into your destinations. The Lonely Planet series of guidebooks has an outstanding reputation, and much of that content is here, in searchable form. Don't miss the worldwide travel news updates, and feel free to post your travel questions on The Thorn Tree.

Travelocity.com

www.travelocity.com

This big site has always had a slight technological advantage over its competitors: It's owned by the Sabre Group, which maintains the largest worldwide reservation system.

That underpinning makes it easy for the site to offer features such as one-click access to the best current fares from your hometown to major cities and automatic searches for the three lowest-priced itineraries for your travel needs. In October 1999, the site merged with Preview Travel, making it the largest travel site around.

WebFlyer
www.webflyer.com

Frequent fliers love their miles, and they love to keep track of them. Though this site isn't particularly interactive (you will find discussion boards), it's an outstanding, up-to-date repository of everything you need to know about every frequent-flier program.

WEB DEVELOPMENT

DevEdge Online
http://developer.netscape.com

Netscape's site for developers offers a comprehensive database of documentation that explains how to program everything from basic HTML to Java and XML, with sample pages to guide you. There's also a helpful area where you can troubleshoot with other members and check the latest bug reports.

DevEdge Online
Your Resource for Building Web Applications

Slashdot
http://slashdot.org

As the open-source movement grows, Slashdot's influence grows as well; it's the major meeting place for techies in love with Linux (and with real antipathy toward Microsoft). Members post interesting articles from around the Web, and other members comment in endless and feisty discussions that can be wildly entertaining to read.

Webmonkey
www.webmonkey.com

This HotWired site for Web developers doesn't seem to be churning out articles at the rate it once was, but it's still a great resource for all aspects of Web site development, from coding and design to promotion and marketing.

Web Site Garage
http://websitegarage.netscape.com

Drive your site in-to the Web Site Garage (a Netscape-owned site) and see what the mechanic has to say about the way you've built it. You'll get instant performance diagnostics, suggestions for tuning up your images for faster loading, and tools for counting your traffic and promoting your site.

World Wide Web Consortium (W3C)
www.w3.org

The W3C was founded in 1994 to "lead the World Wide Web to its full potential by developing common protocols that promote its evolution and ensure its interoperability"—a lofty ambition, to say the least. At the site, you'll find the technical reports and specifications that outline the agreed-on standards for the Web. ≡

A Great Review is Worth Repeating

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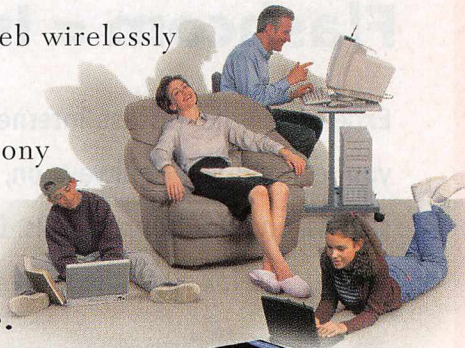

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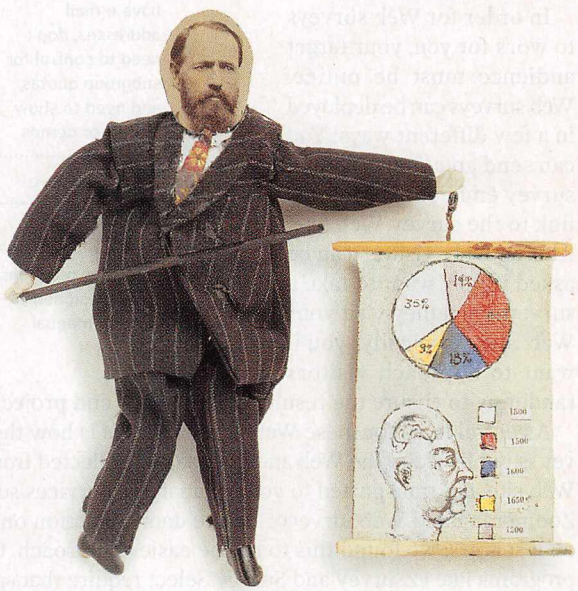
WHAT ARE THEY THINKING?

Surveying your customers online is a great way to gauge their satisfaction with your business. Web survey products help you ask the right questions—and understand the answers.

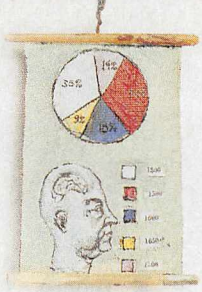
An important tenet of good business is "know your customer." One of the best ways to get to know your customers or clients is to ask them questions through a survey. Until recently, surveys—telephone, mail, or in-person—were expensive and therefore the domain of big organizations. Then along came the Internet (of course) to change the survey industry. Web surveys have several big advantages. They have negligible distribution costs: Unlike mail surveys, for example, which require printing and postage, Web survey results travel for free across the wire. Web survey results are typically tabulated automatically as soon as the respondents complete a survey. Not only does this avoid the high



165 EZSurvey 99 for the Internet
166 MarketSight 2.5
173 Survey Select 2.1
174 SurveySolutions for the Web 2.0
175 WebSurveyor 2.0
176 Zoomerang
173 Make Your Numbers Count

BY NELSON KING

ILLUSTRATIONS BY POLLY BECKER



Survey software can build a questionnaire, put it on the Web, and slice the data for you.

cost of manually keying in responses associated with most other types of surveys, it also lets you check your survey's progress, including interim results, at any time.

All this means that even small and medium-size businesses can now use surveys to gather incredibly useful information, be it from their customers or potential customers or employees. We tested six survey development products that work on the Web: Raosoft's EZSurvey 99 for the Internet, Decision Architects' MarketSight 2.5, Saja Software's Survey Select 2.1, Perseus Development's SurveySolutions for the Web 2.0, WebSurveyor Corp.'s WebSurveyor 2.0, and Market Tools' Zoomerang. All of these programs help you build a Web survey questionnaire, publish it to the Web, collect the data, and then analyze and report the results. Some of them make it surprisingly easy; and prices range from free to $1,090.

The Web survey products we tested should not be confused with the free polling services that let you embed little questions on your Web site such as "Who was your favorite Beatle?" These services may keep people coming back to your site, but they're entirely unscientific and should not be used for real research.

In order for Web surveys to work for you, your target audience must be online. Web surveys can be deployed in a few different ways: You can send an e-mail with the survey embedded or with a link to the survey Web site. Alternatively, visitors can be asked if they want to take a survey when they visit your Web site. Typically, you'll want to approach visitors randomly to ensure the results are unbiased and projectable.

A central issue for these Web-based surveys is how the survey is published to the Web and how data is collected from the Web site and transported to you for analysis. Services such as Zoomerang and WebSurveyor do the data collection on their own servers; we found this to be the easiest approach. Other programs like EZSurvey and Survey Select require that special scripts (CGI or Perl programs) be placed on the Web server. Because this involves relatively complex interactions between databases, Web servers, CGI programs, and often e-mail, there is plenty of room for problems. This can lead to difficulties, especially if an ISP is involved; not all of the programs solved the problems equally well.

All of the programs we tested automatically translate questions and responses into Web-page forms that you display at a Web site. There are many kinds of survey questions: "What is your age?" "Pick your favorite color." Survey software attempts to provide you with matching question types—for example, a list of responses with check boxes to select all that apply.

In general, the more question types the better—especially on the Web, where keeping the survey compact and varied can be a factor in how many people will complete it. All the programs we reviewed have single (check one) and multiple (check all that apply) question types, but there are wide differences in what other types are provided. In the reviews we note programs like EZSurvey that can accommodate unusual question types, or the ability to validate the entries of people taking the survey.

Because basing a new survey on an existing survey can be a big time-saver, we give extra credit to products where the reuse of surveys is well organized in a template system. For the most part, there are no limits—other than common sense—on the number of questions in a survey or the number of response items per question. Most of the programs have a question library, which is another time-saver. None of the products has a WYSIWYG presentation of the survey form as you develop the survey; you must jump to a preview mode in a Web browser.

Although all the products have built-in charting, we noticed that many are relatively thin in advanced analytical and reporting features. Since most of our products are entry-level, many of the companies have a family of products to provide upgrade options, including additional reporting and analysis.

For this roundup we focused on Web survey capabilities, though we've noted which products can also be used to conduct surveys by other means, including e-mail, by telephone, and in person. Web surveys don't replace the traditional techniques, but they are rapidly becoming an important tool—one that can be used to great effect by companies big and small.

Which Method Is Right for You?

Online research may not be the right choice every time. This chart compares the best uses for online, mail, and telephone surveys.

	ONLINE	MAIL	TELEPHONE
Best use	When you already have e-mail addresses, don't need to control for subgroup quotas, and need to show visuals or demos	When you have a very large database without e-mail, don't need to control for subgroup quotas, and have high involvement of the audience	When you have respondents without e-mail, need to control for subgroup quotas, and need in-depth information
Cost	Least expensive	More expensive	Most expensive
Speed	Fastest	Slowest	Slow
Example	Employee reactions to a redesigned training manual	Profiles of a professional association's members	Reactions to product concepts among heavy and light users in five markets

MORE ON THE WEB: For more information about Web survey solutions, visit the sites listed in our Site Finder section. You'll find links to products and advice on creating useful surveys. **www.pcmag.com**

PC MAGAZINE EDITORS' CHOICE

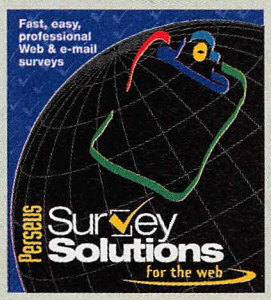
SurveySolutions for the Web 2.0

Our Editors' Choice, Perseus's SurveySolutions for the Web 2.0, strikes the best balance between powerful features and easy-to-use tools.

We particularly liked SurveySolutions' familiar interface, which closely resembled a standard Microsoft Office document. The program features a wizard that walks you through creating your survey and allows you to choose any of the 230 questions included in the program's question library.

Once you get the results from your survey, editing and adding the data is accomplished using a familiar spreadsheetlike format. There are also reporting and analysis wizards that make SurveySolutions' tools—some of the most powerful we saw—easy to use.

For raw power, we couldn't ignore the tools we found in Raosoft's EZSurvey 99 for the Internet, which is why it deserves an honorable mention. In addition to its powerful analysis tools, EZSurvey offers the most advanced capabilities for validating the types of answers you receive from your survey respondents. You can make questions mandatory, control the length of write-in responses, and set ranges for numeric answers. With a more modern and easy-to-use interface, EZSurvey would be hard to beat.



WebSurveyor 2.0 gets an honorable mention for its ease of use. Though it lacks some of the more advanced features, such as data validation and branching, it is a great choice if you need to get a survey out fast, without a lot of setup time and without sacrificing too much power.

EZSurvey 99 for the Internet

Price: $399 direct. Raosoft Inc., Seattle, WA; 206-525-4025; www.raosoft.com. ●●●●

EZSurvey 99 for the Internet ($399 direct) has the guts, if not the prettiest interface, for developing and managing Web surveys. Its wide variety of question types, branching ability, and data validation more than compensate for its slightly spartan analysis and reporting. It's easy enough for the advanced beginner and also offers an unusual number of powerful features.

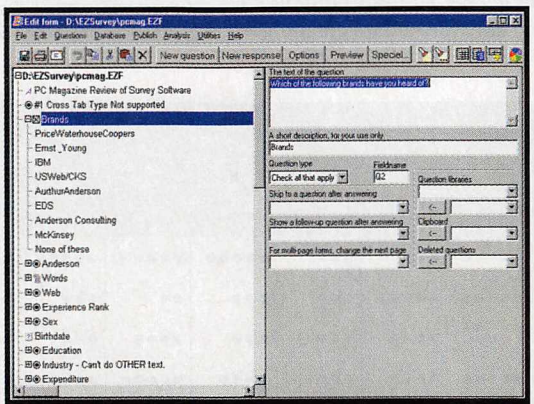
Surveys are constructed as a sequence of questions and responses in a treelike hierarchy (it looks something like Microsoft Windows Explorer). Moving questions around is a snap, and at a keystroke you can preview the survey in a browser. Formatting the survey isn't a strong point; you can change only fonts and colors. There are no automatic multiple-column formats like the matrix (crosstab) question found in SurveySolutions, WebSurveyor, and Zoomerang. With this one exception, EZSurvey provides an outstanding selection of question types.

Following the old rule of GIGO (garbage in, garbage out), validating survey information is important. EZSurvey distinguishes itself from all the other products in this roundup by the extent of its ability to control and validate survey entries. Questions can be made mandatory; you can control the length of write-in answers and set field masks to ensure properly formatted responses. Numeric entries can be set to allowed ranges, and responses may have a default value.

Among its most useful control features is support for several kinds of branching (the ability to jump from one question to another). If the user completes one question with a certain answer, the survey can jump to another question or page, skipping over any irrelevant questions. If the user gives a response like "other," a follow-up branch brings up a dialog box in which to elaborate. Branching can be applied to both single- and multiple-answer questions.

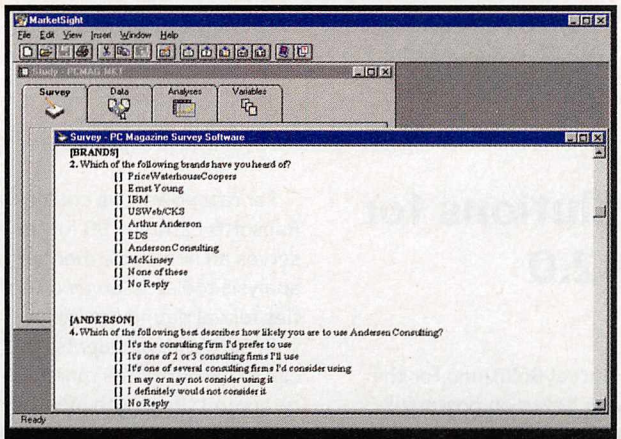
Any survey can be used to produce an e-mail survey, and EZSurvey does an especially good job of making bulk mailing and e-mail data collection easy. When it comes to deploying your survey to the Web, EZSurvey includes a facility for managing multiple sites (the only program in this roundup to do so) and provides password security. Publishing the survey to a site is fully automated, although you must first configure a Web server (yours or an ISP's). Whereas most of EZSurvey is simple enough for beginning users, server configuration may require handing the task to a Webmaster or technical support person.

On the back end of the survey, data collection is handled by automatic download from the server into a DBF file. Access to the database is through



THE EZSURVEY 99 approach to survey design uses a Windows Explorer–like environment to organize questions and responses.

Our contributors: **Sheryl Canter** is a contributing editor and **Nelson King** is a frequent contributor to *PC Magazine*. **Kathy Speas** is vice president of Research & Development at Audits & Surveys Worldwide, which provides online and traditional research from its San Francisco office. Associate editor **Nancy E. Hirsch** and PC Magazine Labs senior project leader **Jay Munro** were in charge of this story.



MARKETSIGHT USES question blocks to develop a survey and provides a library of questions to speed up the process.

the utilitarian EZSurvey spreadsheet, where you can add or edit information. Analysis and reporting are not EZSurvey's strongest points, though they are useful. As with many survey companies, Raosoft offers a family of products, including EZReport ($299) and Survey-Tools ($149), which can be used to bolster the product's reporting and data management capabilities.

EZSurvey doesn't have the slickest user interface or data analysis in this roundup, but in other areas that count—a good selection of question types, data validation, e-mail management, and data handling—it's very strong and deserves to be a top choice.—*NK*

MarketSight 2.5

Price: $495 direct. Decision Architects (an affiliate of Monitor Company Inc.), Cambridge, MA; 800-788-8840; www.decisionarc.com. ●●●

Web surveys are a new feature in Decision Architects' MarketSight 2.5 ($495 direct), which is a good general-purpose survey program that includes support for telephone and in-person surveys. MarketSight's strength is in data manipulation and analysis, but it lacks the Web design features and some important survey functions that are available with other products in this roundup.

MarketSight creates a survey as a series of question blocks that can be edited but provide limited flexibility for the survey layout as a whole. Within a question block, responses (answers), which MarketSight calls *variables,* are linked to *data variables* (which most programs call *data fields*). The use of variables throughout the survey process, and especially for calculations, gives MarketSight one of the most powerful analytical approaches in this roundup, although at the cost of a more difficult learning curve.

There is a well-organized question library (to which you can add your own questions). You can also select a question type and create the question from scratch. MarketSight does not support some common question types, such as drop-down lists and combo boxes, although it does have a Constant Sum question in which responses must be amounts that add up to a specific total (usually percentages). Unlike EZSurvey, MarketSight doesn't support required fields or question branching. It does, however, perform data validation.

Setting up a survey on the Web is extraordinarily obtuse. MarketSight requires the installation of Perl 4 or later, which in our experience probably should be done by a Webmaster or ISP technician. Using this script, MarketSight collects survey data in an ASCII text file at the server. In

SCORECARD

For **installation and setup,** we evaluate how easily each product can be installed and integrated into your system. For **help, tutorials, and tips,** we check for documentation such as online help, a tutorial, and a guide on how to make surveys. We base the **forms** score on form building and the ability to add, edit, and manage template libraries. **Survey building** involves the options for building single- and multiple-page forms and branching to other questions within or between pages. **Data collection** refers to the product's ability to scan e-mail or data files for results. **File management** includes the ability to import and export data, as well as the software's data cleaning and recoding features. For **deployment,** we look at the ability to post surveys on the Web, and the ease and power of server-side support. The **analysis** score reflects the options and ease of use of the data analysis tools, and the types of analysis available. **Reporting** refers to charting and presentation options. **Ease of use** encompasses the workings of the product and its user interface. For the **overall** score, we consider all of these factors to determine each product's suitability for Web-based surveys.

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●●●●●-EXCELLENT
●●●●-VERY GOOD
●●●-GOOD
●●-FAIR
●-POOR

	Installation and setup	Help, tutorials, and tips	Forms	Survey building	Data collection	File management	Deployment	Analysis	Reporting	Ease of use	OVERALL
EZSurvey 99 for the Internet	●●●●●	●●●	●●●	●●●●●	●●●●●	●●●●●	●●●●	●●●	●●●	●●●	●●●●
MarketSight	●●●●●	●●●●●	●●●	●●●	●●	●●●	●●	●●●●●	●●●●	●●●	●●●
Survey Select	●●●●●	●●●●	●●●	●●●	●●●●	●●●●	●●●	●●●	●●	●●	●●●
SurveySolutions for the Web	●●●●●	●●●●	●●●●	●●●●	●●●●●	●●●●	●●●●	●●●	●●●	●●●●	●●●●
WebSurveyor	●●●●●	●●●●	●●●	●●●	●●●●	●●	●●●●	●●●	●●●●●	●●●●●	●●●●
Zoomerang	●●●●●	●●●●	●●●●	●●	●●●	●	●●●	●	●●	●●●●●	●●

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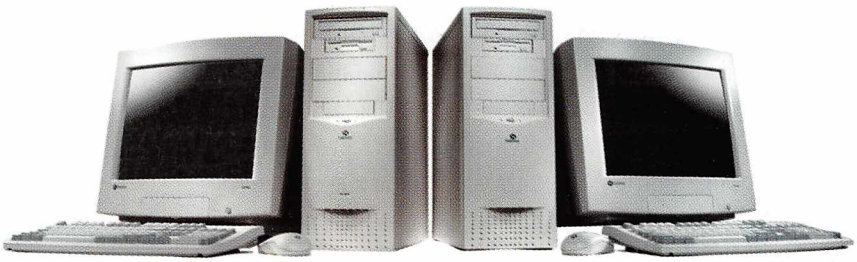

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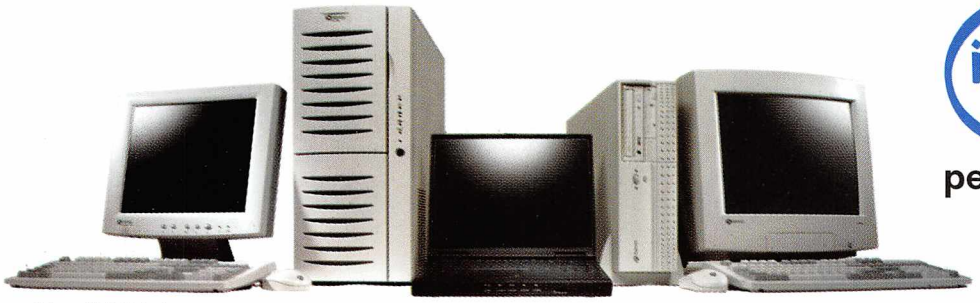

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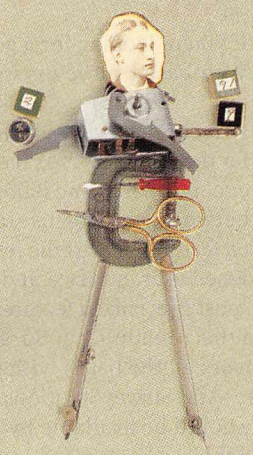


These survey tools can put you in control of powerful information quickly and efficiently. Or they can enable you to make mistakes and waste resources faster than ever. Survey tools can be part of a valuable decision support strategy, provided you use them wisely.

Online survey tools cover the *how* of conducting research, but you must add the *why* to complete the picture. All too often, survey research provides interesting numbers and elegant graphs but fails to be actionable. An awful lot of market research is collecting dust on shelves in corporate America. To avoid having your online survey become just a set of bookends, here are some things to consider as you launch your surveys.

First, ask yourself what you're going to do with the information. What decisions will be made based on this study? What actions could be taken or avoided? What do you want to know at the end of the survey that you don't know now? Does the study address something that can actually be affected, or is it just "nice to know"? Remember to develop your research with an action plan in mind and remain focused on the goal as you move forward.

Next, decide who should be included in the survey. Depending on your action plan, you may want to include customers (or product users), noncustomers (or nonusers), former customers or users, distributors, analysts, decision makers, prospective client, or other audiences. The rule of thumb is that you need a sample size of about 100 in any group of particular interest. Be sure to structure a sample that is not inherently biased toward a particular viewpoint. For example, your top 100 customers may be easy to reach, but they would not be the best sample to tell you what might encourage competitors' customers to switch.

Of course,having an adequate response rate is also important. High-level executives, IT decision makers, and high-income households are heavily surveyed and reluctant to respond. Do not assume that if you attempt to contact Fortune 100 CFOs that you will obtain 100 interviews. If your survey is going to a known audience (your company's employees, association members, or respondents who have been prerecruited), your response rate may be 40 to 50 percent or higher. Banner ads on Web sites typically generate 1 to 5 percent response rates. Blind e-mails, which are generally frowned on as spam, will generate a 5 to 10 percent response rate, at the most.

Then, once you've decided on your objectives and your audience, it's time to create your questionnaire. You may want to consult a researcher about different ways to ask questions. There are many good ways to ask, "How much should this product cost?"— but that wording is not one of them. Show your survey to a few people to test it out before you launch it. Pretests are an invaluable way to identify potential misunderstandings that could mar your results.

Now what? You've collected data; now what? The survey tools we've reviewed will give you the numbers but won't tell you how to use them. A goal-directed analysis plan will keep you from obscuring meaningful results in a blizzard of numbers. Ask a researcher to help you evaluate your results in view of the sample you finally obtained and your original goals. Is 80 percent satisfaction "good"? There's no inherently right answer; your ability to interpret the information you've collected is what makes your numbers count.

For thorough answers to all the related questions you were afraid to ask, consult the easily readable white paper "Survey 101—A Complete Guide to a Successful Survey" at *www.perseus.com/surveytips/Survey_101.htm.—Kathy Speas*

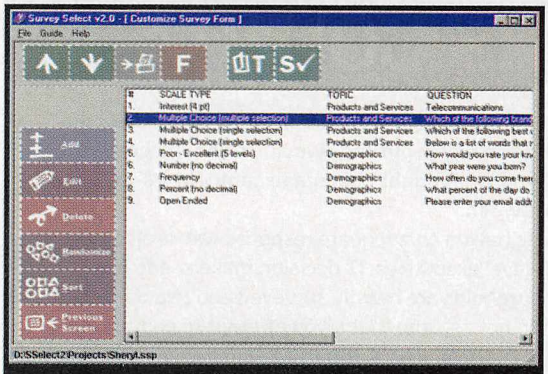
order to create survey databases on their desktops, users can create a new data dictionary file to correspond to each text file. For someone familiar with database management, this is not a difficult task, but it's a lot to ask of anyone who isn't. This is especially true considering the ease with which products such as SurveySolutions accomplish the same task.

Once the survey data is available, it can be edited in the Data Window. Analysis is performed in data tables, a spreadsheet workalike that uses the MarketSight variables to perform a wide range of calculations and statistical functions. In the hands of experienced users, this is a powerful way to analyze the information that has been collected. MarketSight also provides wizards to help the novice with common analyses. The same data tables are used to generate charts within a full-featured graphics module. MarketSight does not create analytical reports per se but does let you easily print individual charts, tables, and surveys.

Although its analytical and charting capabilities are excellent, MarketSight lacks too many of the features provided by other (often less expensive) products in this roundup to make it a good choice for Web surveys.—*NK*

Survey Select 2.1

Price: $1,090 direct. Saja Software Inc., Longmont, CO; 800-945-0040, 303-449-2969; www.surveyselect.com. ●●●



YOU CONTROL Survey Select by means of the buttons stacked vertically in the lower-left-hand corner. The available controls shift depending on the current task.

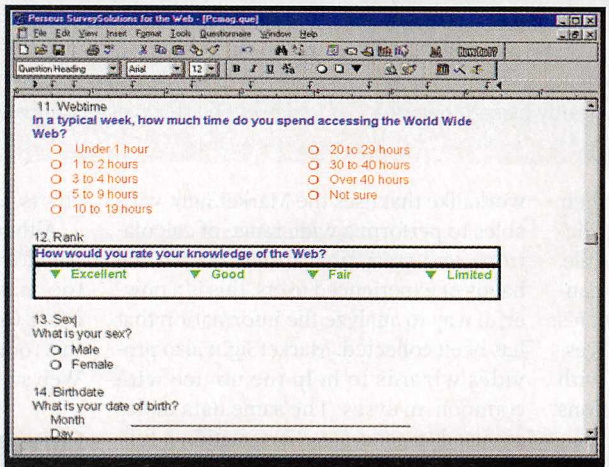
Like MarketSight, Survey Select ($1,090 direct with e-mail/Web module) was not originally a Web survey product. It was designed to create disk-, e-mail-, and paper-based surveys; the e-mail/Web module is an add-on. And just as with MarketSight, Web-based surveys can be difficult to deploy—especially if you're running a Windows NT-based Web server. Moreover, although Survey Select is the most expensive product in our roundup, it is by no means the most powerful. Raosoft's EZSurvey 99 for the Internet, at almost half the price, can create much more sophisticated surveys. (Saja Software has recently released a high-end product called Survey Select Expert 3.0 that offers more features, but its $1,495 price tag exceeded the limit for this story.)

Survey Select is not the easiest product to use. Its nonstandard interface requires you to snake through screen after screen to get to the feature you need, and the analysis portion of the package is particularly cumbersome. The controls are a set of unusual-looking buttons stacked vertically in the main window. You click on these buttons to move from screen to screen, and on each screen the controls change. To get to the Web portion of the product, you must click your way through three screens. To return to the design portion, you must back out by repeatedly clicking on Previous Screen. The analysis portion is especially awkward to use because you must keep moving back and forth between screens. You don't get much power in exchange for your pain, either. The question types are limited, and they are hard to pick out because prelabeled scales are mixed in with other question types. (It would be better to place the prelabeled scales on a submenu.) The product has data validation but no branching, and you can't mark fields as required. All of these are features found in EZSurvey.

On the plus side, Survey Select comes with a library of over 800 questions in 30 categories, and you can add to them as well. Each question on a survey is categorized by topic, a feature that is useful in the analysis stage. You can analyze the questions in each topic separately, and you can use the Demographic topic to create subgroups for analysis.

Survey Select's documentation is extensive and includes a tutorial-style series of tips, online help, and printed documentation. The tutorial is particularly helpful in prodding you through the nonstandard interface. Some important topics are not covered, however, notably the special steps you must take to deploy a Web-based survey on a Microsoft Windows NT server and the special setting needed when using MAPI e-mail to import responses.

If your main focus is Web-based surveys, Survey Select is not the best choice. It's expensive, the interface is cumbersome, options are limited, and the Web piece is an add-on with gaps in its documentation.—*Sheryl Canter*



SURVEYSOLUTIONS uses a word processing environment to design surveys and display reports.

SurveySolutions for the Web 2.0

Price: $179 list. Perseus Development Corp., Braintree, MA; 877-737-7387, 781-848-8100; www.perseus.com. ●●●●

PC MAGAZINE EDITORS' CHOICE

If you're looking for a good Web-based survey system, our Editors' Choice, Perseus's SurveySolutions for the Web 2.0 ($179), has an exceptionally fine balance between ease of use and more advanced features, in part the result of a well-designed user interface. It does not have the most specialized features in every area in this roundup, but SurveySolutions covers all the bases with uncommon ease. And SurveySolutions for the Web 3.0 should be available by the time you read this.

Almost the entire survey process is handled in a word processing environment. The approach carefully follows Microsoft Office guidelines for look and feel, which should help many users and makes SurveySolutions feel more modern than programs such as EZSurvey 99 for the Internet and MarketSight 2.5.

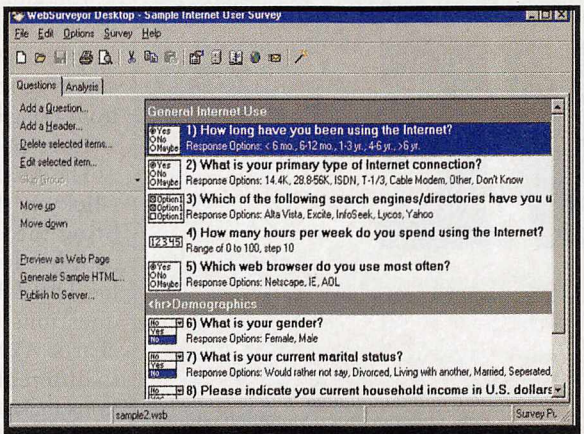
You develop a survey by using the Question Wizard, which guides you through all the steps for questions and responses, or by using the unusually well-stocked question library (containing more than 200 questions) and the scales library. We especially liked the question library's preview window, which makes it easy to see the question layout. Sometimes you just want to borrow the format of a sample question and rewrite the details.

SurveySolutions lacks the variety of question types and the advanced ability to validate response entries found in EZSurvey, but the basics are covered. We do give it extra points for having a matrix (crosstab) question format, which is a good way to gather a lot of information in a compact form. In terms of layout, SurveySolutions is one of the best at creating a survey that looks as if it was designed for the Web.

As with EZSurvey, the SurveySolutions server is used to transmit survey results. This transmis-

sion relies on a well-developed e-mail system, which can also be used for e-mail surveys.

Although unusual, we liked the idea that SurveySolutions doesn't build its survey database until you get your first results back. The program compares the values from the results to the form you created and automatically generates the database table. For beginners, this couldn't be easier. Editing and adding data are done in a data sheet (another spreadsheetlike arrangement).



WEBSURVEYOR'S main window has two pages: Questions and Analysis. To see what a survey will look like, just click on the Preview button.

Analysis and reporting of survey information is likewise highly automated; the AutoPresent and AutoReport wizards take most of the work out of data preparation. The simplification does mean that SurveySolutions doesn't have the numeric analytical flexibility of products such as MarketSight. On the other hand, the program's charting capability goes far beyond precanned charts and provides more options than most people will ever use. For reporting, the word processing environment works like a charm. Survey reports take the form of a word processing document that you can edit and format using familiar tools.

Though it doesn't have all the survey elements and data validation of EZSurvey, SurveySolutions doesn't have any major weaknesses either. It has a modern user interface, good Web features, excellent graphics, and better-than-average reporting. In short, this is a terrific value, the best in the roundup.—*NK*

WebSurveyor 2.0

Price: For one active survey, $199 direct. WebSurveyor Corp., Ashburn, VA; 703-729-5621; www.websurveyor.com. ●●●●

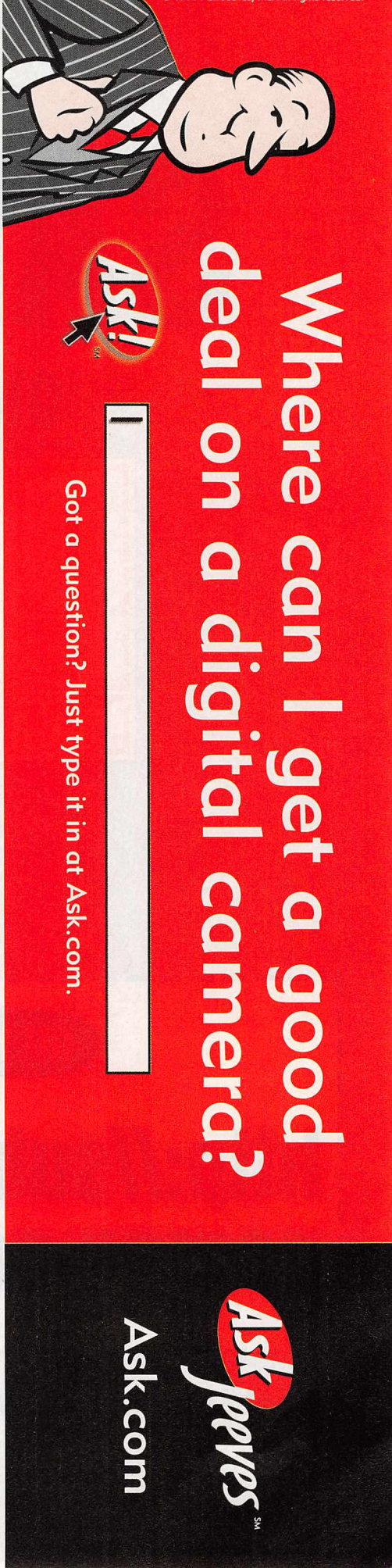
WebSurveyor combines free desktop software for survey creation and analysis with a moderately priced Internet service for deployment and data collection. One active survey with 1MB of disk space for 3 months costs $199. The intuitively designed desktop software is easy to set up and use. The program offers few analysis features, but you can export the data to analyze in another package. WebSurveyor is a good choice if your survey requirements are moderate and you need to get up and running quickly.

The most serious drawbacks in WebSurveyor are its limited question types and its lack of data validation. There are no automated matrix-style questions, like the ones found in SurveySolutions for the Web 2.0 and Zoomerang. You can't restrict the type of input, there is no data validation, and the package doesn't offer common data types such as date, Social Security number, or telephone number. And you can't require answers to selected questions, as you can with EZSurvey 99 for the Internet and SurveySolutions.

But what you can do, you can do easily. Response templates let you choose from a large number of multiple responses. A set of design templates offers preconfigured schemes similar to the stationery options in Microsoft Outlook Express. The designs are in HTML that you can edit and save back to the library. It's also easy to add new response templates.

A Skip Group option lets you create a branch in your survey, jumping over irrelevant questions. The option has limitations, but you can edit the HTML code if you need more flexibility. You can add bitmaps to survey questions with HTML code in the question text.

A built-in e-mail list manager lets you create lists for various purposes. You can notify list members of the survey by sending the URL, e-mail a copy of the survey itself as an attachment, or send the survey or the URL to a sample of people on the list.



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You can allow only one survey response per e-mail address or IP address, and you can embed a unique ID in the survey to screen for multiple responses from a single respondent. You can also restrict responses to certain IP addresses.

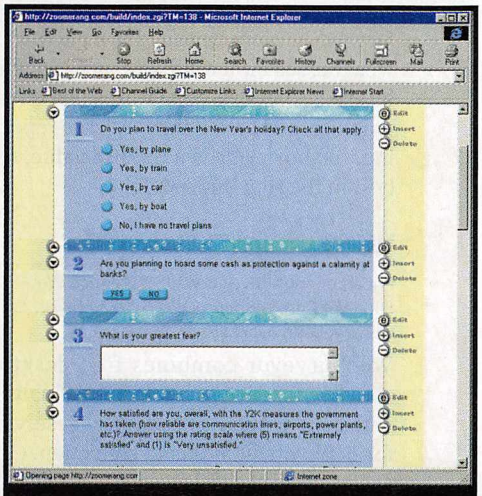
The Analysis page is nicely designed. Click on the Update Now button to bring the most recent additional responses down from the server to your local hard disk. You can flip through the questions quickly, viewing prebuilt charts. A chart toolbox lets you switch to different chart types, and filter options make it easy to look at subgroups. There is little statistical analysis, but you can export data in FoxPro or CSV format.

WebSurveyor's greatest strength is its intuitive design and ease of use. Its weakness lies in the survey design itself. The question styles are limited, and you have no control over responses. If the questions you need to ask are not overly complex and you're prepared to deal with occasional dirty data, then WebSurveyor is a very good choice.—*SC*

Zoomerang

Price: Free. MarketTools Inc., Sausalito, CA; 877-289-9555, 415-289-4300; www.zoomerang.com. ●●

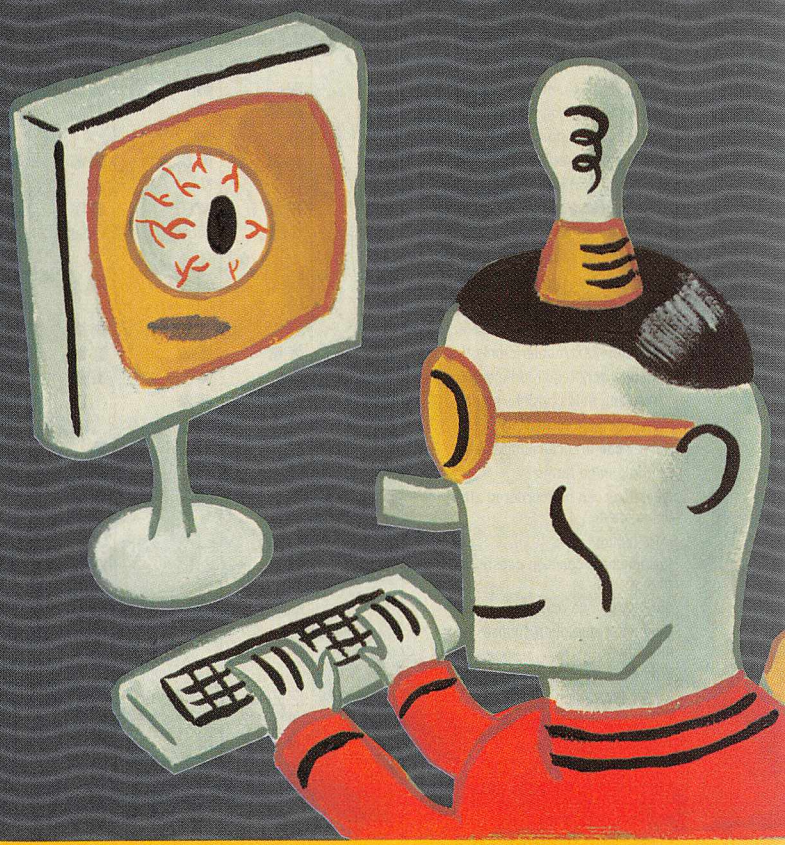
Zoomerang is a newly launched online service for creating and managing surveys. Basic functionality, which is all that's available at the time of this writing, is free. A premium service, available for a monthly fee, will be added in the coming months. Planned features for the



ZOOMERANG is easy to use and includes many prebuilt surveys. Unfortunately, options are limited to color schemes and a list of basic question types.

Defy Hype

Give the Web Substance



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SUMMARY OF FEATURES

Survey Software

■ YES □ NO

	EZSurvey 99 for the Internet	Market-Sight 2.5	Survey Select 2.1	Survey-Solutions for the Web 2.0	Web-Surveyor 2.0	Zoomerang
Price	$399 direct	$495 direct	$1,090 direct*	$179 list	$199 direct	Free
Hosting charge	N/A	N/A	N/A	Included	Included	Included
SURVEYS						
Surveys can be distributed on-disk	□	□	■	□	□	□
Surveys can be distributed via e-mail	■	□	■	■	■	□
Surveys can be password-protected	■	□	□	□	□	□
Maximum response choices per question	Unlimited	Unlimited	20	90	1,000	100
Maximum questions per survey	Unlimited	Unlimited	Unlimited	Unlimited	1,024	20
Number of survey templates	4	7	8	5	2	Over 100
Grouped by theme	■	■	■	■	□	■
User can add/edit templates in library	■■	■■	□□	□□	□□	□■
Number of questions in question library	70	87	800	230	48	N/A
User can add/edit questions in library	■■	■■	■■	■■	■■	N/A
Number of scales in scale library	N/A	21	30	20	66	N/A
User can add/edit scales in library	N/A	■■	■□	■■	■■	N/A
Surveys authored	Locally	Locally	Locally	Locally	Locally	Online
Answer fields support:						
Single-choice drop-down boxes	■	□	□	■	■	■
Multiple-choice drop-down boxes	■	□	□	□	□	□
Matrix single-select/multiselect	□□	□□	□□	■■	□□	■□
Multiline text/numeric-only field	■■	■■	■■	■■	■■	■□
Rank order/Required fields	■■	■□	■□	■■	□□	□□
Tracking fields (visible/hidden)	■■	□■	■■	□■	□■	□□
User-defined formatted fields	■	□	□	□	□	□
Survey can branch conditionally	■	□	□	■	■	□
Multiple-page forms	■	□	□	■	■	□
Questions can be reordered after deployment	■	■	□	■	□	□
Data piping	■	□	□	□	□	□
Respondents can skip questions/pages, then return	■■	■□	□□	■■	■■	□□
Surveys can be restarted	■	■	□	■	□	□
Can block multiple responses per individual	■ (e-mail surveys)	□	■	■	■	□
Modules for server deployment:						
ASP, ISAPI, Perl	□□■	□□■	N/A	□□■	N/A	N/A
Java, JavaScript, NSAPI	■■■	□□□	N/A	□■□	N/A	N/A
E-mail list management	■	□	■	□	■	■
Context-sensitive help	■	■	■	■	■	□
DATA GATHERING						
Automatically scans e-mail	■	N/A	□	■	N/A	N/A
E-mail clients supported:						
Lotus Notes/Outlook	■■	N/A	■■	■■	N/A	N/A
Other	All types	N/A	MAPI, POP, SMTP	All types	N/A	N/A
Can schedule data retrieval by start-up/time	□□	N/A	□□	□□	N/A	N/A
Survey can be stored to a server-side/local database	■■	□■	□■	□■	■■	■□
Native database format	DBF	Proprietary	Proprietary	MS Access	CSV	Open standards
Data can be recoded	■	■	□	■	□	□
Data exported to SPSS/XLS/CSV file	□■■	□□■	□□■	□■■	□□■	□□□
Data imported from XLS/text/database file	■■■	□■□	□□□	■■■	□■□	□□□
ANALYSIS AND REPORTING						
Can calculate min, max, mean	■■■	■■■	■■■	■■■	■■■	□□□
Can calculate frequency distribution	■	■	■	□	■	■
Can calculate standard deviation	■	■	■	■	□	□
User can edit chart labels, titles, scales	■■■	■■■	■■■	■■■	■■■	□□□
Charts can be published on the Web	■	□	■	■	■	□
Charts can be updated live	■	■	□	■	□	□
Pivot tables (crosstabs)	■	■	■	■	□	□
Stem-and-leaf diagrams	□	□	□	□	□	□
Tables can be published on the Web	■	□	□	■	■	□

RED denotes Editors' Choice. * With add-on. N/A—Not applicable: The product does not have this feature.

premium service include extended data storage; the ability to upload images, audio, and video; and more complex data analysis.

Zoomerang is the only product in this roundup that is entirely Web-based; no software is installed locally. It's easy to use but limited. You can create and deploy a survey in minutes and see the results with a single button click, but there is a long list of things you cannot do. You can't prevent people from responding more than once; you can't validate data or require questions to be answered. You also can't add images or branching logic, massage the data or perform any type of data analysis other than frequencies, and you can't export the data for analysis in another package.

On the plus side, Zoomerang comes with many prebuilt surveys in four categories: Business, Community, Personal/Social, and Education. You can edit these surveys or create your own from scratch. The 11 supported question types cover all the basics and include a matrix type. The only other product we reviewed with support for matrix questions is SurveySolutions. The built-in components are attractive but cannot be modified. The only formatting option is to change the color scheme.

Each survey is deployed on the company's Web site, and an e-mail message with the survey's URL is sent to your target audience. Once the survey is launched, it cannot be changed. The target audience can be your own—you can create and manage e-mail lists on the site—or you can use Zoomerang's "panel" of volunteer respondents.

The e-mail message that all the respondents receive includes a long disclaimer from Zoomerang that may set a tone you don't like. After completing the survey, respondents see an ad inviting them to sign up with Zoomerang as panel members or survey creators. Responses are accepted until you close the survey. Once the Close button has been pressed, you can no longer access the survey form for reference or for use in other surveys.

At this early stage of its life, Zoomerang is more like a toy than a serious survey tool. It's very easy to use, but its limitations make it a poor choice for trying to conduct a survey of even modest complexity.—*SC* ≡

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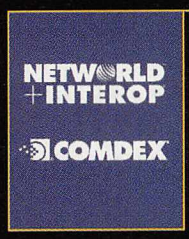

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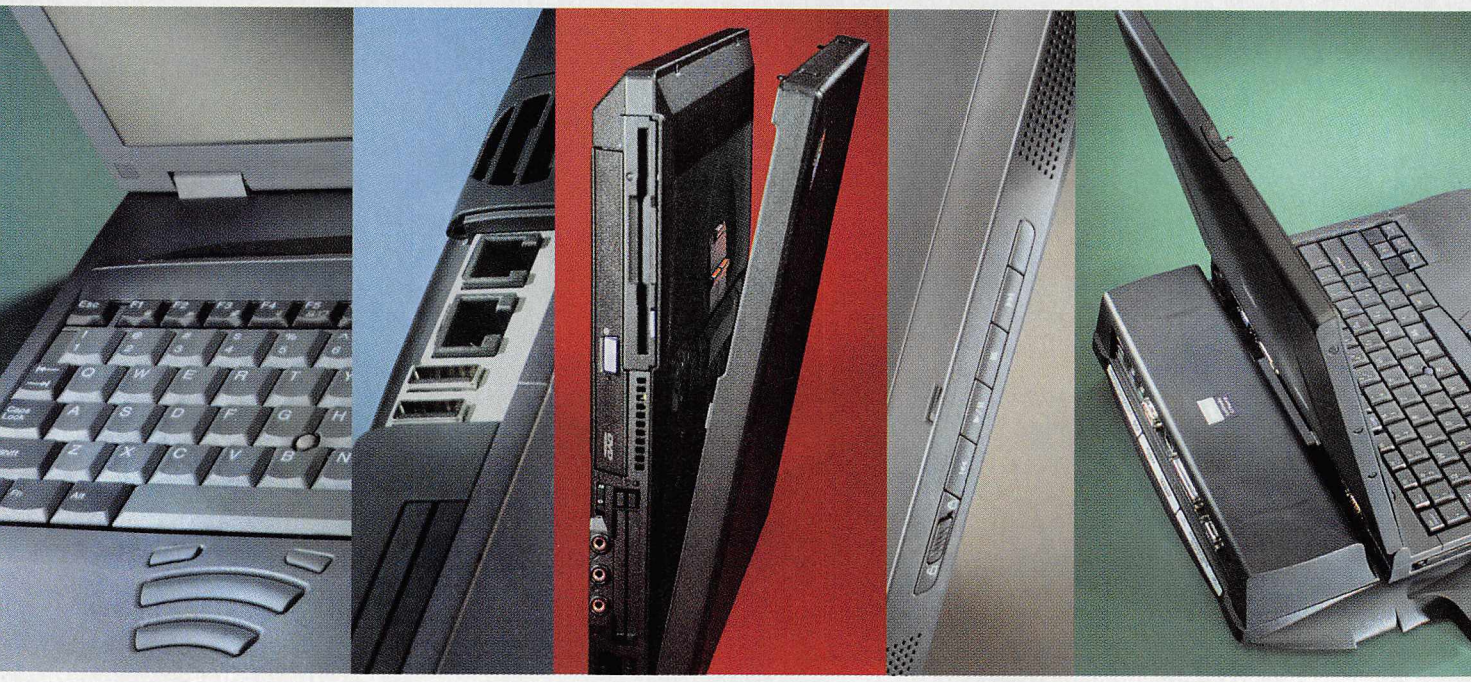

Pentium III notebooks are here, and they deliver a marked speed improvement over their Pentium II–powered predecessors. With the 12 units we tested, we considered manageability plus product-line breadth and stability to identify the best portables for corporate users.

BY BILL HOWARD

PHOTOGRAPHY BY THOM O'CONNOR

Call it "fast-enough computing": Notebook PCs are *fast enough* for the majority of users running the vast majority of business productivity applications, as evidenced by our testing of a dozen corporate notebooks. They're every bit as fast as the leading desktops of a year ago, meaning someone who switches from a two-year-old desktop PC or upgrades from a year-old notebook will be pleasantly surprised by the speed and disk capacity.

Corporate notebooks, the focus of this roundup, differ from other notebooks in ways that may seem dreary. But business computing is about manageability, uptime, and cost of ownership, not about whether you can play music CDs with the cover closed or DVD movies on the plane home. Many corporate notebooks run Windows NT—despite difficulties with the suspend-and-resume function, with plug-and-play, and with hot-swapping of removable drives. Corporate notebooks have management software. They have to have docking stations or port replicators available, and ideally these docks will work across the manufacturer's entire model line and be unchanged for two or even three years. And more and more buyers are insisting on modular drives and battery packs that are useful across model lines.

For corporate bids, where the rollout and delivery might take place over a year or more, ideally the notebook hardware will remain stable during that time so that the same *disk image* (the operating system plus the applications and drivers) can be used on every notebook in the fleet. Typically, the buyer is willing to accept later notebook deliveries with faster CPUs or bigger hard disks from the same immediate family—but not a faster graphics adapter if that means a different driver and hence a new image.

IN THIS REVIEW

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REVIEW CRITERIA

For this roundup, PC Magazine Labs required systems configured with Microsoft Windows NT 4.0 Workstation (Service Pack 4) and preinstalled management software. We sought out systems with the fastest available processor, a 10GB or larger hard disk, exactly 128MB of system RAM, a 56K modem, and Ethernet built-in or on a plug-in PC Card. We also recommended docking stations, port replicators, and high-capacity Iomega Zip or Imation SuperDisk (LS-120) removable drives. This filter netted us 12 systems from 8 major vendors: Compaq, Dell, Gateway, HP, IBM, NEC, Toshiba, and WinBook. Acer, Fujitsu, and Micron were between product cycles and declined our invitation, and Sony does not yet offer a managed Windows NT corporate solution.

THE SWITCH TO PIII

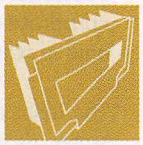
Since our last roundup of portable PCs ("Connect Anywhere: Notebook PCs," August 1999), the pinnacle of mobile performance has shifted from Pentium II to Pentium III. The Mobile Pentium II tops out at 400 MHz (466 MHz for Mobile Celeron); the Mobile Pentium III is available at 400, 450, and 500 MHz. Architecturally, a Mobile Pentium III CPU is a lower-voltage version of the desktop Pentium III, which currently goes to 733 MHz; it uses the same Coppermine (code name) core. The front-side bus runs at 100 MHz instead of the Pentium II's 66 MHz (the desktop Coppermine's is 133 MHz), and the 256K of integrated Level 2 advanced transfer cache has greater bandwidth than the Mobile Pentium II's 256K on-board L2 cache. In plain English, the systems reviewed here are more than a third faster than the 400-MHz Pentium II notebooks running Windows 98 that PC Magazine Labs tested last August. You can attribute roughly half the increase to the faster hardware and half to the operating system: Windows NT performs better on our benchmark tests than Windows 98.

The traditional desktop/notebook performance gap is about to narrow somewhat. SpeedStep (code-named Gey-

What's new

Laptop offerings from the major vendors have been evolving pretty rapidly in the past few months. Here are the highlights.

- **Pentium III chips** The original 0.25-micron Pentium III was not a good candidate for portable machines; it was just too power-hungry, and it produced too much heat for today's ever-shrinking laptops. The 0.18-micron chip actually runs cooler than the Mobile Pentium II chip it replaces and runs faster (up to 500 MHz, versus 400 MHz for the Mobile Pentium II).



- **SpeedStep** SpeedStep technology (code-named Geyserville) will enable portable performance to keep pace with desktop speed increases. The idea is simple: If the laptop OS detects AC power, the Pentium III chip will run at full speed (600 MHz and above), with cooling provided by an additional fan. When the laptop is running on battery, the chip will run at a slower speed (500 MHz), requiring less power and eliminating the need to run the extra fan, which will give users the battery life they expect.

- **LAN on board** An increasing number of laptops aimed at corporate buyers now incorporate Ethernet. In the past, it was up to customers (or resellers) to supply a PC Card networking solution. But customer demand has meant that now some notebooks have built-in Ethernet adapters.

- **Swappable CD-RW drives** Most major laptop makers have added another choice for their modular bays: CD-RW drives. Until recently, CD-RW drives were too bulky to fit in a standard half-inch laptop bay, but makers recently unveiled units that can be incorporated internally.

PC MAGAZINE EDITORS' CHOICE

Toshiba Tecra 8100, Toshiba Portégé 7140CT

For this roundup we tested the best of the best, so you won't go wrong with any of the 12 notebooks here. But with our focus on corporate customers, two machines stand out from the rest.

The Toshiba Tecra 8100 ($3,900 street) delivers the most features per dollar of any portable in this roundup, and it is our Editors' Choice. The 8100 delivers a full complement of I/O ports and a multipurpose drive bay on-board—all with a 6.1-pound, 1.6-inch chassis. The bay can accommodate any one of seven devices, and drives can be shared with other models in the Toshiba Tecra family—a help for corporate IT departments that need to maintain fleets of machines. Another bonus: The 8100 can use docking stations from previous Tecra models, building on your investment. Another point in Toshiba's favor is its complete line of mobile offerings, which makes it easy for a company to standardize on Toshiba for all its portable needs. That said, a second Editors' Choice goes to the thin and light entry from Toshiba, the 4.2-pound Portégé 7140CT ($3,500), which is another outstanding value.

As we noted, all of the tested systems have their strong points, and the models from Compaq, Dell, HP, and IBM especially are also worth close consideration.

serville, and due for release by the time you read this) is a mobile Pentium III that makes even greater distinctions between battery and AC power modes than today's mobile CPUs. When plugged into a wall outlet (as most notebooks are most of the time), SpeedStep notebooks run at full power (600 MHz and above). Such speed necessitates more power and produces more heat (requiring an extra fan), which would be an unacceptable drain on the battery. So when on battery power, a SpeedStep notebook runs at 500 MHz. SpeedStep was initially slated to debut in October 1999, but Intel had problems getting sufficient yields at 600 MHz, so it brought out only the non-SpeedStep Pentium IIIs. AMD has plans to produce a similar technology this year, giving Intel competition at the peak of performance among notebooks as it did last year with its Athlon CPUs for desktops.

CHANGING NEEDS, CONFIGS

The systems in this roundup range from about 4 pounds to about 8 pounds *system weight* (with battery, without the AC adapter). Two of the models here are *one-spindle* notebooks: They have only a built-in hard disk; all other drives (floppy disk, CD-ROM, DVD-ROM, and so on) are external. These units are popular with road warriors who want to travel light and don't see the need for a DVD, CD, or CD-RW drive on the road. *Two-spindle* units (a hard disk plus one other bay for another type of drive, an extra battery, or another device) are popular with mainstream users; the leading example, the IBM ThinkPad 600, has been the industry's single best-selling notebook since its introduction in April 1998. Despite their heft, *three-spindle* notebooks (the hard disk, plus bays for two additional peripherals) are a popular choice with corporations that want all drives built-in, lessening the chance that end users will misplace the valuable peripherals.

Our review specifications called for DVD-ROM rather than CD-ROM drives. We've found that many corporations believe DVD may be important over the 18 months. Notebooks are front-line machines, and users get a kick out of being able (theoretically) to play DVD movies in off hours (actually, DVD MPEG drivers in Windows NT don't always work and aren't always available). You might also consider the latest option: CD-RW. These rewritable drives let users do their own remote backups and also use CD-RW or CD-R disks for data interchange. Figure about $300 extra for DVD versus a CD-ROM drive, and about $200 extra for CD-RW compared with vanilla CD.

Virtually all notebooks today run at 1,024 by 768 pixels (XGA), and standard screen size is creeping up from 13.3 inches (three of the models in this roundup) to 14 inches (five models) and even 15 inches (four models). The exceptions are 3-pound ultralight notebooks and value-oriented personal and small-business systems with 12-inch, 800-by-600 displays. Also, we're starting to see the first 15.4-inch and even 16-inch displays running at 1,280-by-1,024 (SXGA) resolution.

Other features to consider are:

- 8MB graphics memory (as found in 8 of the 12 machines we tested). If you're sending output to a separate monitor, the extra memory lets you display full-color presentations at full resolution. 8MB is the maximum now; you'll see 16MB with new chips from ATI and S3 soon.
- Two USB ports (the Gateway and NEC machines here). There's almost zero cost and space penalty in having two ports instead of one, and you can use the ports for an ever-increasing number of peripherals, including printers, scanners, and external drives.
- Built-in Ethernet (the Compaq Armada E700 and Gateway Solo 9300XL). Fewer IS managers today care which Ethernet cards they use; having one built into the notebook (not the docking station) is a convenience, especially for employees

MORE ON THE WEB: Visit the sites listed in Site Finder for tips on portable accessories. Don't omit *PC Magazine*'s own Web site, with its unique interactive price/performance chart and Summary of Features table. **www.pcmag.com**

who visit remote offices.

• Built-in modem and RJ-11 jack (seven models). As with built-in Ethernet, this will mean one less dongle (adapter cable) to remember not to lose.

On the other hand, we've seen little use of infrared (IrDA) among notebook users. Dell dropped IrDA off the Latitude CS R400XT. Eventually IrDA may be replaced by Bluetooth, the short-range RF protocol.

THE UPGRADE PATH

If you buy a Windows NT notebook now, you'll be better poised to upgrade to Windows 2000 down the road.

Once you do upgrade to Windows 2000, you're likely to find that this new operating system gets along better with a wider range of peripherals than Windows NT did. But don't expect manufacturers to support Windows 2000 on notebooks more than a year old (those introduced before 1999).

As we mentioned earlier, for this roundup we focused more on the checklist items important to corporate IT departments—common peripherals, stable platforms, management software, and consistent OS images. Read on to see which companies deliver.

SCORECARD

The **vendor grade for service and reliability** is derived from 8,500 readers' responses to our most recent Service and Reliability Survey (July 1999). This overall grade reflects the vendor's scores on four key measures: repair frequency in the past 12 months and user satisfaction with reliability, technical support, and repair experiences.

For the **manageability** rating, we give preference to DMI-compliant notebooks that can be managed on a network just like desktop PCs. Does the company plan to use the same components in the future? Can you use peripherals from one generation to the next?

Our **Web site support** rating indicates how user-friendly and complete the vendor's site is. We look for complete, up-to-date system specs, driver updates, and troubleshooting support.

The **performance** rating reflects the machine's showing on our benchmark and battery rundown tests.

YOUR CUSTOM SCORECARD: To find the notebook that best meets your particular needs, create your own custom scorecard online (*www.pcmag.com*). Just tell us what matters most to you and get an instant ranking of the notebooks according to your priorities.

RED denotes Editors' Choice.

●●●●●-EXCELLENT
●●●●-VERY GOOD
●●●-GOOD
●●-FAIR
●-POOR

	Vendor grade for service and reliability	Manageability	Web site support	Performance	OVERALL
Compaq Armada E700	B	●●●●	●●●●●	●●●●	●●●●
Compaq Armada M700	B	●●●●	●●●●●	●●●●	●●●●
Dell Latitude CPx H500GT	B	●●●●	●●●●●	●●●●●	●●●●●
Dell Latitude CS R400XT	B	●●●●	●●●●●	●●	●●●●
Gateway Solo 9300XL	B	●●●	●●●●●	●●●●●	●●●
HP OmniBook 4150	C	●●●●●	●●●●●	●●●●●	●●●●●
IBM ThinkPad 390X MNU	A	●●●	●●●●●	●●●	●●●●
IBM ThinkPad 600X 9EU	A	●●●	●●●●●	●●●●●	●●●●
NEC Versa LXi	C	●●●●	●●	●●●●	●●●●
Toshiba Portégé 7140CT	B	●●●●	●●●●●	●●●●●	●●●●●
Toshiba Tecra 8100	B	●●●●	●●●●●	●●●●●	●●●●●
WinBook XL^3 500	D	●●	●●●●●	●●●●●	●●

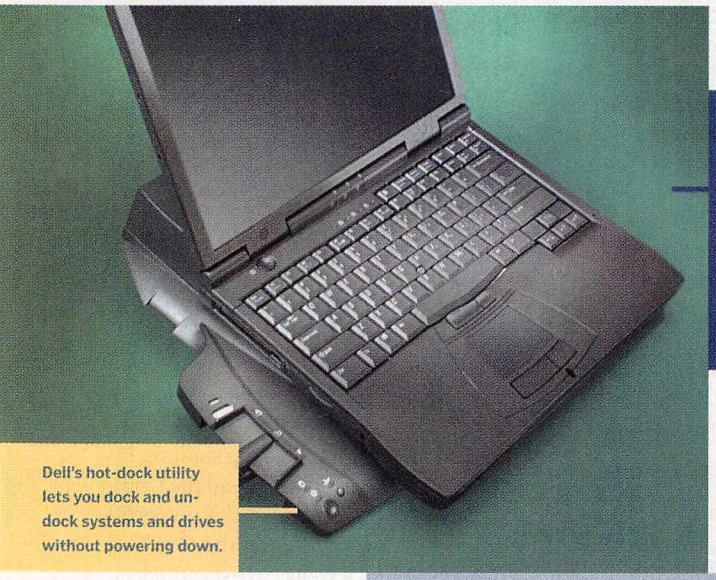
Compaq Armada E700, Armada M700

E700: Pentium III/500, 24.2GB hard disk, 15-inch TFT screen, 8MB ATI Rage Mobility graphics, 4X DVD-ROM drive, floppy disk drive. Winstone: 26.7. $5,400 street. ●●●● **M700:** Pentium III/500, 11.5GB hard disk, 14-inch TFT screen, 8MB ATI Rage Mobility graphics, 4X DVD-ROM drive, floppy disk drive. Winstone score: 25.6. $4,300. ●●●● Houston; 800-345-1518; www.compaq.com.

Compaq offers five different Armada corporate notebooks, all designed to be used together in a corporate fleet. Each can accommodate the same set of removable drives and secondary batteries. Certain models use common docking stations, including the two reviewed here: the Compaq Armada E700, a bulky but powerful desktop replacement, and the Compaq Armada M700, a light two-spindle system. The two Armadas are well suited for large corporate environments, offering desktop management software and a wide range of hardware.

In addition to using the same removable drives and the same secondary batteries, the E700 and the M700 use the same docking stations. At PC Magazine Labs, we tested both with the new $700 ArmadaStation II (which includes drive bays, PCI slots, PC Card slots, an Ethernet adapter, and additional ports) and the $330 Convenience Base EM (a port replicator with an Ethernet adapter). Compaq also offers the $700 ArmadaStation EM (a smaller version of the ArmadaStation II) and the $250 Port Replicator EM (which lacks Ethernet) for the E700 and the M700. Compaq lets you manage the entire Armada line with its Insight Manager software, and soon many of these systems will support a common software image.

With a weight of 8.8 pounds (9.8 pounds with AC adapter) and a 2.1-inch-thick chassis, the E700 is this roundup's bulkiest machine. But what you gain in weight, you also gain in features. The machine includes a capacious 24GB hard disk and an Ethernet adapter, and (presenters, take note) its audio subsystem is better by far than that of any other system reviewed here. The front of the E700 includes two multipurpose bays, each capable of housing any one of five devices: a floppy disk, CD-ROM, or DVD-ROM drive, a second hard disk, or a second battery. (Our test configuration included the DVD-ROM and floppy disk drives.) The E700 posted average scores



Approaching the corporate management ideal, the Dell Latitude C-series machines can share many of the drives with the ultraportable Dell Latitude LS.

Dell's hot-dock utility lets you dock and undock systems and drives without powering down.

Dell Latitude CPx H500GT

on most of our benchmark tests, and its battery life (2:59) was also midpack.

Just 1.25 inches thick, the 5.6-pound M700 (6.5 pounds with adapter) has a weaker sound system, a smaller hard disk, and only one multipurpose drive bay. This bay is identical to those used by the E700 and supports all the same devices. With the same processor and graphics engine as the E700, performance from the M700 was also right in the middle of the road, as was its 3:01 battery life.

The Armada line includes three other models: the inexpensive V300, a 3-pound ultraportable known as the M300, and the E500, a smaller version of the E700. All of these support the same removable devices as the E700 and the M700, and all use at least one of the docking stations mentioned above.

This is a well-conceived line of corporate notebooks. The common peripherals make the Armadas strong contenders, and once they are in place, the ability to use a common software image will add to their appeal.—*Cade Metz*

Dell Latitude CPx H500GT, CS R400XT

CPx: Mobile Pentium III/500, 10GB hard disk, 14.1-inch TFT screen, 8MB ATI Rage Mobility graphics, 24X CD-ROM, floppy disk drive. Winstone score: 25.7. $4,141 direct. ●●●●● **CS:** Mobile Pentium II/400, 11.5GB hard disk, 13.3-inch TFT screen, 4MB NeoMagic MagicMedia 256ZX graphics, 24X external CD-ROM, external floppy disk drive. Winstone score: 17.2. $3,841. ●●●● Round Rock, TX; 800-388-8542; www.dell.com.

This pair of notebooks, the 6.9-pound two-spindle Dell Latitude CPx H500GT and the 4.8-pound one-spindle Dell Latitude CS R400XT, are exemplary corporate machines, especially in the way they complement each other. The CPx uses the same batteries as the Dell Latitude

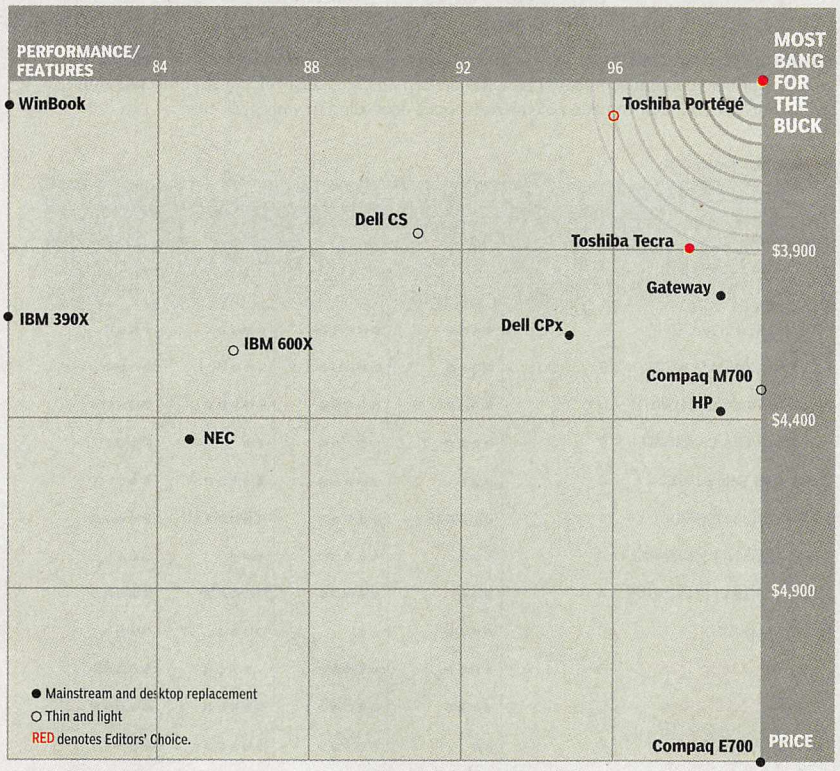
PC LABS

PRICE/ PERFORMANCE INDEX

The two Compaq entries had the highest performance/features scores. Alas, each is also the most expensive in its category. The two Toshiba entries had the best overall price/performance ratios.

THE DATA POINTS: For the mainstream and desktop replacement notebooks, performance accounted for 23 percent of the overall score, screen size and resolution accounted for 15 percent, and specifically corporate issues (manageability, common peripherals, and so on) accounted for another 15 percent. Warranty, service, support, battery life, and general features rounded out the rating.

The thin and light notebooks were rewarded for low travel weight, small case size, and large screen size (17 percent of the score). Performance accounted for 26 percent of the score for notebooks in this category, and the BatteryMark test result accounted for 10 percent. Note that because we used different scales, scores are not directly comparable across categories but are relative to other machines' scores in the same category.



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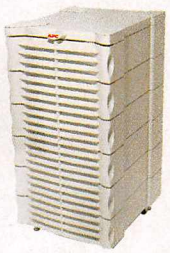

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CPi and CPt models (not reviewed here), and many of the same drives used by all the C-series machines can be used by the Dell Latitude LS, a 3.7-pound ultraportable even thinner and lighter than the CS we tested.

Both machines are available with Dell's fine desktop management tool, IT Assistant, for seamless integration into your corporate network. Our favorite feature of the notebooks: Dell's hot-dock utility (available for Microsoft Windows 98 and NT), which lets you dock and undock systems or add and remove drives without powering down. Both of the systems offer only a few power management tools within Windows. You need not leave Windows, however, to access their BIOS setup screens: You can check on your PM settings without rebooting, although you'll have to reboot to change those settings.

Just under 2 inches thick, the CPx has a multipurpose front bay that accommodates one of eight different devices: a CD-ROM, floppy disk, DVD-ROM, Imation SuperDisk, CD-RW, or Iomega Zip Drive; a second hard disk; or a second battery. The CPx model tested at PC Magazine Labs came with the floppy disk drive (which also attaches externally, in case you want to populate its bay with something else) and the CD-ROM drive. Conveniently, the CPx offers two pointing devices—a scroll-capable touch pad and a pointing stick. Performance was average on our Business Winstone 99 and Content Creation Winstone 2000 tests, but the system had the second-best battery life of the group (3:33).

At just 1.4 inches thick, the CS has an external multipurpose drive bay to accommodate drives other than its built-in hard disk; this takes the same devices as the CPx's internal bay. These drives are also used by the Pentium II–based Dell Latitude CPi and the Celeron-based Dell Latitude CPt as well. Even better, the CPx, the CS, the CPi, and the CPt use the same two docking stations: One ($299) includes networking and I/O ports, and the other ($649) offers all the same technology plus PCI slots and the familiar multipurpose bay. Performance from the Pentium II–based CS trailed the group.

We were impressed with the documentation and support tools supplied by Dell. The CPx and CS were two of only a few systems to arrive at PC Magazine Labs with both printed and electronic documentation. And these machines are tagged with a Dell Express Service Code, letting you gather support information from Dell's Web site in a matter of seconds.—*CM*

Gateway Solo 9300XL

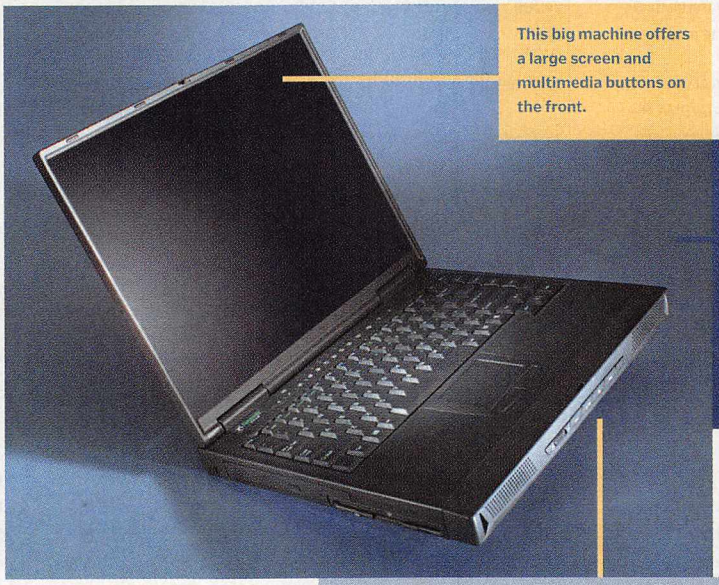
Mobile Pentium III/500, 128MB RAM, 11.5GB hard disk, 15-inch TFT screen, 8MB ATI Rage Mobility graphics, 4X DVD-ROM drive, 120MB SuperDisk. Winstone score: 29.4. $4,023 direct. North Sioux City, SD; 800-315-2536; www.gateway.com. ●●●

The flagship of Gateway's notebook lines, the corporate-focused Gateway Solo 9300XL is DMI 2.0–compliant and ships with Intel's LANDesk Client Manager installed. Offering a large screen, impressive overall performance, and comprehensive corporate customer service and support programs, the 9300XL is a fine choice for users who don't mind carrying a little extra weight (7.8 pounds without AC adapter, 8.7 pounds with) to have a fine desktop replacement notebook.

The big unit includes a 56K modem and 10/100 Ethernet support, both using 3Com components. The 9300XL has two USB ports for added peripheral expansion. Notable features include multimedia control buttons on the front of the case, function buttons behind the keyboard, and an SPDIF jack for digital audio output. The system also has a 4X DVD-ROM drive and an internal 120MB SuperDisk floppy disk drive as standard equipment.

Gateway's services for corporate customers include 90-day freezes on system images, advance notice of upcoming changes, and custom integration services including image downloads, network software installation, and asset tagging. The target for product life cycles is six to nine months. Memory, hard disks, and AC adapters are interchangeable among all Gateway notebooks. This Gateway notebook gives no ground in performance testing, achieving excellent Business Winstone 99, Business Disk WinMark, and Business Graphics WinMark scores. Its 2:58 battery life was average for the group.

In addition to Gateway's standard three-year service contract (which can be extended to four or five years), corporate customers can join the Mobile Access program, which provides priority technical assistance, online data backups, help with software applications, and notebook depot service.—*Bruce Brown*



This big machine offers a large screen and multimedia buttons on the front.

Gateway's comprehensive corporate-customer service and support programs can be extended with the Mobile Access program.

Gateway Solo 9300XL

HP OmniBook 4150

Pentium III/500, 11.5GB hard disk, 14.1-inch TFT screen, 8MB ATI Rage Mobility graphics, 4X DVD-ROM drive, floppy disk drive. $4,380 street. Winstone score: 30.9. Palo Alto, CA; 800-322-4772; www.hp.com.
●●●●●

The HP OmniBook 4150 is a remarkable machine, offering a 14.1-inch display and a multipurpose drive bay in a 6.8-pound chassis that is just 1.5 inches thick. But it is much more impressive when you consider how it dovetails with the rest of the 4100 line as well as with the smaller, lighter HP OmniBook 900 systems.

SUMMARY OF FEATURES

Power Portables

■ YES □ NO	Compaq Armada E700	Compaq Armada M700	Dell Latitude CPx H500GT	Dell Latitude CS R400XT	Gateway Solo 9300XL	HP OmniBook 4150	IBM ThinkPad 390X MNU	IBM ThinkPad 600X 9EU	NEC Versa LXi
Price of tested configuration	$5,400 street	$4,300 street	$4,141 direct	$3,841 direct	$4,023 direct	$4,380 street	$4,090 street	$4,200 street	$4,450 street
Processor	Mobile Pentium III/ 500	Mobile Pentium III/ 500	Mobile Pentium III/ 500	Mobile Pentium II/ 400	Mobile Pentium III/ 500	Mobile Pentium III/ 500	Mobile Pentium III/ 500	Mobile Pentium III/ 500	Mobile Pentium III/ 500
Chip set	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX	Intel 440BX
System weight/Travel weight (pounds)*	8.8 / 9.8	5.6 / 6.5	6.9 / 7.9	4.8 / 5.8	7.8 / 8.7	6.8 / 7.7	7.6 / 8.4	5.4 / 6.1	8.8 / 9.7
Dimensions (HWD, in inches)	2.1 x 12.5 x 10.4	1.3 x 12.5 x 9.8	1.8 x 12.5 x 9.9	1.4 x 12.0 x 9.6	1.6 x 12.7 x 10.3	1.5 x 12.8 x 10.0	1.8 x 12.9 x 10.6	1.4 x 11.8 x 9.4	1.9 x 12.9 x 10.5
Installed SDRAM	128MB	64MB	128MB	128MB	128MB	128MB	128MB	128MB	128MB
Installed SRAM (L2 cache)	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst	256K pipelined-burst
BIOS	Compaq Version 1.1	Compaq Version 1.1	Dell/Phoenix A00	Dell/Phoenix A01	Phoenix 4.0 Release 6.0	Phoenix 4.0 Release 6.0	IBM Version 4	IBM ITET35WW	AMI Version 1.0
Hard disk capacity (formatted)	24.2GB	11.5GB	10.1GB	11.5GB	11.5GB	11.5GB	11.5GB	11.5GB	9.6GB
Manufacturer and model	IBM DARA-22500	IBM DARA-212000	Fujitsu MHG2102AT	IBM DARA-212000	IBM DARA-212000	IBM DARA-212000	IBM DARA-212000	Hitachi DK23AA-12	IBM DCXA-210000
Rotational speed and interface	5,400-rpm IDE	4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE
Supports Ultra ATA/DMA 66	□	■	□	■	■	■	■	■	■
LCD panel size and technology	15.0-inch TFT	14.1-inch TFT	14.1-inch TFT	13.3-inch TFT	15.0-inch TFT	14.1-inch TFT	15.0-inch TFT	13.3-inch TFT	15.0-inch TFT
Graphics chip set	ATI Rage Mobility	ATI Rage Mobility	ATI Rage Mobility	NeoMagic MagicMedia 256ZX	ATI Rage Mobility	ATI Rage Mobility	NeoMagic MagicGraph 256AV	NeoMagic MagicMedia 256ZX	S3 SavageMX
Graphics memory	8MB SGRAM	8MB SGRAM	8MB SGRAM	4MB SGRAM	8MB SGRAM	8MB SDRAM	2.5MB SGRAM	4MB SGRAM	8MB SGRAM
Floppy disk drive	Swappable	Swappable	Swappable	External	Swappable	Swappable	Swappable	Swappable	Swappable
Alternatives	None	None	Iomega Zip 100, Imation SuperDisk	Iomega Zip 100, Imation SuperDisk	Imation SuperDisk	Imation SuperDisk	None	None	Imation SuperDisk
Optical drive type	4X DVD-ROM	4X DVD-ROM	4X CD-RW	24X CD-ROM	4X DVD-ROM	4X DVD-ROM	4X DVD-ROM	6X DVD-ROM	6X DVD-ROM
Manufacturer and model	Torisan DRD-U424	Torisan DRD-U424	KMD 1701U	Samsung SCR-2438	Torisan UJDA310L	Toshiba SD-C2202	Toshiba SD-C2202	Toshiba SD-C2302	Matsushita SR-8173-BNC
Built-in speakers	2	2	2	1	2	2	2	2	2
Microphone	□	■	■	■	■	■	■	■	■
Line-in/line-out jack	■■	□■	■■	□■	■■	■■	■■	■■	■■
NTSC video-in/video-out	□□	□■	□□	□□	□■	□□	□□	□□	□□
Infrared (IrDA) speed	4 Mbps	4 Mbps	1.1 Mbps	N/A	1.1 Mbps	4 Mbps	4 Mbps	4 Mbps	4 Mbps
USB ports	1	1	1	1	2	1	1	1	2
Shared mouse/keyboard port	■	■	■	■	■	■	□	□	■
Port replicator	$139 list	$139 list	$299 direct	$299 direct	$149 direct	$189 list	$155 list	$189 list	$159 list
Full docking station	$699 list	$699 list	$649 direct	$649 direct	$299 direct	$775 list	$395 list	$695 list	$799 list
Modem	None	Internal (x2)	PC Card (x2)	PC Card (x2)	Internal (x2)	PC Card (K56flex)	Internal (K56flex)	Internal (K56flex)	PC Card (K56flex)
Built-in Ethernet adapter	■	□	□	□	■	□	□	□	□
PC Card Ethernet solution in tested configuration	Lucent LAN/ Modem Combo	Compaq Netelligent	Xircom Real-port Ethernet 10/100	Xircom Real-port Ethernet 10/100	None	Xircom Real-port Ethernet 10/100	10/100 Ether-Jet CardBus Adapter	10/100 Ether-Jet CardBus Adapter	3Com 10/100 LAN CardBus
PC Card slots and type	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II	1 Type III or 2 Type II
CardBus socket	■	■	■	■	■	■	■	■	■
Zoomed video support	■	■	■	■	■	■	■	■	■
Live technical-support hours (eastern time)	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days	24 hours, 7 days
Standard warranty on parts/labor	3 years/ 3 years	3 years/ 3 years	3 years/ 3 years	3 years/ 3 years	3 years/ 3 years	3 years/ 3 years	1 year/ 1 year	3 years/ 3 years	3 years/ 3 years
On-site service charge for 1 year	$99	$99	Included	Included	$69	$89	$49	$49	N/A
24-hour turnaround for parts replacement	■	■	■	■	■	■	□	□	■

RED denotes Editor's Choice. All systems have 1,024-by-768 screen resolution and use lithium ion batteries with Smart Battery technology. All included modems run at 56K.
* System weight is the PC plus battery, with all drive bays filled. Travel weight adds the AC adapter. ** Included with docking station. N/A—Not applicable: The product does not have this feature.

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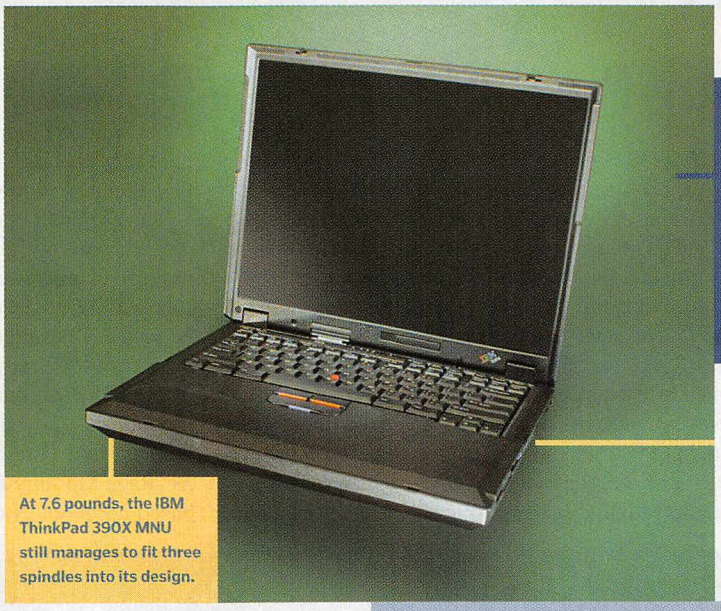
Toshiba Portégé 7140CT	Toshiba Tecra 8100	WinBook XL³ 500
$3,500 street	$3,900 street	$3,468 direct
Mobile Pentium III/500	Mobile Pentium III/500	Mobile Pentium III/500
Intel 440BX	Intel 440BX	Intel 440BX
4.2 / 4.8	6.1 / 7.2	7.3 / 8.2
1.2 x 11.8 x 9.4	1.6 x 12.5 x 10.0	1.8 x 12.0 x 9.8
128MB	128MB	128MB
256K pipelined-burst	256K pipelined-burst	256K pipelined-burst
Toshiba V0.75	Toshiba V1.03	AMI Version 1.04
6.5GB	9.6GB	11.5GB
Toshiba MK6411MAT	IBM DARA-210000	Hitachi DK23AA-12
4,200-rpm IDE	4,200-rpm IDE	4,200-rpm IDE
□	■	■
13.3-inch TFT	14.1-inch TFT	14.1-inch TFT
Trident CyberBlade	S3 SavageMX 3D	ATI Rage LT Pro
4MB SDRAM	8MB SGRAM	8MB SGRAM
None	Swappable	Swappable
None	Iomega Zip 100	Imation SuperDisk
6X DVD-ROM	6X DVD-ROM	4X DVD-ROM
Toshiba SD-C2302	Toshiba SD-C2302	Toshiba SD-C2202
1	2	2
■	■	■
□■	□■	■■
□■	□■	□■
4 Mbps	4 Mbps	4 Mbps
1	1	1
□	■	■
Included	$299 list	$99 direct
$649 list	$798 list	N/A
Internal (K56flex)	Internal (K56flex)	Internal (K56flex)
■**	Optional**	□
None	None	3Com 10/100 LAN CardBus
1 Type III or 2 Type II	1 Type III or 2 Type II	2 Type II
■	■	■
■	■	■
24 hours, 7 days	24 hours, 7 days	8:00a–9:00p M–F, 9:00–4:00 Sat.
3 years/3 years	3 years/3 years	1 year/1 year
$79	$79	N/A
■	■	□



At 7.6 pounds, the IBM ThinkPad 390X MNU still manages to fit three spindles into its design.

Individually, these ThinkPad models are brilliant machines. But IBM could do more in the way of common peripherals and images.

IBM ThinkPad 390X MNU

Processor, display, and memory sizes vary, but each machine in the 4100 line uses the same chassis design. The chassis has a front bay compatible with any one of six different devices. The 500-MHz system reviewed here ships with a DVD drive and a floppy disk drive for use with the bay; a CD-ROM drive, a SuperDisk drive, a second battery, and a second hard disk are available separately. With an additional cable, you can also connect the floppy disk drive to the system's parallel port, leaving the bay available to house another device.

Its keyboard and display quality are average, and it includes both a touch pad and a pointing stick; you can use the pointing stick to select icons and windows on the desktop. Most important, this system's batteries, its AC adapters, its port replicators, its docking station, and all the devices that fit into its multipurpose bay can be used with the HP OmniBook 900 series, a line of 4-pound ultraportable notebooks. Equipped with identical graphics engines, both lines can use the same software image as well. Ideally, you'd buy OmniBook 4150s and 900s in bulk, managing them all with TopTools—HP's exemplary management utility—and readily swapping hardware between models.

Performance overall was very good, and at 3:23, the OmniBook 4150's battery life was excellent. We did notice instabilities in the unit's CPUmark 99 performance, which could point to a power management problem that slows down the CPU when tight CPU-to-memory operations are occurring. HP's Web site offers driver updates and fixes, though configuring and ordering online are not as polished as we've found from Dell and others; you'll want to go through traditional reseller channels. But the OmniBook 4150 is worth the extra step.—*CM*

IBM ThinkPad 390X MNU, ThinkPad 600X 9EU

390X: Mobile Pentium III/500, 11.5GB hard disk, 15-inch TFT screen, 2.5MB NeoMagic MagicMedia 256AV graphics, 4X DVD-ROM drive, floppy disk drive. Winstone: 27.9. $4,090 street. ●●●●

600X: Pentium III/500, 11.5GB hard disk, 13.3-inch TFT screen, 4MB NeoMagic MagicGraph 256ZX graphics, 6X DVD-ROM drive, floppy disk drive. Winstone: 32.1. $4,200. ●●●● Research Triangle Park, NC; 800-426-7255, ext. 4754; www.ibm.com/pc/us.

The IBM ThinkPad 390X MNU and the IBM ThinkPad 600X 9EU are brilliant notebook computers. The 5.4-pound 600X is the market's lightest two-spindle, and the 7.6-pound 390X is one of the

Our contributors: **Bill Howard** is a senior executive editor at at *PC Magazine*. **Cade Metz** is a senior writer at *PC Magazine*, and **Bruce Brown** is a contributing editor. Senior associate editor **Jamie M. Bsales** and PC Magazine Labs senior project leader **Rich Fisco** were in charge of this story.

BENCHMARK TESTS

Power Portables

The HP OmniBook 4150 topped its competitors on ZD Business Winstone 99, a measure of overall system performance when running typical business applications, thanks to a combination of a fast IBM hard disk and an ATI Rage Mobility graphics chip. On multiple runs of ZD CPUmark 99, however, we noted instabilities in its score that varied by nearly a factor of 2. (In the table we present the best score obtained by each machine.) The inconsistency could point to a power management problem that slows down the CPU when tight CPU-to-memory operations are occurring in the absence of disk, graphics, or other I/O operations. We made all attempts to disable power management settings.

High scores are best. Bold type denotes first place.	ZD Business Winstone 99	ZD Content Creation Winstone 2000	ZD BatteryMark 3.0 (hours:minutes)	ZD CPUmark 99	ZD Business Disk WinMark 99 (thousand of bytes per second)	ZD Business Graphics WinMark 99
Compaq Armada E700	27.7	20.1	2:59	47.6	3,550	127
Compaq Armada M700	27.4	19.7	3:01	**47.9**	3,020	126
Dell Latitude CPx H500GT	26.9	19.0	3:33	46.7	3,210	122
Dell Latitude CS R400XT	18.2	14.9	3:15	34.3	2,780	44
Gateway Solo 9300XL	29.4	23.4	2:58	46.9	3,740	**145**
HP OmniBook 4150	**30.4**	**24.1**	3:31	47.5	**4,030**	121
IBM ThinkPad 390X MNU	20.7	19.1	**3:47**	47.6	3,050	48
IBM ThinkPad 600X 9EU	27.9	20.8	2:35	47.3	3,960	84
NEC Versa LXi	26.2	18.2	2:30	47.3	3,090	104
Toshiba Portégé 7140CT	27.5	21.6	2:25	47.5	3,550	82
Toshiba Tecra 8100	28.1	21.1	3:00	47.4	3,140	113
WinBook XL³ 500	28.1	**24.1**	3:00	47.5	3,010	118
RED denotes Editors' Choice.	BETTER ▶	BETTER ▶	BETTER ▶			

▲ **The HP OmniBook 4150** posted the best performance for business applications overall, based on ZD Business Winstone 99. But its ZD CPUmark score varied widely—from a low of 25.5 to a high of 47.5 (presented here). We typically see variations of only 2 to 3 percent from run to run. The IBM ThinkPad 390X MNU had the longest battery life.

If you create video, audio, or Internet content on your notebook, look at the top performers on our ZD Content Creation Winstone 2000 test program. Because the tests are based on application *hot spots*—those subsystem-intensive moments when users have to wait for their PCs to catch up—all subsystems (especially disk and CPU subsystems) need to be both fast and balanced, with a minimum of latency and timing delays. Although any vendor optimizations may not easily be seen when testing an individual subsystem, they show up here, because the whole system is tested. Finishing in a tie for first place were the HP OmniBook 4150 and the WinBook XL³ 500. CPUmark 99 scores were very close. That's not surprising, since all the notebooks but one (the Mobile Pentium II/400-based Dell Latitude CS R400XT) are based on the Mobile Pentium III/500. The Mobile Pentium III/500 is based on the same core as the desktop Coppermine processors. Including the same new technology as the desktop Pentium III, such as advanced transfer cache (256K of full-speed L2 cache), the Mobile Pentium III should be close to its desktop counterpart on CPU and memory operations.

ZD BatteryMark 3.0 measures a system's battery life while running our heavy-usage scenario. The thin and light notebooks are the systems that appeal most to road warriors, but ironically, they tend not to have the best battery life: The constraints on size and weight just don't allow for a powerful battery. As a result, the larger notebooks lasted about 12 percent longer, on the average, than the thin and light notebooks. The longest battery life belonged to the IBM ThinkPad 390X MNU: nearly 4 hours.

The ZD Business Disk WinMark 99 score reflects the performance of the hard disk subsystem. Again, the HP OmniBook 4150 was at the top, because of its IBM hard disk. Interestingly, the Compaq Armada E700 came with the largest (25GB) and fastest-spinning (5,400-rpm) drive, but it was not the best-performing drive.

The ZD Business Graphics WinMark 99 tests stress a notebook's 2-D graphics subsystem. Our first-place finisher here was the Gateway Solo 9300XL, which is based on the ATI Rage Mobility graphics chip. In fact, Rage Mobility–based notebooks took the top five spots.

On the i-Bench test suite, the Toshiba Tecra 8100 performed best overall: It bested the field on the Load Complex Pages test, the XML (eXtensible Markup Language) tests, and the VRML test. The Load Complex Pages and XML tests showed how well the Tecra handles loading text and graphics Web pages. Its top score on the VRML test reflected its graphics and Direct3D performance. The RealVideo G2 LAN test showed a slight edge going to the Compaq Armada M700 and the Gateway Solo 9300XL. The Java VM test, which exercises the processor, showed the Gateway machine coming in first.

HOW WE TESTED

We tested all systems with Windows NT 4.0 and 128MB of RAM; each system also had 5GB or more of hard disk space. We stripped each system's start-up configuration of all processes or tasks except for Explorer, Systray, and graphics card control panels. The resolution for all tests was set at 1,024-by-768, true color, with small fonts. We also disabled all power management features. We used the vendor's provided graphics driver for each system. For our ZD ➤

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BENCHMARK TESTS

Continued

BatteryMark 3.0 test we use standard power management settings: 2 minutes for hard disk time-out (or the closest value available) and Auto or Fast CPU speed.

Our **ZD Business Winstone 99** tests measure the time a PC takes to execute a set of scripts that exercise eight office-suite Windows 98 applications and an Internet browser. The scripts include task switching between a suite application and the browser. Business Winstone 99 weights a PC's test timings based on the applications' unit market shares; it derives a composite number and converts that to a relative score. (The score is relative to the performance of a Dell Dimension XPS—a Pentium MMX/233 with 32MB of SDRAM at 1,024-by-768 resolution with 24-bit color, running Windows NT 4.0 with Service Pack 3. The base score is defined as 10.)

We also ran our **ZD Content Creation Winstone 2000.** Much like our other Winstone tests, Content Creation Winstone measures the performance of a Windows 98 or Windows NT PC while running the following top Internet content creation applications: Adobe Photoshop 5.0, Adobe Premiere 5.1, Macromedia's Director 7.0, Macromedia's Dreamweaver 2.0, Netscape Navigator 4.6, and Sonic Foundry's Sound Forge 4.5. (The score is relative to the performance of the same base machine described above but with 64MB of SDRAM. The base score is defined as 10.)

ZD BatteryMark 3.0 measures a notebook's life by exercising three different 32-bit software workload engines, one each for processor, disk, and graphics tasks. BatteryMark 3.0 mixes these workloads together and adds periodic "think times," or breaks, that reflect normal user pauses in work. Because Windows NT 4.0 does not support ACPI or APM, we ran the benchmark test with no power management enabled unless the vendor supplied a third-party Windows NT program. **ZD CPUmark 99** is a processor-subsystem benchmark test that lets us measure the speed of a PC's processor subsystem, which includes the CPU, RAM, and RAM cache. CPUmark 99 emulates the CPU activity of the real-world 32-bit applications used in Business Winstone 99. Because the applications in Business Winstone 99 do not use floating-point or MMX instructions, neither does CPUmark 99.

The **ZD Business Disk WinMark 99** score is based on a log of disk functions used by the applications in the Business Winstone test suite and represents the performance of each machine's disk subsystem running Windows NT 4.0. We record the results in thousands of bytes per second and convert them to a harmonic mean, weighting the applications in the same way as in the Business Winstone 99 score.

The **ZD Business Graphics WinMark 99** score is based on a log of GDI operations used by the applications in the Business Winstone 99 suite and represents the performance of each machine's graphics subsystem while running Windows NT 4.0. The score is relative to that of the base system used for Business Winstone testing, whose score is defined as 10.

For testing performance on the Internet, we used **ZD i-Bench,** a cross-platform benchmark program that tests a client's performance and capabilities using the latest Internet technology and features. Clients can range from a browser on a PC with a modem to a wireless hand-held device—anything that can display standard HTML. The series of tests measures both speed and the scope of the client's features. We ran the following i-Bench tests on all systems. The **Load Complex Pages** test measures how quickly the browser can load and scroll pages of text and graphics. The **eXtensible Markup Language** tests measure how quickly the browser can download, format, and display XML pages: The **CSS** (cascading style sheets) test applies complex formatting to multiple pages, while the **XSL** (eXtensible Style Language) test lets users customize the way content on a Web page is displayed.

The graphics-intensive **VRML** test evaluates Direct3D performance. It measures how well a system and a VRML client (Blaxxun Contact 4.2) display a clip containing a complex 3-D animation. The **RealVideo G2 LAN** test measures how well a browsing environment handles RealVideo clips. We run a clip suitable for LAN playback, compressed at 150 Kbps. The **Java VM** test, a processor test, measures how well a system handles processor work with the Java VM.

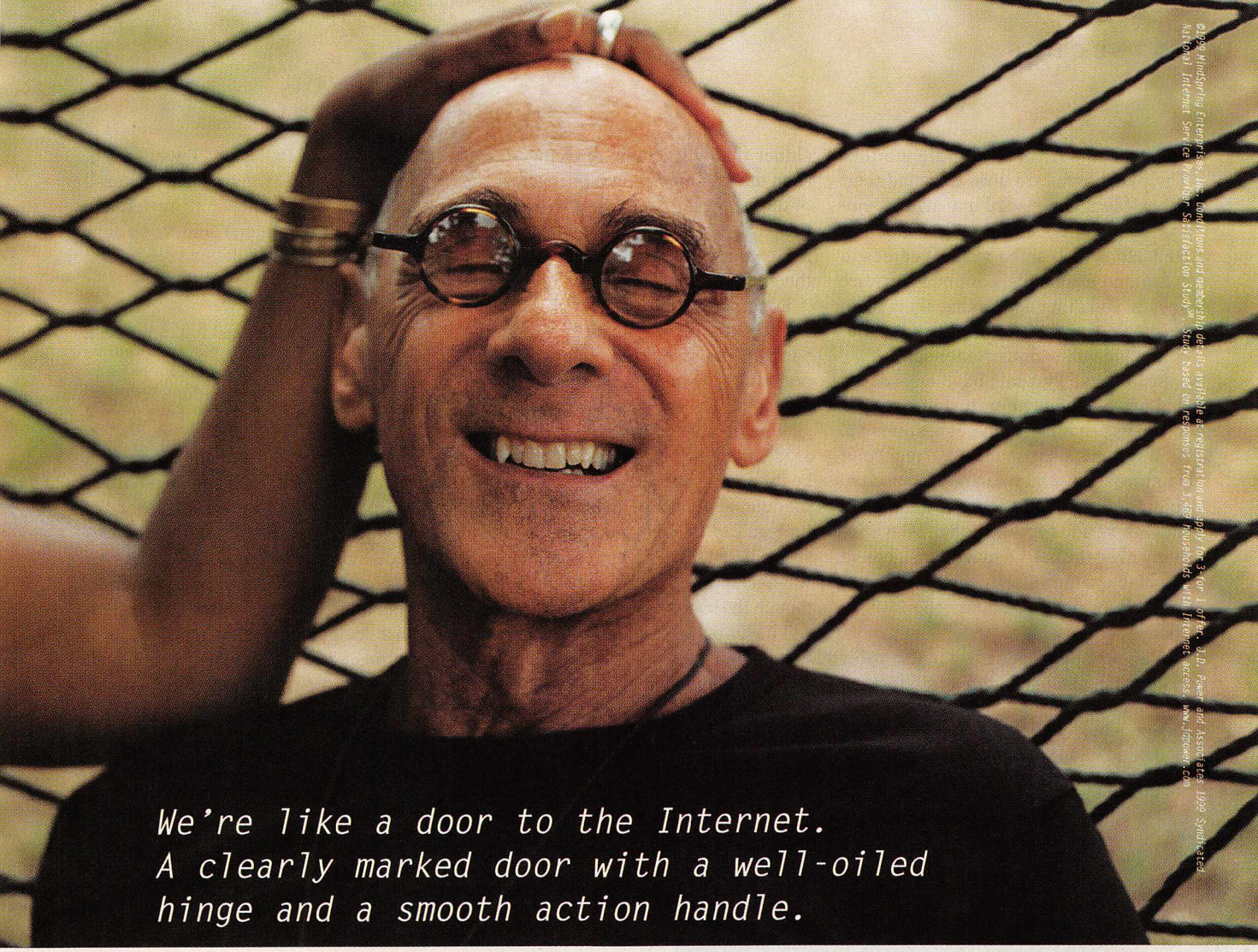
ZD i-BENCH

▲ High scores are best.
▼ Low scores are best.
Bold type denotes first place.

	Processor	Load Complex Pages Seconds ▼	XML: CSS Execution Seconds ▼	XML: XSL Execution Seconds ▼	VRML Frames per second ▲	RealVideo G2 LAN Seconds ▼	Java VM Score ▲
Compaq Armada E700	Mobile PIII/500	18	25	**4**	15	69	50,722
Compaq Armada M700	Mobile PIII/500	16	11	**4**	15	**67**	52,843
Dell Latitude CPx H500GT	Mobile PIII/500	16	12	**4**	16	68	51,665
Dell Latitude CS R400XT	Mobile PII/400	25	24	5	10	68	37,636
Gateway Solo 9300XL	Mobile PIII/500	17	11	**4**	15	**67**	**53,669**
HP OmniBook 4150	Mobile PIII/500	15	11	**4**	15	68	52,225
IBM ThinkPad 390X MNU	Mobile PIII/500	19	20	**4**	13	68	48,747
IBM ThinkPad 600X 9EU	Mobile PIII/500	22	22	**4**	13	68	49,837
NEC Versa LXi	Mobile PIII/500	18	14	**4**	15	68	52,225
Toshiba Portégé 7140CT	Mobile PIII/500	16	14	**4**	12	68	51,664
Toshiba Tecra 8100	Mobile PIII/500	**14**	**10**	**4**	**18**	68	52,785
WinBook XL³ 500	Mobile PIII/500	16	12	**4**	15	68	53,315

RED denotes Editors' Choice.

▲ Results on our ZD i-Bench tests were fairly close across the board. The Toshiba Tecra 8100 was a tick faster on the Load Complex Pages test than the second-place HP OmniBook 4150 (14 seconds versus 15). The Dell Latitude CS R400XT generally trailed the field because of its Mobile Pentium II/400 processor.



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lighter, thinner three-spindle models. Their keyboards are unrivaled, and their ebony-black chassis are unusually handsome. IBM falls behind makers such as Dell, HP, and Toshiba when it comes to common peripherals, common software images, and other details that affect managing a corporate fleet, but these machines are still serious contenders.

Both these systems have keyboards that are extremely comfortable to use, with keys that are firm yet responsive. Both systems also use the IBM TrackPoint pointing stick, which can now be used to select icons in Windows and to scroll through various applications. We particularly liked the units' Power Management interface, which is entirely Windows-based; you needn't access the BIOS to change settings.

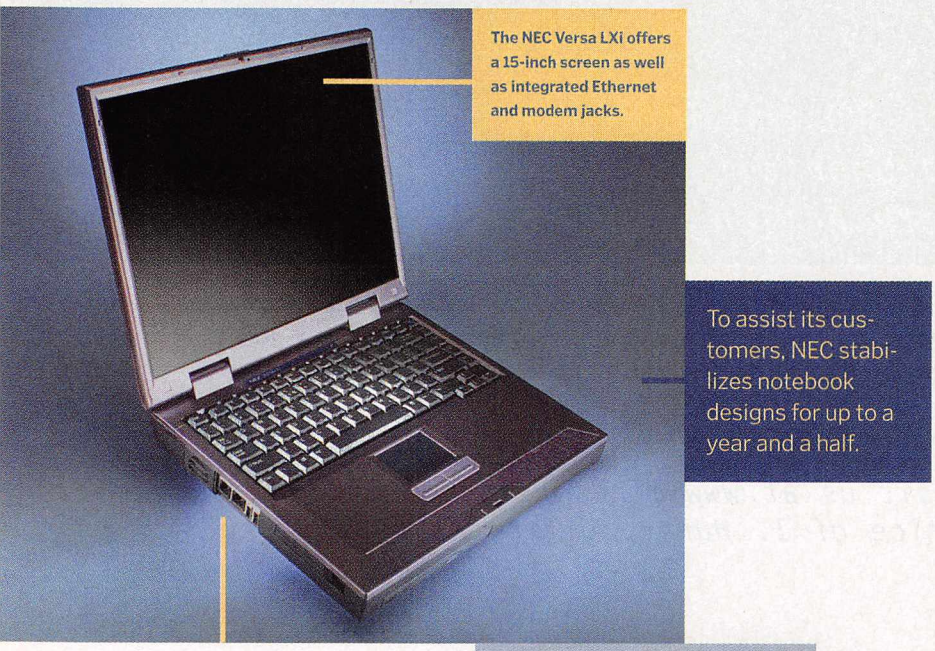
Well equipped on its own, the 390X system can't be used with a full docking station, but it does support two port replicators: the simple Port Replicator 380 ($155) and the EtherJet ($400), which offers an Ethernet adapter. The 600X uses two different docking stations: the SelectaBase 600 (a $190 port replicator) and the $700 SelectaDock III (a full docking station with built-in Ethernet, drive bays, and PCI slots).

To aid IT departments with long-term rollouts, IBM offers versions of both machines that will remain unchanged over each model's nine-month life cycle. Each of these workhorse models will support the same software image whether you make your purchase at the beginning or the end of that cycle.

Equipped with a floppy disk drive and a DVD-ROM drive (a $390 option), the 390X is 1.8 inches thick and weighs 7.6 pounds (8.4 with AC adapter). The floppy disk and DVD-ROM drives are part of a single module that easily slides in and out of a side multipurpose bay. This bay can also be used with a CD-ROM/floppy disk drive module, an Imation SuperDisk drive, an Iomega Zip Drive, a second battery, or a second hard disk. The unit's performance was average or a touch below on our tests, though the battery life (3:23) was excellent.

The 600X also has a multipurpose drive bay. The DVD-ROM and floppy disk drives are separate, though the floppy disk drive can attach either internally or externally, so you can have it and any one of six other devices (CD-ROM, DVD-ROM, SuperDisk, Zip Drive, second battery, or second hard disk) in use at once. Conveniently, you can use these peripherals with the IBM ThinkPad 570 line as well.

Equipped with DVD-ROM and an AC adapter, the unit weighs a mere 6.4 pounds. By comparison, the HP OmniBook 4150 weighs 7.7 pounds, and the Dell Latitude CPx H500GT weighs 7.9. The 600X was the top performer overall (as measured by the comprehensive Business Winstone 99), and its battery life, 2:35, was acceptable for such a light machine.—*CM*



NEC Versa LXi

NEC Versa LXi

Mobile Pentium III/500, 128MB RAM, 9.6GB hard disk, 15-inch TFT screen, S3 SavageMX graphics, 6X DVD-ROM drive, floppy disk drive. $4,450 street. Winstone score: 24.9. Mountain View, CA; 888-632-8701; www.nec-computers.com. ●●●●

The NEC Versa LXi is the most powerful notebook sold by the recently renamed NEC Computers and takes advantage of backward compatibility with previous models for many system components. NEC offers a variety of custom-build and user-support services for corporate customers, with an emphasis on meeting client specifications. Although the Versa LXi did not have particularly good battery life on our test, its generous support makes it a strong choice for corporate adoption.

At 8.8 pounds (9.7 with the AC adapter), the Versa LXi is one of the heaviest notebooks we tested. Part of the blame, of course, lies with the 15-inch screen. The integrated Ethernet and modem jacks can utilize internal mini-PCI boards, although the test system was equipped with 3Com modem and NIC PC Card solutions, which also can access the integrated jacks.

NEC does not ship Intel LANDesk CDs with the Versa LXi. Rather, on a build-to-order basis, NEC will install and ship the software preferred by customers and will also burn software images and enter all configuration information. Continuity with the previous LX notebooks includes using common AC adapters; removable hard disks and floppy disk, DVD, CD, and SuperDisk drives; and second batteries. The LXi also can use the docking station and port replicator from the earlier model. NEC's goal for its corporate notebooks is to hold a platform design for a year to a year and a half for model stability.

The NEC unit posted average scores on our benchmark tests, but battery life (2:30) was rather short for a machine in this weight class.

In addition to offering extended warranties that can last up to five years, NEC can build Web sites for corporate customers. For system continuity and custom software configurations, the NEC Versa LXi is worth considering.—*BB*

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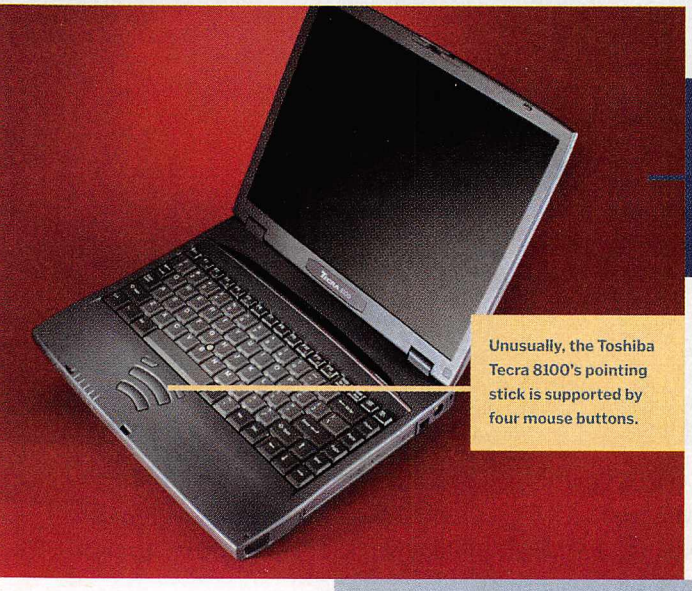
Toshiba Portégé 7140CT, Tecra 8100

7140CT: Pentium III/500, 6.5GB hard disk, 13.3-inch screen, 4MB Trident CyberBlade graphics, external floppy disk drive. Winstone: 27.5. $3,500 street.
●●●●● **8100:** Pentium III/500, 9.5GB hard disk, 14.1-inch screen, 8MB S3 Savage 3D graphics, DVD-ROM drive, floppy disk drive. Winstone: 28.1. $3,900.
●●●●● Irvine, CA; 800-867-4422, 949-598-7802; www.computers.toshiba.com.

PC MAGAZINE EDITORS' CHOICE

Toshiba America offers two upmarket designs: the single-spindle Toshiba Portégé 7140CT and the larger, more powerful Toshiba Tecra 8100. The 7140CT shares hardware with earlier Portégé models, and the 8100 is fairly compatible with earlier Tecras. Both ship with the latest version of Intel's desktop management application, LANDesk Client Manager, and come with a variety of core components. The unsurpassed value for the dollar makes these machines our Editors' Choices.



All Toshiba Tecra 8100s come with the same motherboard and chassis; the rest is up to you.

Unusually, the Toshiba Tecra 8100's pointing stick is supported by four mouse buttons.

Toshiba Tecra 8100

Both the 7140CT and the 8100 offer an unusually effective Windows-based power management interface and a pointing stick supported by four different mouse buttons. Two of these buttons let you scroll in certain Windows applications.

The 7140CT is just 1.2 inches thick and weighs a mere 4.2 pounds (4.8 with AC adapter). Though the main system lacks serial, parallel, and mouse ports and removable-media drives, Toshiba supplies a floppy disk drive and a half-pound port replicator, both of which attach externally. For an additional $650, you can purchase the 2.6-pound DVD Network Dock II, a slim (less than 1-inch-thick) docking station that includes DVD and floppy disk drives, additional I/O ports, stereo speakers, and an Ethernet adapter. (The dock is also compatible with Toshiba Portégé 7020 and 7010 models, as is the notebook's AC adapter.) You can easily travel with this device attached to the 7140CT, making a complete system at 6.8 pounds. Performance and battery life were more than acceptable for a machine of this size.

The 8100 delivers a full complement of I/O ports and a multipurpose drive bay on-board, yet it still manages a 1.6-inch chassis. The bay can accommodate any one of seven devices. Equipped with the DVD drive, the system weighs 6.1 pounds (7.2 pounds with AC adapter).

You can use the 8100 with one of two docking stations. Meant to remain on your desktop, the Network Dock Port Replicator ($300) includes a network adapter and all the expected I/O ports. If you need PCI slots and standard 5.25-inch bays, you can attach the Network Dock to a larger Expansion Station ($400). With an adapter, the Expansion Station can also accommodate any of the drives that plug into the 8100's multipurpose bay. Both the docking stations and all the 8100 drives can be used with any Toshiba Tecra 8000.

The 8100 is a built-to-order system available in several thousand configurations. Each configuration uses the same motherboard and the same chassis, letting you standardize on a single software image and swap hardware between models. The 8100 was a good performer on our benchmark tests, and its 3:00 battery life put it right in the middle of the pack.

Like HP's and NEC's, Toshiba's Web site is a good resource for driver updates and information, but you will need to go through an authorized reseller to make a purchase.—*CM*

WinBook XL^3 500

Mobile Pentium III/500, 128MB RAM, 11.5GB hard disk, 14.1-inch TFT screen, 8MB ATI Rage LT Pro graphics, 4X DVD-ROM drive, 120MB SuperDisk drive. $3,468 direct. Winstone score: 28.1. Columbus, OH; 800-254-7806; www.winbook.com. ●●

WinBook Computer Corp. has a history of bundling an attractive array of features in its notebook PCs for compelling prices, and the WinBook XL^3 500 is no exception. WinBook has a sales force for corporate customers along with priority technical support. Beyond special pricing for volume purchases and a dedicated salesperson, however, corporate customers won't find many special services (such as custom Web pages for support), although volume customers can specify components and request image burns of licensed software. Thus, while there is a good deal of apparent value in the XL^3, it is most appropriate for companies that do not need extra levels of corporate support or services.

At 7.3 pounds (8.2 with AC adapter), the XL^3 is on the heavy side. Components such as the AC adapter, battery, and docking stations are interchangeable with the earlier WinBook XL and XL^2 notebooks. Product life cycles for WinBook notebooks can be guaranteed by arrangement, but there is no formal design-longevity policy.

The XL^3 has an internal 56K modem and is equipped with both a pointing stick and a touch pad (both are active at the same time). On most benchmark tests, the XL^3 was an average performer, but it delivered an above-average score on our Business Winstone and Content Creation Winstone tests. Battery life (3:00) was average for the field.

WinBook's standard one-year warranty does not include on-site support, but a number of extended service plans are available, including one with 48-hour repair turnaround service. —*BB*

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- 4 Channel 3D Surround Sound Speakers with Subwoofer

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- 1.44MB Floppy Drive
- 56Kbps V.90 PCI FAX/Modem

Software Included
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- Corel Wordperfect Office 2000

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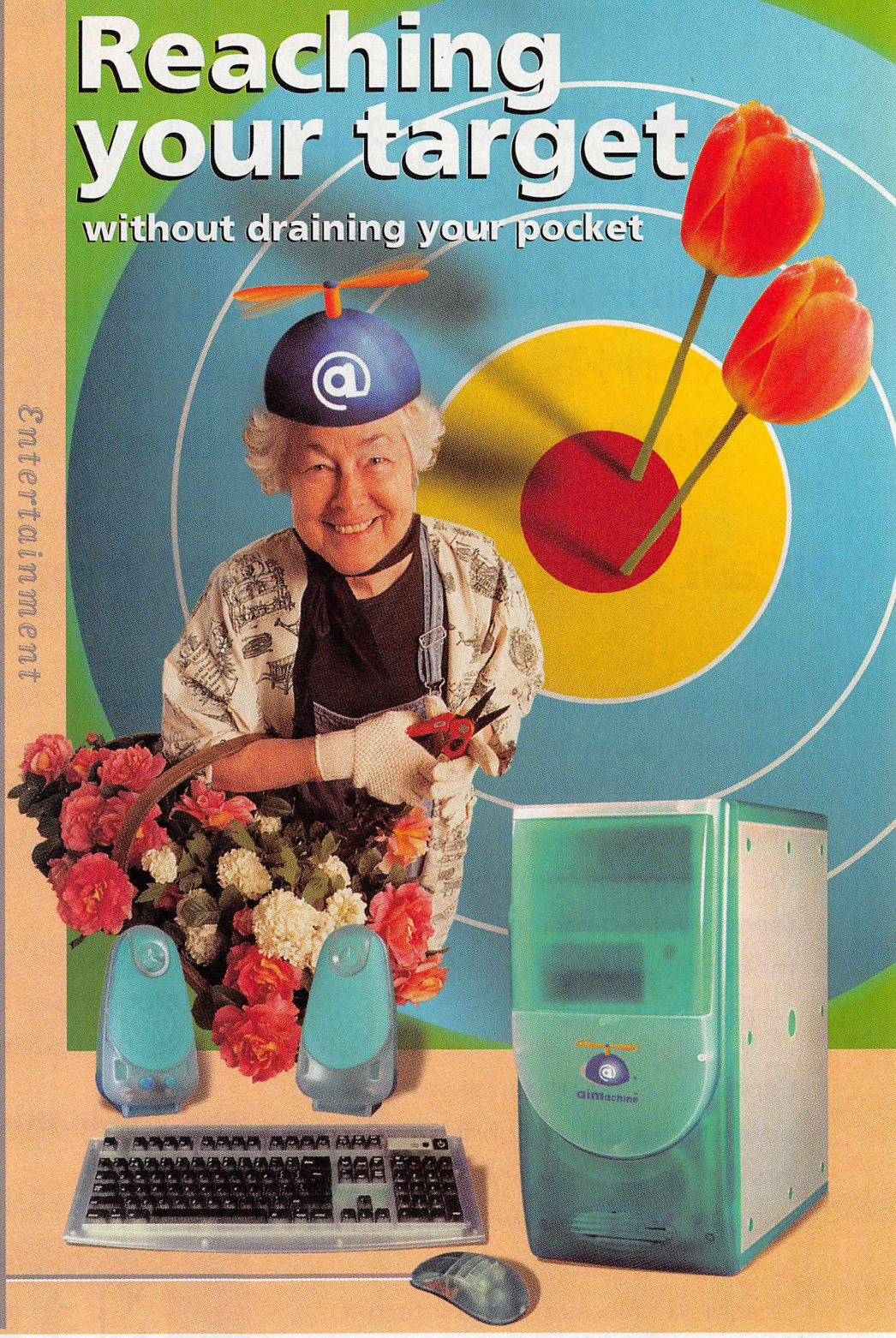

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Digital *Divide*

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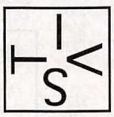
January 28th
9:00 pm
(check your local listings)
www.pbs.org/digitaldivide

ENCORE PRESENTATION

February 7th
9:00 pm et/8:00pm central

www.zdtv.com



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15.0GB	512k	5400	QML15000LA	1	$149
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13.0GB	512k	5400	WDAC136AA	3	$137
13.6GB	2MB	7200	WDAC136BA	3	$155
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18.2GB	10,000	Seagate	ST318203LW	$645
18.2GB	10,000	Seagate(4MB)	ST318203LW4	$665
36.4GB	10,000	IBM	IDMVS36U2	$1015
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48x	Mitsumi	CRMCFX48X	65	$55
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40x	NEC	CDR3010	85	$79
40x	Toshiba	XM6401B	79	$87
40x	Plextor	PX40TS	85	$105
52x	Kenwood	UCR415	90	$169
72x	Kenwood	Call for details on this hot drive!		

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10.0GB	12.5	Toshiba	MK1101GAV	$275
12.0GB	9mm	IBM	DA212000	$379
12.1GB	9.5	Toshiba	MK1214GAP	$316
15.0GB	12.5	IBM	DA215000	$535
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8x	50 pack (CDR74-50)	$73
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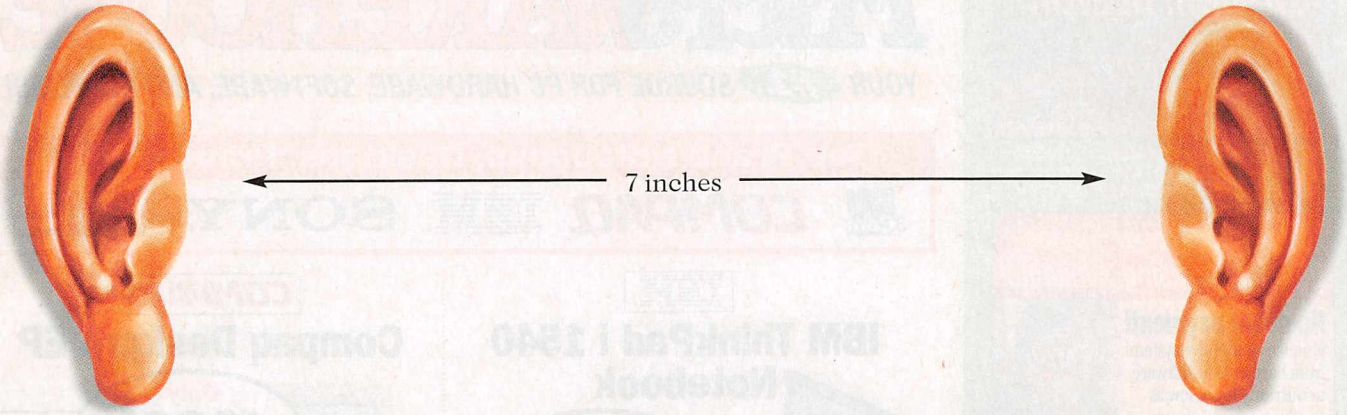

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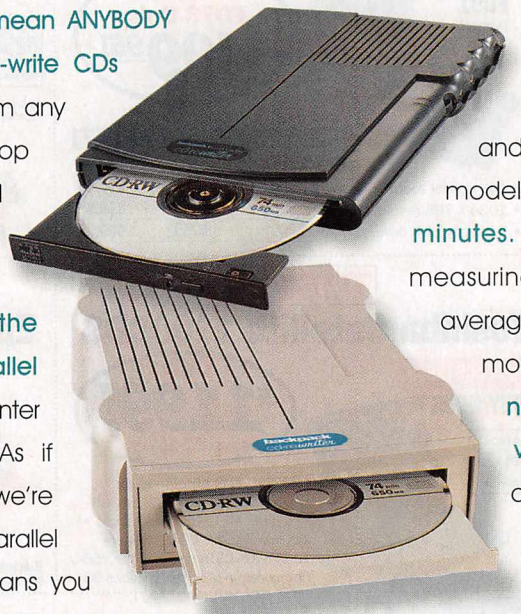

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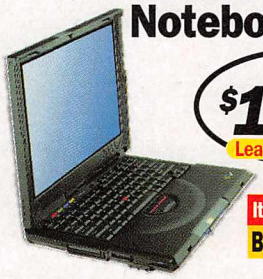

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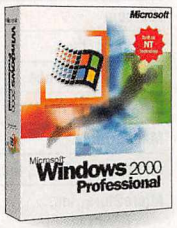

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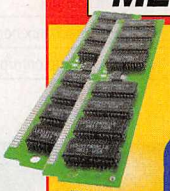

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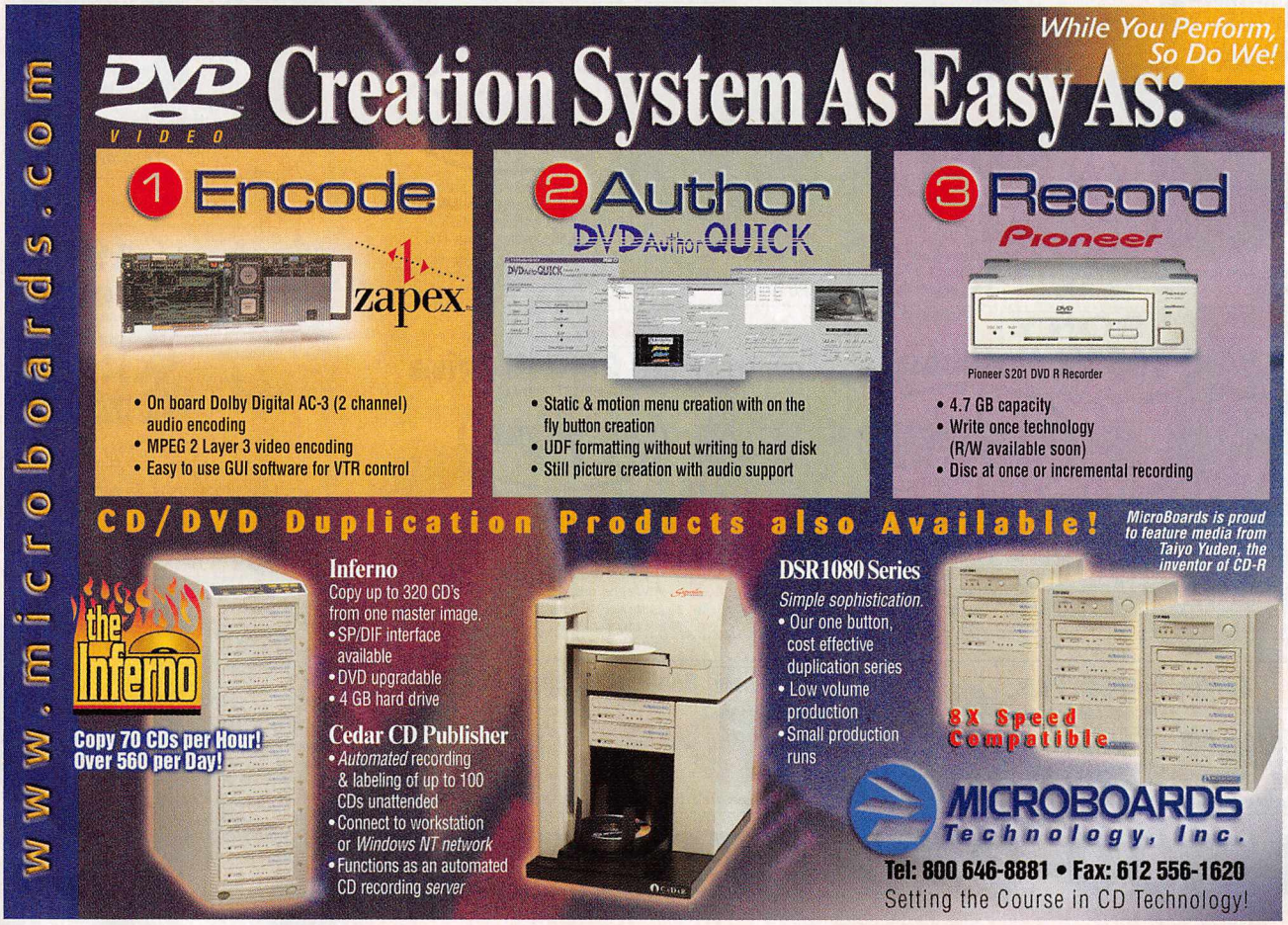

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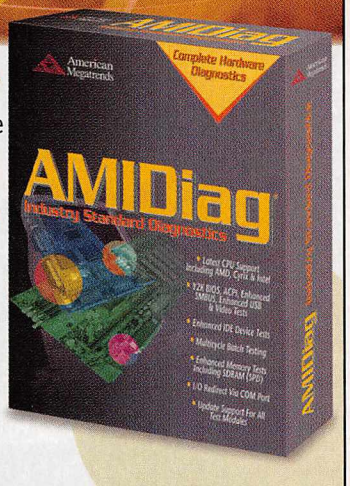

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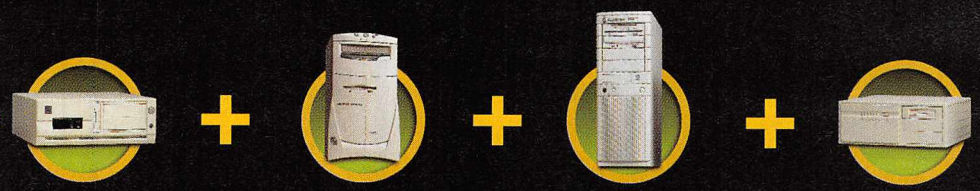

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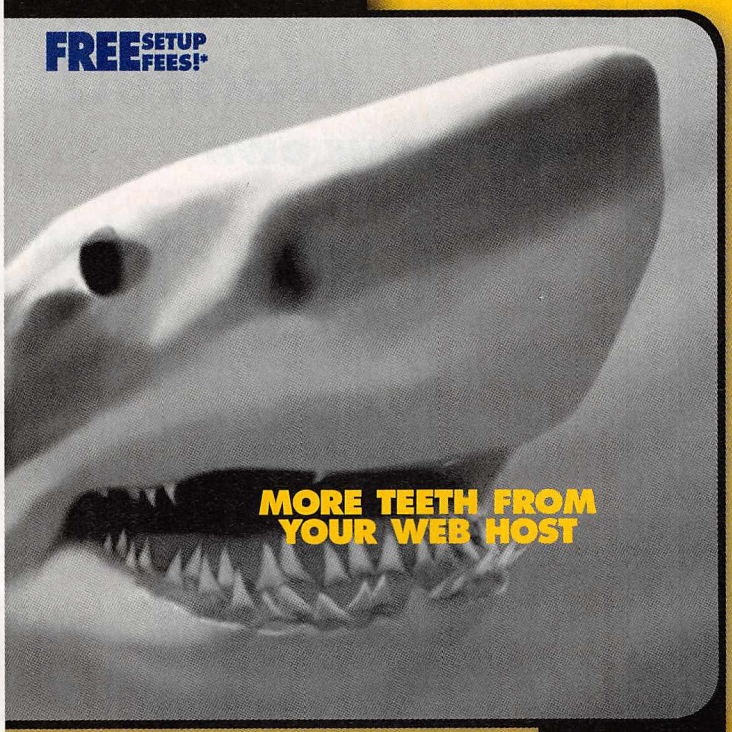

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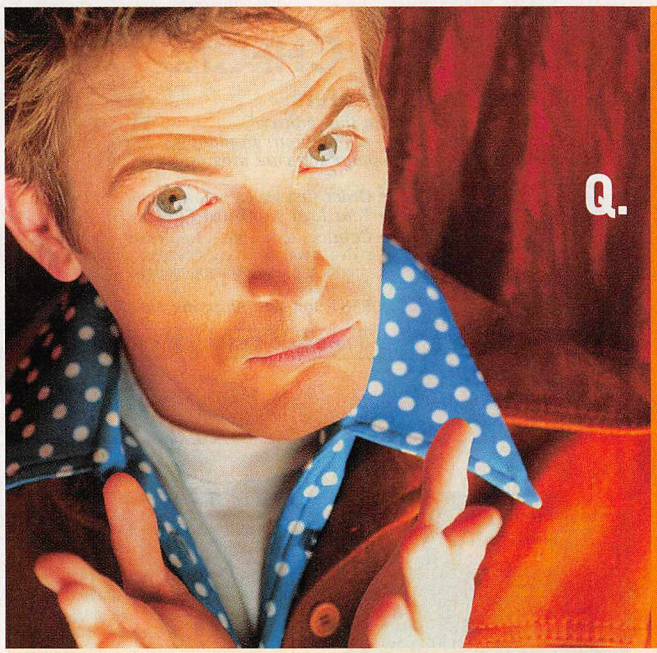

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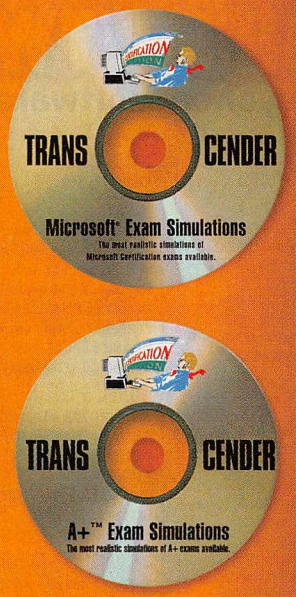

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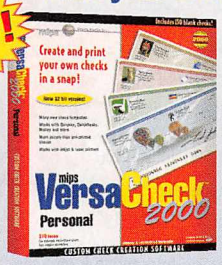

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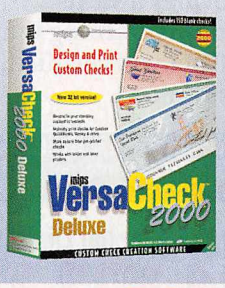

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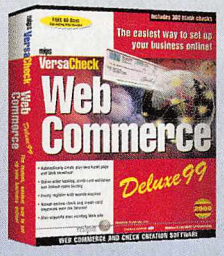

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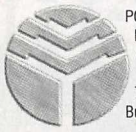

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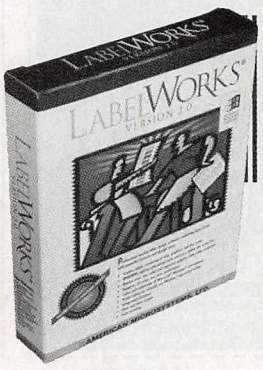

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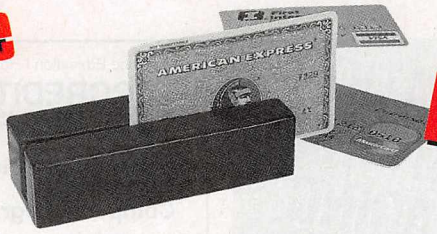

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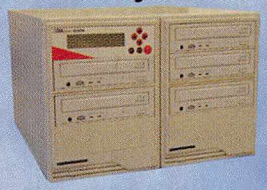

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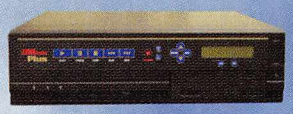

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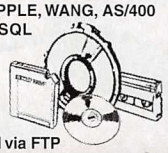

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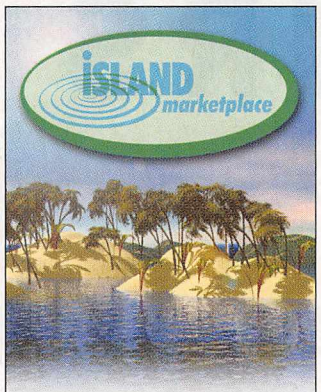

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PC Magazine, ISSN 0888-8507, is published twice a month except in July and August at $49.97 for one year. Ziff-Davis Inc., 28 E. 28th St., New York, NY 10016-7930. Periodicals postage paid at New York, NY 10016-7930 and at additional mailing offices. POSTMASTER: Address changes to *PC Magazine,* P.O. Box 54093, Boulder, CO 80328-4093. The Canadian GST registration number is 14049 6720 RT. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477. Printed in the U.S.A.

MP3 to Go

BY MATTHEW GRAVEN AND JEREMY A. KAPLAN

Just about a year ago, the first portable MP3 players appeared on the market. Today, many more players are available, and trying to decide which is right for you can be overwhelming. To root out the wanna-bes of the MP3 player market, we tested seven players that were ready in time for our roundup.

We found that sound quality didn't vary noticeably among these devices. Instead, the players vary in storage capacity, supported storage media, and the type of connection used for transferring music files from your PC to each MP3 player. Ease of use, additional features like voice recorders and radios, LCD quality, and the general design of the players are also important.

Of the seven products here, all but two rely on parallel-port connections, which are inconveniently slow compared with the USB connections offered by the Diamond Rio 500 and the HanGo Personal Jukebox. We expect USB to catch on in this market quickly. In fact, several new USB-based players—the Creative Nomad II, Samsung Yepp, and Sony VAIO Music Clip and Memory Stick Walkman—just missed our roundup.

As for storage media, most players use one of two competing formats: Smart Media or CompactFlash. Smart Media cards are smaller, but the largest-capacity CF card stores at least twice as much as the biggest SM card.

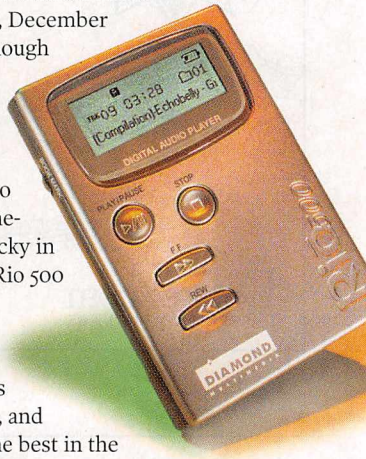
With its generous storage space, USB connectivity, and industry-standard SmartMedia, the Rio 500 runs away with our Editors' Choice. The Sensory Science raveMP 2100 earns an honorable mention for its excellent feature set and is a great choice for those who have older PCs that lack USB ports.

In coming months we expect to see players that support copy protection. Also look for players that support additional music formats such as Microsoft's Windows Media.

Diamond Rio 500

PC MAGAZINE EDITORS' CHOICE

Already in its second generation, the Diamond Rio—the player that started the craze—proves its maturity with a fine collection of features in a well-designed body. The player wins our Editors' Choice (besides having won *PC Magazine*'s Technical Excellence award, December 14, 1999). Though many MP3 players, including the original Diamond Rio 300, are somewhat gimmicky in design, the Rio 500 has a sleek, almost simple look. The controls are intuitive, and the LCD is the best in the group—a sizable screen with excellent backlighting and plenty of information.



Like the Sensory Science raveMP, the Rio 500 includes 64MB of base memory and has a SmartMedia slot for additional storage. Also, the Rio 500 is one of only two devices in this roundup that use USB for transferring files (the other is the HanGo Personal Jukebox).

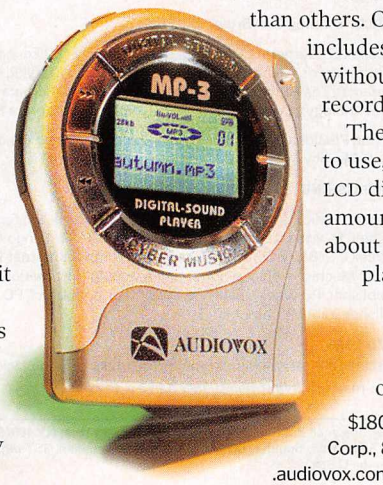
The Rio 500's software, RioPort Audio Manager, provides a well-integrated interface but is a bit convoluted and quirky to use. Otherwise, the Rio 500 is clearly a cut above the competition.—*MG*

$250 street. Diamond Multimedia, 800-468-5846, www.diamondmm.com. ●●●●●

Audiovox MPDj MP-1000

The Audiovox MPDj MP-1000 includes 32MB of embedded memory, it supports SmartMedia cards, and it has an easy-to-read LCD with lots of information. On the negative side are the MP-1000's physical design flaws: The unit is poorly constructed (ours began to separate at the seams after two days of use).

Also, the memory slot cover does not snap in and is not attached, making it easy to misplace. And the player's buttons are erratically placed, making the MP-1000 much less intuitive to use than others. Oddly, the MP-1000 includes a microphone without offering a record feature.



The software is easy to use, however, and the LCD displays a fair amount of information about the song being played. This is a very capable MP3 player that is limited by inferior design.—*MG*

$180 street. Audiovox Corp., 800-290-6650, www.audiovox.com. ●●

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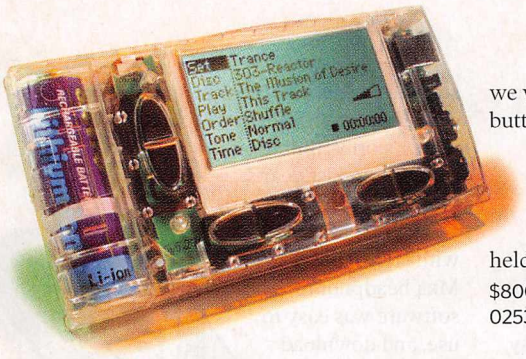

HanGo Personal Jukebox

About four times the size of the shirt-pocket-size other players here, the HanGo Personal Jukebox includes a 4.86GB hard disk for storing music files. This translates into roughly 80 hours of music encoded at 128 Kbps, far exceeding the 1- to 2-hour limits of the other devices reviewed here. The Personal Jukebox also supports USB for file transfer.

With a built-in hard disk, the Personal Jukebox requires more juice than a pair of triple-A batteries can muster. Instead, it uses a rechargeable lithium ion battery; it can also run on AC power. The player's LCD is by far the largest in this roundup, but we would have liked more single-function buttons on the spacious console.

The Personal Jukebox, durable and portable, is a great option for road trips and parties. Obviously, you should look elsewhere for a hand-held MP3 player.—*MG*

$800 street. HanGo Electronics Ltd., 714-525-0253, www.pjbox.com. ●●●

I-Jam

Arguably the best-looking player in this story, the I-Jam offers some nice extras, such as a built-in FM tuner. Unfortunately, design flaws hinder the player. The LCD is difficult to read and doesn't list track titles. And the I-Jam provides no on-board memory, relying instead on SanDisk MultiMediaCards for storage: Two 16MB cards are included (each holding 24 minutes of music, at a 96-Kbps encoding rate), but you can use only one at a time.

We liked the external MultiMediaCard reader, which allows for simple drag-and-drop file transfer to the I-Jam cards. But the buttons on the I-Jam are poorly labeled and control multiple functions awkwardly; for instance, the forward and rewind buttons also control the volume. The clunky buttons combined with the device's poorly implemented memory make the I-Jam little more than an expensive toy.—*MG*

$220 street. I-Jam Multimedia LLC, 888-326-4526, www.ijamworld.com. ●●

SUMMARY OF FEATURES

MP3 Players

■ YES □ NO	Audiovox MPDj MP 1000	Diamond Rio 500	HanGo Personal Jukebox	I-Jam	Pine D'music SM-320V	RCA/ Thomson Lyra	Sensory Science raveMP 2100
Price	$180 street	$250 street	$800 street	$180 street	$188 list	$199 list	$269 list
Interface	Parallel	USB	USB	Parallel	Parallel	Parallel	Parallel
Included storage	32MB	64MB	4.86GB	32MB*	32MB	32MB	64MB
Expanded storage media	SmartMedia	SmartMedia	None	SanDisk MultiMedia-Cards	SmartMedia	Compact-Flash	Proprietary
Batteries	2 AAA	1 AA	1 lithium ion	2 AAA	2 AAA	2 AA	1 AA
LCD information:							
Album title	□	□	■	□	□	■	□
Artist	□	■	□	□	□	■	■
Battery life	■	■	□	■	■	■	■
Bit rate	■	□	□	□	□	■	□
Encoding format	□	□	□	□	□	□	■
Equalizer	□	□	■	□	□	■	□
Repeat mode	□	□	□	□	■	□	■
Storage space	□	□	□	□	□	□	■
Track title/ number/time	■ ■ ■	■ ■ ■	■ □ ■	□ ■ ■	■ □ ■	■ □ ■	■ ■ ■
Volume	■	■	■	□	■	■	■
Backlighting	■	■	□	■	□	■	□
Track organizer	□	■	■	□	■	■	□

RED denotes Editors' Choice. * The package includes two 16MB cards.

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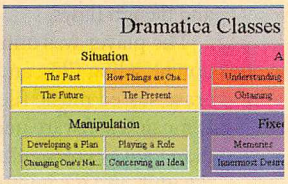
While the world debates the ethical issues, create your own genetic masterpieces with the Home Gene-Splicing Kit. Ever wondered what a cross between you and your hamster would look like? Scan in pictures, add them to the gene pool, and mix and match facial features. Then use the software to create postcards, a lab book, and other projects. Kids will love the workspace, complete with a toilet bowl where you flush your mistakes. Tool tips would help, and the mutant-creation process could be streamlined, but all in all, the program's a lot of fun.—*Nancy E. Hirsch*

$24.95 direct. You-Betcha Interactive Inc., 800-338-3844, www.genesplicing.com. ●●●

Dramatica Pro 4.0

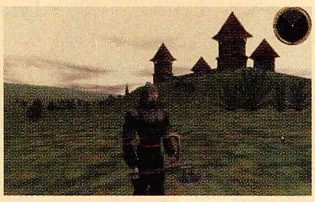
This program is an amazing tool for helping both professional and wanna-be screenplay writers create, deepen, and refine their stories. Previously, the only downside was the time and effort required to learn the unique Dramatica theory of storytelling, with its sometimes baffling terminology. In Version 4, more easily understandable terminology has been added as an option, so you won't be stopped before you start. Structure templates for various story forms have been added as well, and the online help system has been expanded to include the entire user guide.—*Carol A. Mangis*



$399 list. Screenplay Systems Inc., 818-843-6557, www.screenplay.com. ●●●●●

Asheron's Call

Microsoft is turning out some great games these days. A case in point is Asheron's Call, a lavish 3-D, online-only fantasy role-playing game. Players create their own avatars for the online game world, then embark on quests, hunt an array of dangerous monsters, and socialize with other players. Asheron's Call is highly addictive and requires a serious time commitment to be truly rewarding, but role-playing fans should love this game.—*Michael E. Ryan*



$45 street plus $10 per month. Microsoft Corp., 800-426-9400, www.microsoft.com. ●●●●

Count the Minutes

This table shows how many minutes of music you can store at various encoding bit rates with 32MB or 64MB of storage (the higher the bit rate the better the quality).

Bit rate (Kbps)	Minutes of music 32MB	64MB
160	28	56
128	35	69
96	47	95
80	56	111
64	71	142

Pine D'music SM-320V

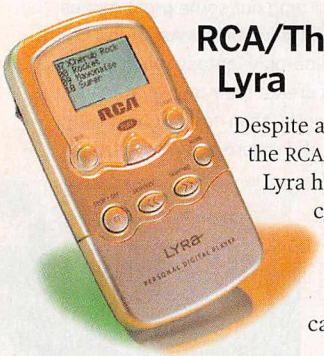
The Pine D'music SM-320V wowed us with its good looks and low price, but unfortunately, that positive first impression didn't last. The player has some decent extras, including a key lock and a voice-record feature; and a model with a built-in FM tuner will soon be available. But the D'music suffers from quirky operation and design flaws.

The player was unusually slow when downloading files, and it was too easy to erase stored music files accidentally. The D'music's software needs refinement; it didn't always recognize the presence of the unit, and it sometimes interrupted downloads for no reason.

The D'music simply does not yet offer the quality and features to compete with the big boys.—*JAK*

$188 list. Pine Technology USA, 510-668-0378, www.pine-dmusic.com. ●●

RCA/Thomson Lyra



Despite a cute design, the RCA/Thomson Lyra has some shortcomings. For example, it's relatively large, and its case feels flimsy. Also, the Lyra takes almost 15 seconds to begin playing a song. And there is no base memory, though the player uses high-capacity CompactFlash cards (the list price includes a 32MB card).

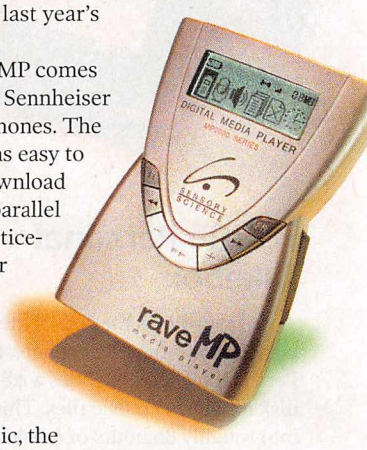
We liked the player's large LCD and functional backlight. You can easily set a playlist, and the Lyra will retain the information even after you turn it off. The included RealJukebox software was easy to install, and once we connected the included CompactFlash card reader to our PC's parallel port, we were able to select and download MP3 files easily and quickly. The Lyra can play RealG2 music files as well as MP3 files

With 64MB of onboard storage and a sturdier case, the Lyra would be a great device. As it is, you're better off with the Rio or raveMP.—*JAK*

$199 list. RCA/Thomson Consumer Electronics, 800-336-1900, www.lyrazone.com. ●●●

Sensory Science raveMP 2100

The Sensory Science raveMP 2100 is a darn good MP3 player. With 64MB of base memory, the raveMP has plenty of storage space. Also, it can run on a single double-A battery for 12 to 15 hours. The player's only limitation is a reliance on last year's technology.



The raveMP comes with stylish Sennheiser Mx4 headphones. The software was easy to use, and download across the parallel port was noticeably peppier than with other non-USB players. In addition to storing music, the raveMP can store voice memos, phone numbers, and text notes. With an optional adapter, you can even download music from a stereo or guitar—a feature you won't find elsewhere.

The downside is that the player doesn't connect through USB, and it uses proprietary removable storage media. Instead we have to recommend the Rio 500, with its USB connection and SmartMedia.—*JAK*

$269 list. Sensory Science Corp., 480-609-9200, www.sensoryscience.com. ●●●●

Tracking Down Tracks

Fans of alternative music are in luck when it comes to finding music online. Artists are increasingly relying upon the Web for hosting and distributing their music. Looking for the latest in underground sounds? Check out Epitonic.com **(www.epitonic.com)**; IUMA, the Internet Underground Music Archive **(www.iuma.com)**; and SpinRecords.com **(www.spinrecords.com)**.

One of the biggest mainstream music sites is Emusic.com **(www.emusic.com)**, which also offers a great bundling deal on the Sensory Science raveMP 2000 player. Some other great MP3 sites include MP3.com **(www.mp3.com)**, Riffage.com **(www.riffage.com)**, RioPort **(www.rioport.com)**, and ZDNet Music **(music.zdnet.com)**.

There are also a number of powerful MP3 search engines on the Web, including one hosted by Lycos **(mp3.lycos.com)**. Another—Listen.com—is accessible through a number of URLs **(www.listen.com** is the simplest**)**. You'll still have to sift through some invalid links and personal Web pages, but for the most part, you'll find a wealth of good information. Also try Audiogalaxy **(www.audiogalaxy.com)**, which provides reviews and songs along with a great search engine.

Many popular artists are already releasing samples of their music online. Check out the Beastie Boys' online home **(www.grandroyal.com)** for their latest work. Public Enemy is also online **(www.publicenemy.com).** Finally, recording labels are getting in on the act: Your favorite Matador **(www.matador.com),** Lookout! Records **(www.lookoutrecords.com),** and Moon Ska **(www.moonska.com)** songs may just be available.—*JAK*

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Flying High

In a new game plan for the company, **Microsoft Flight Simulator 2000** is available in both a Standard version and an expanded Professional version. Both include new aircraft, improved worldwide scenery with realistic terrain and seasonal effects, and approximately 20,000 airports. The Professional version adds more aircraft designed for instrument flight, more cities with detailed scenery, and advanced utilities to customize aircraft appearance and handling. From improved clouds to a working GPS, this remains the sim to beat.—*Alfred Poor*

Standard Edition, $60 direct; Professional Edition, $80. Microsoft Corp., 800-426-9400, www.microsoft.com/games/fs2000. ●●●●●

PC Sketching

The KBGear SketchBoard Studio is a pressure-sensitive drawing tablet aimed at children aged 4 to 12. The package includes Disney Interactive's excellent Magic Artist Studio software, but the tablet will work inside any Windows application. Using the SketchBoard takes some getting used to, but kids will eventually love it.—*Ben Z. Gottesman*

$59 list. KBGear Interactive, 612-941-1905, www.kbgear.com. ●●●●

Smoother Online Gaming

The **U.S. Robotics Internet Gaming Modem** (which doesn't rely heavily on your CPU) has a firmware-encoded instruction set designed to boost your Internet game performance. With its gaming mode enabled via an icon on your taskbar, the Internet Gaming Modem maximizes your connection speed while minimizing errors and packet loss.—*Richard Brown*

$139 list. 3Com Corp., 800-638-3266, www.3com.com. ●●●●●

Burn Some Virtual Rubber

The ThrustMaster NASCAR Pro Digital Racing Wheel has two pedals, a stick shift, four buttons, and two shifters—so you can accelerate, brake, and downshift without taking your hands off the wheel. Steering and pedal response are very accurate. All that's missing is force feedback.—*John Delaney*

$79.99 list. Guillemot, 514-279-9960, www.guillemot.com. ●●●●

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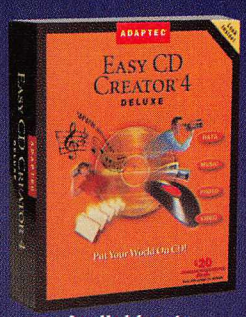

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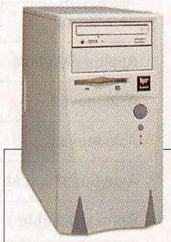

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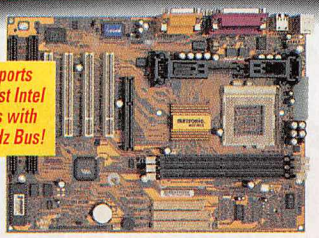

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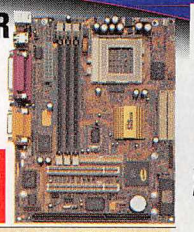
Tiger 7112C Form Factor: **ATX** • CPU: **Socket 370/Slot 1** • Bus Speed: **Up to 133 MHz** • On-board Video: **No** • On-board Audio: **YES** • PCI Slots: **4** • ISA Slots: **2** • Memory: **3 DIMM** • Max Memory: **768 MB**

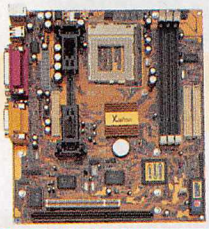
Tiger 599LMR M-ATX Socket 7 with AGP



599LMR—ATX Socket 7 with 2 PCI/1 ISA, PCI Sound, AGP Video , 56K Modem & NIC Onboard

Tiger 599LMR Form Factor: **M-ATX** • CPU: **Socket 7** • Bus Speed: **Up to 100MHz** • On-board Video: **AGP 8MB** • On Board Audio: **YES** • PCI Slots: **2** • ISA Slots: **1** • Memory: **3 DIMM** • Max Memory: **768 MB**

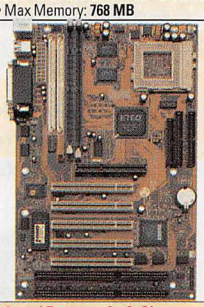
Tiger MATX 741LMRT Socket 370/ Slot 1



M-741LMRT Micro-ATX SOCKET 370/Slot 1 with Video, Sound, Modem & NIC on-board

Tiger 741LMRT Motherboard Features At-A-Glance
Form Factor: **M-ATX** • CPU: **Socket 370/Slot 1** • Bus Speed: **Up to 100MHz** • On-board Video: **AGP 8MB** • On-board Audio: **Yes** • PCI Slots: **1** • ISA Slots: **1 (Shared)** • Memory: **3 SIMM** • Max Memory: **768 MB**

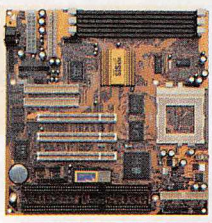
Tiger 5EMA+ ATX Super Socket 7



Motherboard Includes:
Motherboard with 1MB Cache ; cables, manual

Tiger 5EMA+ Motherboard Features At-A-Glance
Form Factor: **ATX** • CPU: **Socket 7** • Bus Speed: **Up to 100 MHz** • AGP Slots: **1** • PCI Slots: **5** • ISA Slots: **2** • Memory: **3DIMM Sockets** • Max Memory: **768MB**

Tiger 598 AT Super Socket 7 with AGP Video



Motherboards Include:
Motherboard, cables & manual

ATX Super Socket 7 with 3 PCI/2 ISA, PCI Sound, AGP Video, 56K Modem & NIC Onboard

Tiger 598 Motherboard At-A-Glance
Form Factor: **AT** • CPU: **Super Socket 7** • Bus Speed: **Up to 100 MHz** • On-board Video: **8MB AGP** • On-board Audio: **YES** • PCI Slots: **3** • ISA Slots: **2** • Memory: **3 DIMM** • Max Memory: **768 MB**

MOTHERBOARD SPECIFICATIONS / MOTHERBOARD ONLY

Motherboard Design	Processors Supported	Item No.	1-2 units	3-5 units	6+ units
Tiger 598 AT including 1MB Cache, Wave Table sound and AGP On-board	**AMD** Up to K6-2/500; K6-III/400 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR333	MB1-E-9B	$82.99	$79.99	$75.99
Tiger M599LMR M-ATX 512KB Cache, Wave Table sound and AGP On-board	**AMD** Up to K6-2/450; K6-III/450 **Intel** Pentium up to 233 MMX **IBM/Cyrix** Up to PR366	MB2-M599LMR	$82.99	$79.99	$75.99
Tiger 5EMA+ Super Socket 7 1MB Cache and AGP Port	**AMD** Up to K6-2/500; K6-III-450 **Intel** Pentium up to 233 MMX **IBM/Cyrix** up to MII 366	MB1-T-7B	$83.99	$78.99	$74.99
Tiger 7112 ATX Slot 1 w/AGP Port	**Celeron** up to 500MHz **Intel** Pentium III up to 733MHz	MB2-MS 7112C	$89.99	$84.99	$79.99
Tiger 741LMRT ATX Slot 1 w/AGP On-board	**Celeron** up to 500MHz **Intel** Pentium III up to 600MHz	MB2-741LMRT	$103.99	$98.99	$93.99

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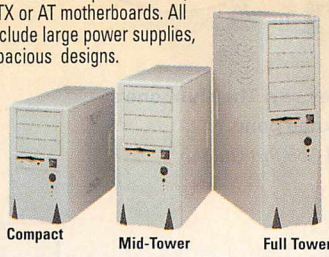
All cases accept Micro ATX, ATX or AT motherboards. All include large power supplies, Spacious designs.



Item #	Description	Units 1-2	3-5	6+
CA1-C-3D	Compact Case 6-Bay 230-W P/S	$43.99	$39.99	$37.99
CA1-C-2D	Mid-Tower Case 6-Bay 230-W P/S	$54.99	$49.99	$46.99
CA1-C-4B	ATX Full Tower 9-Bay 300-W P/S	$79.99	$72.99	$64.99

Power Your Motherboard With A Premium Processor!

AMD K6-2 With 3DNow!

AMD K6-2 Processors		1-2 Units	3-5 Units	6 units or more
#CP2-K62-300	300 3DNow!	$34.99	$32.99	$29.99*
#CP2-K62-333	333 3DNow!	$41.99	$37.99	$34.99**
#CP2-K62-350	350 3DNow!	$49.99	$45.99	$42.99*
#CP2-K62-400	400 3DNow!	$56.99	$52.99	$49.99*
#CP2-K62-450	450 3DNow!	$68.99	$64.99	$61.99*
#CP2-K62-475	475 3DNow!	$94.99	$89.99	$84.99**
#CP2-K62-500	500 3DNow!	$119.99	$112.99	$107.99*
#CP2-K62-533	533 3DNow!	$166.99	$156.99	$148.99*

Pentium & Cyrix MII

Tiger recommends the AT or a Super Socket 7 motherboard with these processors.

From $29.99

Pentium & Cyrix MII		1-2 Units	3-5 Units	6 units or more
#CP2-6X300	MII 300 CPU	$39.99	$34.99	$29.99
#CP2-P233	Pentium 233 CPU	$46.99	$43.99	$39.99
#CP2-K62-30	K6-2 300 3DNow!	$34.99	$32.99	$29.99*

Intel Celeron, Pentium II & III

**** Celeron CPUs are socket 370 format and require a fan and adapter (see far right) to be used in any slot 1 motherboard.*

Intel Celeron, Pentium II & III Processors		1-2 Units	3-5 Units	6 or more
#CP1-CI366	Intel Celeron **366** processor (370)	$54.99	$49.99	$45.99
#CP2-CI400	Intel Celeron **400** processor (370)	$79.99	$74.99	$69.99
#CP2-CI500	Intel Celeron **500** processor (370)	$174.99	$164.99	$154.99
#CP2-P3-450	Intel Pentium III **450** processor *	$249.99	$239.99	$229.99
#CP2-P3-500	Intel Pentium III **500** processor *	$287.99	$272.99	$249.99
#CP2-P3-550	Intel Pentium III **550** processor *	$429.99	$407.99	$379.99
#CP2-P3-600	Intel Pentium III **600** processor *	$549.99	$519.99	$479.99
#CP2-P3-600B	Intel Pentium III **600B** processor ††	$559.99	$529.99	$489.99
#CP2-P3-733B	Intel Pentium III **733B** processor ††	$949.99	$889.99	$829.99

1.44MB 3.5" Drives

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Item #	Description	1-2	3-5	6+
TC1-6000	Floppy (Beige)	$19.99	$17.99	$15.99

Cooling Fan SALE!

From $3.49

Protects your CPU against the damaging effects of heat!

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A216-1010	Socket 7 Fan	$5.99	$5.49	$4.49
A216-1002	Slot 1 Fan	$5.99	$5.49	$4.49
CI-PPGA370	Celeron Slot 1 Adapter	$8.99	$7.99	$7.49

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TC1-2000	Scrolling-Wheel Mouse	$4.99*

*Limit 2 at this price

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104 Keys, for Windows/NT

FROM $8.49

Item #	Description	1-2 Units	3-5 Units	6+ Units
TC1-1000	104-Key Keyboard	$9.99	$8.99	$8.49

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Item #	Description	1-2 Units	3-5 Units	6 units or more
TC1-4020	44X CD-ROM†	$39.99	$37.99	$35.99

56K PCI Modem Blowout!

56K, v.90 & X2 Fully Compatible PCI Modem With Voice Features!

FROM $19.99

Item #	Description	Price
TC1-5501	56k Faxmodem	$19.99*

*Limit 2 at this price

MEMORY SALE!

FROM $43.49

Item #	Size	1-2	3-5	6+
TC1-MEM-32	32MB PC100 SDRAM	$45.99	$44.99	$43.49
TC1-MEM-64	64MB PC100 SDRAM	$86.99	$84.99	$82.99
TC1-MEM-128	128MB PC100 SDRAM	$173.99	$171.99	$169.99

Note: *In order to bring you these low unheard of prices on premium bulk memory, we have negotiated returns for defective exchange only and a 20% restocking charge on all returns with our memory vendor. We will pass these policies on to all retail sales of bulk memory. Call for PNY Branded Memory prices. Prices are subject to change.*

Quantum 6.4GB FROM $106.99 HARD DRIVE BLOWOUT!

Item #	Manufacture	Size	Units 1-2	3-5	6+
THD-64C	Quantum	6.4GB	$110.99	$108.99	$106.99
THD-102C	Quantum	10.2GB	$130.99	$128.99	$126.99
THD-19Q	Quantum	19GB	$159.99	$149.99	$139.99

Sorry, but as prices are always changing on CPUs and memory, we do not offer price protection in the event prices rise or fall. *Requires 100MHz bus motherboard and 8ns PC100 SDRAM Memory. ** Requires 95MHz bus motherboard and 8ns PC100 SDRAM.. ††Requires 133MHz bus motherboard and 8ns PC100 SDRAM Memory. † CD-ROM speeds are variable, maximum speeds are shown. Call us for details and warranty information. No returns accepted on CPUs.

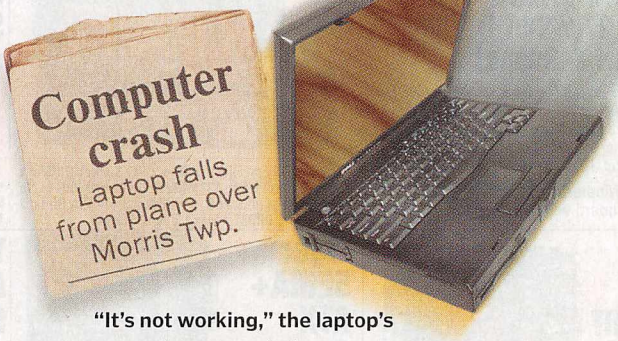
DCQ

Backspace

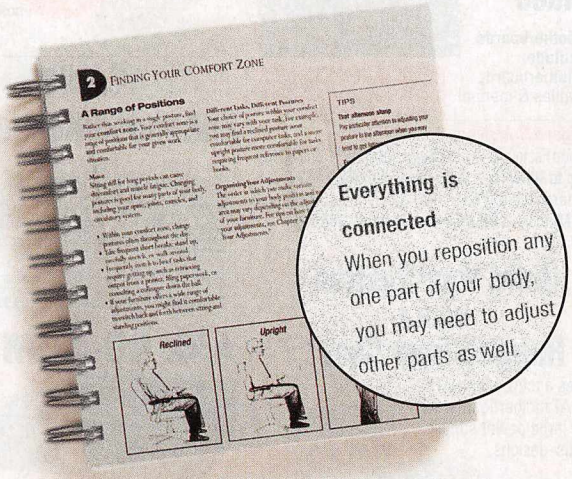
WHERE PC STANDS FOR PEST CONTROL

Edited by Don Willmott

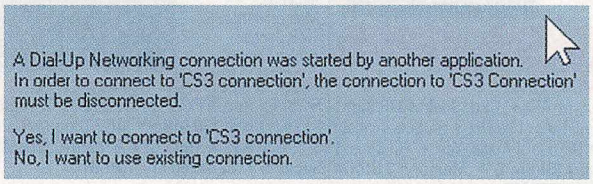
Greetings from Austria's Tirol region, where they have museums for *everything.*



"It's not working," the laptop's owner later reported.
(*The Bergen Record.*)



You know what they say: The shinbone's connected to the knee bone.
(*Compaq Safety and Comfort Guide.*)



From Norton Antivirus Live Update, an error message for the ages.

CLASSIFIED INTELLIGENCE

"Growing international educational software company in Hampden seeking a person w/experience in Basic and VD. Non-smokers only."
(*The Boston Globe.*)

Carouse? Never heard it put that way before, but it sounds fun to us!
(*The Boulder* [Colorado] *Daily Camera.*)

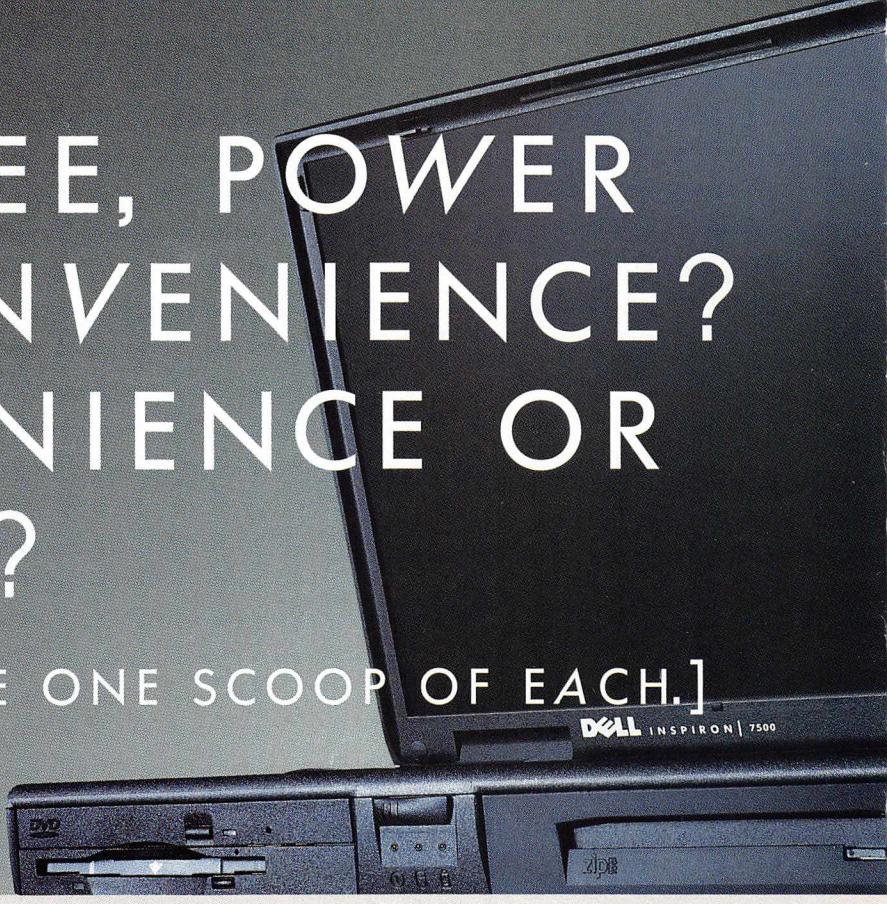
When the AOL search box pops up in awkward locations, news headlines can take on whole new meanings.

If your entry is used, we'll send you $50 and a *PC Magazine* T-shirt. Send your entries to Backspace, *PC Magazine*, 28 E. 28th St., New York, NY 10016-7930 or via e-mail to *don_willmott@zd.com*. Winners this issue: Ken Craven, Andre Felix, Roy Kratzke, Scott Menard, Jon Pfeifer, Tristam Pye, and Chad Vanaman.

PC Magazine, ISSN 0888-8507, is published twice a month except in July and August at $49.97 for one year. Ziff-Davis Inc., 28 E. 28th St., New York, NY 10016-7930. Periodicals postage paid at New York, NY 10016-7930 and at additional mailing offices. POSTMASTER: Address changes to *PC Magazine*, P.O. Box 54093, Boulder, CO 80328-4093. The Canadian GST registration number is 14049 6720 RT. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477. Printed in the U.S.A.

LET'S SEE, POWER OR CONVENIENCE? CONVENIENCE OR POWER?

[OH HECK, TAKE ONE SCOOP OF EACH.]



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- harman/kardon Speakers

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[38]Includes one (1) free upgrade and online support from MusicMatch. [42]To achieve 75GB Max. hard drive capacity on the Inspiron 7500, you must purchase a 25GB internal primary hard drive and the 25GB HDD option for both the 2nd and 3rd hard drive bays. Note that the Inspiron 7500 notebook must be used on AC power when utilizing the 75GB Max. hard drive configuration. [44]Includes 150 hours Internet access per month with a $1.50 per hour charge for each hour (or fraction thereof) over 150 hours. Remote subscribers subject to an additional charge of $4.95 for each hour of Dellnet℠ service. Excludes applicable taxes and local/long distance telephone access fees or charges. Additional $1.00/hr. surcharge for Dellnet service in HI and AK. [55]Online Backup services are provided by a third party, and such services are provided subject to terms and conditions between such a third party and the customer. Limited to 20MB of online storage space; additional storage space available for additional charge. Dell disclaims any responsibility for lost customer data. [56]13.8X Min. Intel, the Intel Inside logo and Pentium are registered trademarks; Pentium III Xeon and Celeron are trademarks of Intel Corporation. MS, Microsoft, BackOffice, IntelliMouse, Windows NT and Windows are registered trademarks of Microsoft Corporation. 3Com is a registered trademark and Fast EtherLink is a trademark of 3Com Corporation. HP and DeskJet are registered trademarks and OpenView is a trademark of Hewlett Packard Corporation. Trinitron is a registered trademark of Sony Corporation. ©1999 Dell Computer Corporation. All rights reserved.

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Workgroup Server

- Intel® Pentium® III Processor at 533MHz (up to 667MHz)
- Dual Processor Capable ■ 64MB 133MHz ECC SDRAM (up to 2GB)
- 9GB[4] 7200 RPM Ultra-2/LVD SCSI Hard Drive (up to 36GB[4] 10K)
- Up to 180GB[4] Hot-swappable Internal Storage Capacity
- Embedded Single-channel RAID with 64MB Cache
- Integrated NIC & SCSI Controllers; 40X Max[6] CD-ROM
- HP® OpenView™ NNM Special Edition
- 3-Year NBD On-site[3] Service; 7X24 Telephone Tech Support

$3289 Business Lease[15]: $110/Mo., 36 Mos.
E•VALUE CODE: **04232-290132**

- Redundant Hot-swap Power Supplies, add $100
- Microsoft® Windows NT® Server 4.0, add $799

DELL® *POWEREDGE*® 1300 Server

Entry Level Server

- Intel® Pentium® III Processor at 500MHz (up to 700MHz)
- Dual Processor/RAID Capable
- 64MB 100MHz ECC SDRAM (up to 1GB)
- 9GB[4] 7200 RPM Ultra-2/LVD SCSI Hard Drive (up to 36GB[4])
- 108GB[4] Internal Storage Capacity
- NIC & Integrated SCSI Controller; 40X Max[6] CD-ROM
- HP® OpenView™ NNM Special Edition
- 3-Year NBD On-site[3] Service; 7X24 Telephone Tech Support

$1649 Business Lease[15]: $55/Mo., 36 Mos.
E•VALUE CODE: **04232-290116**

- Small Business Upgrade Bundle, add $1897
  Bundle Includes: MS® BackOffice Small Business Server 4.5, Modem, Training on CD-ROM & System Support

DELL® *OPTIPLEX*® GX110 Desktop

Performance Managed PC at a Great Value

- Intel® Pentium® III Processor at 500MHz (up to 733MHz)
- 64MB SDRAM at 100MHz (up to 512MB)
- 6.4GB[4] SMART II Ultra ATA-66 Hard Drive (up to 20GB[4])
- 15" (13.8" vis) E550 Monitor (up to Flat Panel)
- Intel® 3D AGP Graphics, 24X Max[7] CD-ROM
- OptiFrame™ Small Form Factor Tool-less Chassis
- Integrated 3Com® 10/100 NIC
- Microsoft® Windows NT® 4.0
- Remote Client Manageability Support via DMI 2.0
- 3-Year Next-Business-Day On-site[3] Service

$1299 Business Lease[15]: $44/Mo., 36 Mos.
E•VALUE CODE: **04232-390112**

- Upgrade to 13.6GB[4] SMART II Ultra ATA Hard Drive, add $60
- 100MB Zip Drive, add $89

DELL® *OPTIPLEX*® GX100 Desktop

Affordable Managed PC

- Intel® Celeron™ Processor at 433MHz (up to 500MHz)
- 64MB SDRAM at 100MHz (up to 512MB)
- 4.3GB[4] SMART II Ultra ATA-66 Hard Drive (up to 15GB[4])
- 15" (13.8" vis) E550 Monitor (up to Flat Panel)
- Intel® 3D AGP Graphics
- OptiFrame™ Small Form Factor Tool-less Chassis
- Integrated 3Com® 10/100 NIC
- Microsoft® Windows NT® 4.0
- Remote Client Manageability Support via DMI 2.0
- 3-Year Next-Business-Day On-site[3] Service

$899 Business Lease[15]: $30/Mo., 36 Mos.
E•VALUE CODE: **04232-390108**

- 24X Max[7] Slimline CD-ROM, add $49

NEW DELL® *PRECISION*™ Workstation 220

Advanced Performance, Specialized Graphics

- Intel® Pentium® III Processor at 533MHz (up to 733MHz)
- Dual Processor Capable
- 64MB PC800 RDRAM at 400MHz (up to 512MB)
- 9GB[4] 10,000 RPM Ultra-2/LVD SCSI Hard Drive (up to 36GB[4] 10K)
- Dual 17" (16.0" vis) P780 Trinitron® Monitors (up to Flat Panel)
- 32MB 4X AGP Matrox G400 Max Graphics Card
- Integrated NIC & Sound; 48X Max[16] Variable CD-ROM
- Microsoft® Windows NT® Workstation 4.0
- 3-Year NBD On-site[3] Service; 7X24 Telephone Tech Support

$3129 Business Lease[15]: $105/Mo., 36 Mos.
E•VALUE CODE: **04232-490131a**

- Second Intel® Pentium® III Processor at 533MHz, add $479

DELL® *LATITUDE*® CPt Notebook

Network-Optimized Notebook

- Intel® Celeron™ Processor at 466MHz
- 14.1" XGA Active Matrix Display
- 32MB SDRAM, 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM/Floppy Drive
- 2X AGP 8MB ATI Mobility Video
- Dual Pointing–Touchpad and Pointing Stick
- Lithium Ion Battery with ExpressCharge™ Technology
- Microsoft® Windows NT® Workstation 4.0
- 1-Year Next-Business-Day On-site[3] Service

$1899 Business Lease[15]: $64/Mo., 36 Mos.
E•VALUE CODE: **04232-790118**

- CD-R/RW with Formatted Media, add $299
- Deluxe Nylon Carrying Case, add $69

NEW DELL® *INSPIRON*™ 3700 Notebook

Light Weight, Light Price

- Intel® Celeron™ Processor at 433MHz
- *NEW* 12.1" XGA Active Matrix Display
- 32MB SDRAM, 4.8GB[4] Ultra ATA Hard Drive
- Modular 24X Max[7] Variable CD-ROM/Floppy Drive
- 2X AGP 8MB ATI RAGE Mobility™-M1 3D Video
- Dual Pointing–Touchpad and Pointing Stick
- Lithium Ion Battery with ExpressCharge™ Technology
- *NEW* Microsoft® Works Suite 2000 with Money 2000 Standard
- Microsoft® Windows® 98, Second Edition
- 3-Year Limited Warranty[2]

$1699 Business Lease[15]: $57/Mo., 36 Mos.
E•VALUE CODE: **04232-890116**

NEW DELL® *INSPIRON*™ 7500 Notebook

Mobile Desktop

- Intel® Celeron™ Processor at 433MHz
- 15" XGA Active Matrix Display
- 64MB SDRAM, 4.8GB[4] Ultra ATA Hard Drive
- Removable Combo 24X Max[7] Variable CD-ROM and Floppy Drive
- 2X AGP 4MB ATI RAGE Mobility™-P 3D Video
- Lithium Ion Battery
- *NEW* Microsoft® Works Suite 2000 with Money 2000 Standard
- Microsoft® Windows® 98, Second Edition
- 3-Year Limited Warranty[2]

$2199 Business Lease[15]: $74/Mo., 36 Mos.
E•VALUE CODE: **04232-890121**

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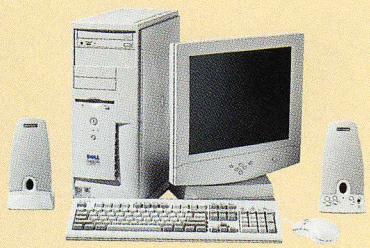

USING SOME PC'S IS LIKE FLYING FIRST CLASS. THEN THERE IS THE SENSATION OF FLYING IN ONE OF THE MOST ADVANCED, LOADED, HIGH-TECH PLANES ON THE PLANET. THAT'S KIND OF WHAT IT'S LIKE USING A DELL® SYSTEM FEATURING THE LATEST INTEL® PENTIUM® III PROCESSOR WITH 133MHZ SYSTEM BUS, AND NEWLY DEVELOPED RDRAM TECHNOLOGY. ALL THAT MEANS FASTER OVERALL PERFORMANCE AND VASTLY IMPROVED MULTI-TASKING. BUT TO REALLY UNDERSTAND, YOU'LL HAVE TO FLY IT FOR YOURSELF. PLEASE FASTEN YOUR SEATBELTS AND PUT YOUR TRAY IN THE UPRIGHT POSITION.

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- *NEW* 133MHz System Bus and Advanced Transfer Cache
- 128MB ECC P700 RDRAM at 356MHz
- 13.6GB[4] 7200 RPM Ultra Hard Drive (up to 37.5GB[4])
- 17" (16.0" vis) M780 Monitor (up to Flat Panel)
- 32MB 4X AGP Graphics Card; 48X Max[16] CD-ROM
- Microsoft® Windows® 98 and Office 2000 Small Business
- 3-Year Ltd. Warranty,[2] 1-Year Next-Business-Day On-site[3] Service

$1879 Business Lease[15]: $63/Mo., 36 Mos.
E•VALUE CODE: **04251-590118**

- 15" (15.0" vis) 1501FP Digital Flat Panel Display (as Shown), add $705
- Premium Sound Card and Speakers, add $59

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