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PC WORLD

March 1995

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IF YOU'RE F. MICHAEL WILCOX, YOU TAKE

Microsoft Office.® Almost everywhere. You see, as a Specialist for G.E.'s Apparatus Service Department, Mr. Wilcox wrestles with giant machines every day: electric motors, compressors, gear boxes. The kind of machines they use at big mining operations and pulp mills. Machines the size of small buildings.

One of these babies goes down and a company can be looking at a serious productivity loss. Sometimes to the tune of $40,000 an hour. So they look to Mike to prevent that from happening. And Mike looks to Microsoft Office.

Oh, he's tried other solutions. He's even tried a proprietary computer system which, unfortunately, wasn't compatible with the systems G.E.'s customers were using. Microsoft Office, on the other hand, is. It's also more flexible and, frankly, more capable. In fact, during the first year of rollout, Mike and Microsoft Office managed to save one customer a whopping $375,000. (Imagine putting that on *your* résumé.)

The reason Mike can work miracles (and you can too) is because everything in Microsoft Office works together seamlessly. First there's Microsoft Access, the database application where every piece of information on every piece of equipment G.E. monitors is stored.

Let's say Mike wants to do a graphical trend analysis, and maybe a little bit of charting to figure out when a gasket is likely to blow. First off he hits the "Analyze It" button, which automatically turns his database table into a Microsoft Excel spreadsheet. Then he and the built-in Wizard whip up a chart.

Our next stop on the assembly line: Microsoft Word. Here Mike uses a template to draft a report warning his client about that problem gasket. If it's real serious he shoots everything over to Microsoft PowerPoint,® includes a few thermographic photos, then blazes over to the site and presents his findings right there in the van.

As a result, the machine doesn't blow a gasket. The client doesn't blow a gasket. And Mike gets to ride heroically off into the sunset.

For more on how Microsoft Office can help you take on the monsters you face, just call us at (800) 240-4782, Dept. EME. We will be glad to send you a catalog that'll help put things in perspective.

Microsoft

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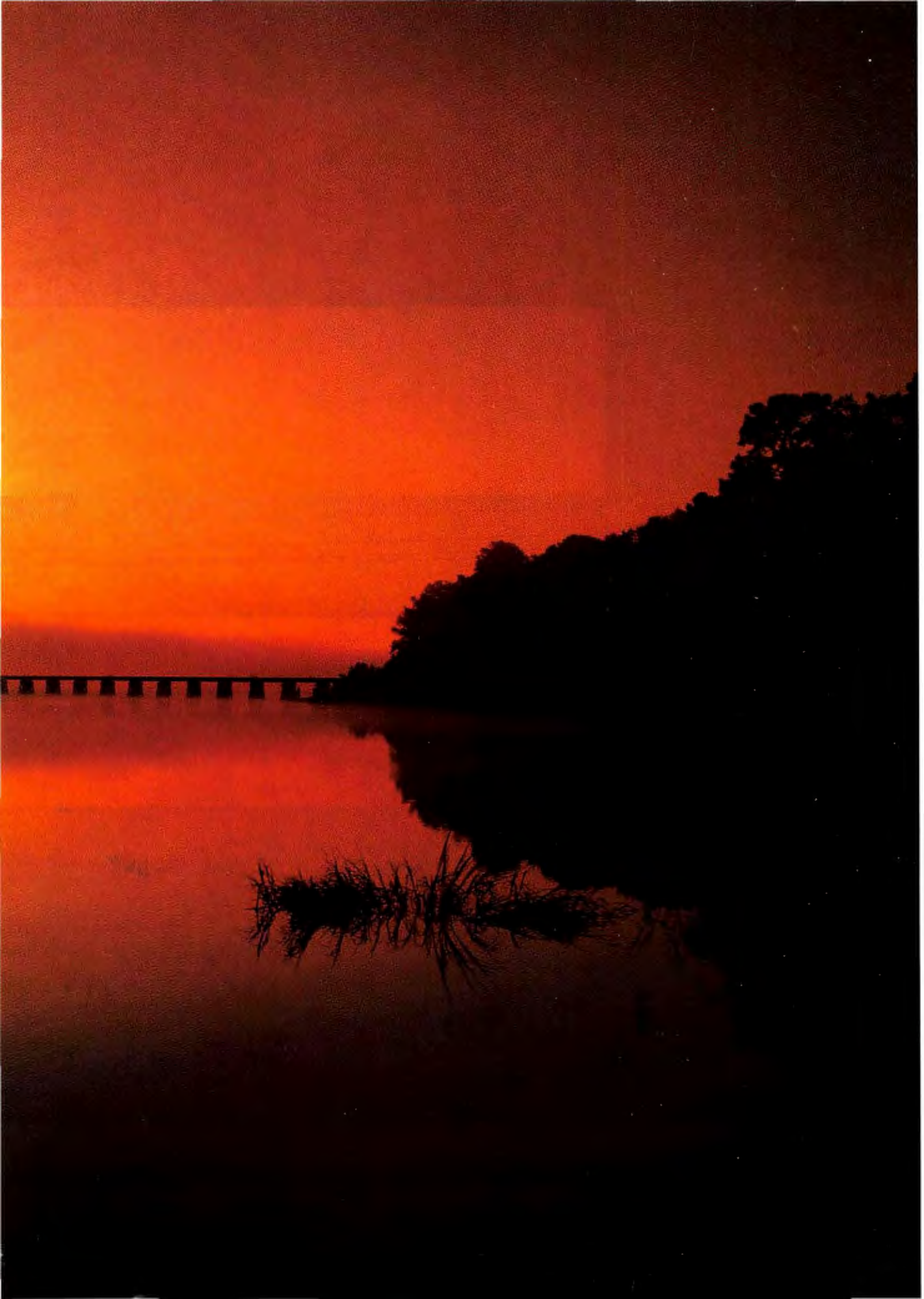

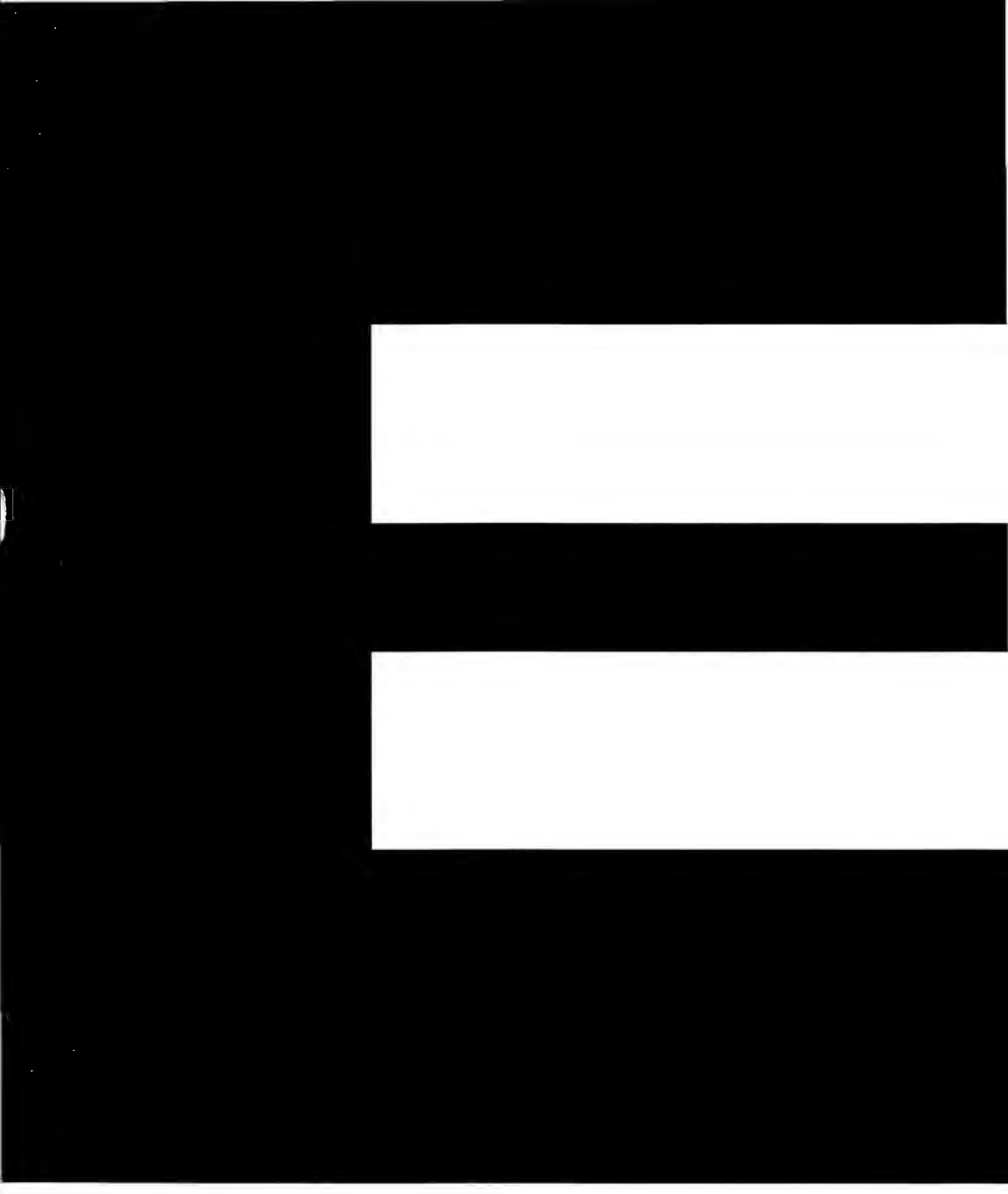

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114 Top 20 PCs: The Pentium Turns 100
The 100-MHz Pentium makes an auspicious debut, with three PCs based on the chip cracking our Power Desktops chart. From these powerhouses to 75- and 60-MHz desktops, we compare all 102 Pentiums we've tested. Plus, how to detect the Pentium bug and what to do about it.

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Cover Photography by Stan Musilek

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Built into Windows 95, Plug and Play claims to be the Holy Grail for hardware conflicts. Does this mean an end to configuration hassles with graphics boards, CD-ROM drives, printers, and other peripherals? Our hardware columnist plugged in 19 devices and emerged with surprising results.

Video Conferencing

176 Video Conferencing: Coast to Coast and Face to Face
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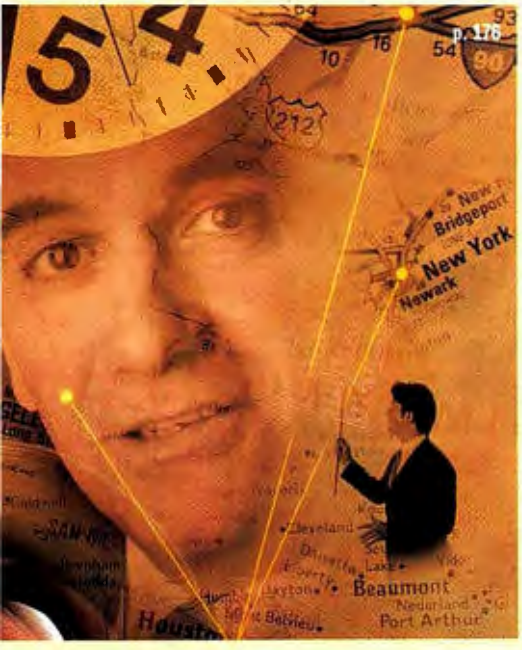

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You've compressed, archived, or deleted every file on your drive—but the only thing that'll relieve your storage squeeze is a big new hard drive. We tested SCSI and enhanced IDE drives, with capacities ranging from 420MB to 4.3GB, and found you can get a lot of room to grow for as little as 50 cents a meg.

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– *PC Magazine*, September 27, 1994

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PC Magazine Editors' Choice
Pentium-66
April 12, 1994
DX4-100
June 28, 1994

Computer Shopper
Pentium-60
April 1994
Pentium-90
August 1994

PC World Best Buy
486DX2-66
January 1994
February 1994
March 1994
June 1994
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DX4-100
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77 Franklin St. #300, Boston, MA 02110
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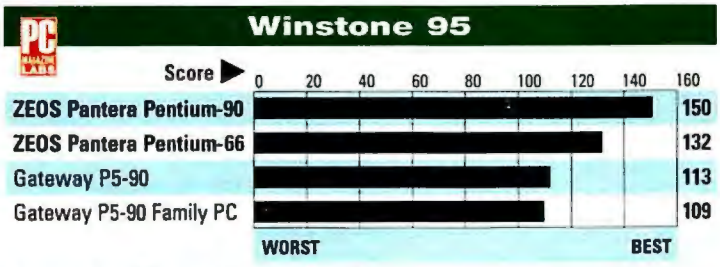

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Flat Square Screen		•	•	•
On-Screen Programming			•	•
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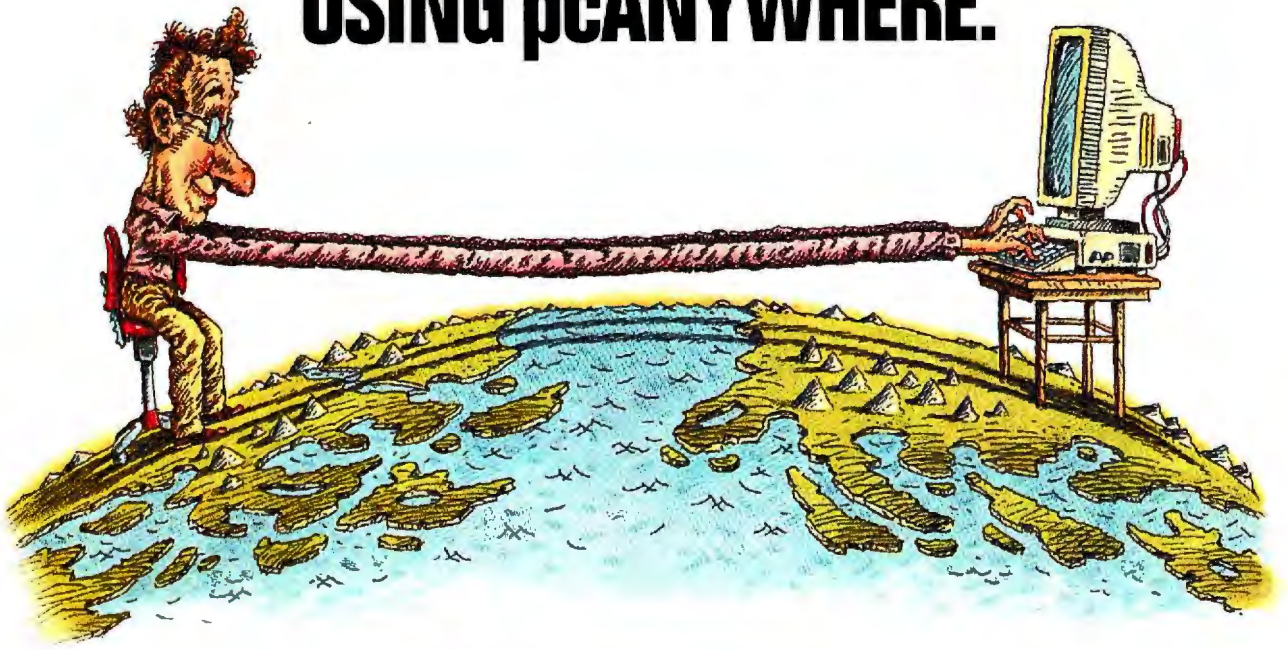

What good is working away from the office if you can't access your PC? Unfortunately, most remote computing software has become so complex, you may waste more time setting up your call than getting work done. Luckily, now there's Norton pcANYWHERE™ 2.0 for Windows.

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PC MAGAZINE EDITORS' CHOICE August 1994 pcANYWHERE 1.0

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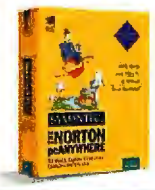

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Travails of the PC Shopper

MICHELE CLEMENT

During the 1994 holiday season, for the first time ever, consumers spent more money on home PCs than on TVs, VCRs, video game machines, or any other type of consumer electronics. As a dedicated consumer, I did my share. When the sales hit on December 26, I joined the hordes of shoppers—once with a brother, once with friends—to buy home PCs. For each of their households, we bought fully equipped multimedia 486-66s with lots of software—one for under $2000 and one for just over $2000.

As expected, shopping was hellish. At the first store, a local consumer electronics chain in the New York metropolitan area, systems on sale were abysmally labeled. Trying to find out details like the speed of a processor or a fax-modem was close to impossible. Spec sheets were nonexistent. At the second store, a Circuit City in New England, the salesperson understood the hardware but knew next to nothing about the bundled software. In both cases, it took several hours of persistence, asking the right questions, knowing prices for comparable PCs and software, being sure of exactly what we wanted, and maintaining a sense of humor in order to drive away with everything we wanted at bargain prices.

A Personal Shopper

Nothing can make the process painless in situations like these. But *PC World* can minimize the pain and guarantee you'll get a great deal. The editors in our consumer issues department—and their writers—love to shop, and that's exactly what they did when researching "Let's Make a Deal." They visited or called local retailers, superstores, consumer electronics stores, discount warehouses, and mail-order companies to price a top-of-the-line multimedia Pentium-90. They attended auctions and swap meets and researched remanufactured brand-name PCs. To find the best places to buy peripherals, they shopped for modems, printers, monitors, and CD-ROM kits.

The result is a clear comparative guide to stores, with information on selection, prices, and the caliber of salespeople and service. We outline all the right questions to ask and let you know exactly what to expect. Use this guide when selecting a store, taking care to match the store with your level of expertise, the risk you're willing to take, the time you're willing to spend, your budget—and your tolerance for pain.

What a Deal?

In the midst of all the holiday shopping, debate raged over the severity of the floating-point flaw in Pentium processors and Intel's botched response to the problem. In mid-December, Intel finally agreed to replace processors, no questions asked. Volume shipments of corrected Pentiums began in January, although defective chips will continue to move through the channel until the end of the first quarter.

If you own a flawed Pentium, see "Bug Watch" in *Consumer Watch* for information on a shareware fix. If you somehow missed the imbroglio, see "Pentium: A House Divided" in this month's Top 20 PCs review for a brief explanation of the problem, whom it's likely to affect, and a formula that lets you test for the buggy CPU. We also list phone numbers for Intel and several major vendors for more information on how to get chips replaced. For an analysis of the fiasco's possible effects on the industry, see Assistant Editor Laurianne McLaughlin's news story "Pentium Flaw: A Wake-Up Call?"

If you're thinking of buying a Pentium, should you reconsider? Definitely not. For most of our readers, who use PCs for mainstream business applications, the floating-point flaw poses absolutely no risk. *PC World* continues to recommend PCs based on this chip, as evidenced by this month's cover story, "Top 20 PCs: The Pentium Turns 100."

In fact, PCs based on Pentiums are becoming even more compelling. The newcomers in this month's review are just-released 100-MHz Pentium systems from Dell, Everex, Gateway, and Polywell; Everex's Step SP/100 headed straight to the top of the charts, earning a Best Buy. Also notable: 75-MHz Pentium desktops and notebooks, expected to oust older Pentium-60 and -66 systems as the year progresses.

If you're considering buying a Pentium, should you reconsider? Definitely not. For most of our readers, the floating-point flaw poses no risk.

Finally, this month we report on 102 Pentium PCs that our reviews editors and Test Center have tested in the last year. Organized by price—from a remarkable $1649 to $5000 and up—and by rank on the Top 20 Power Desktops list, this information should help you navigate safely through the sea of Pentium systems on the market today.

Cathryn Baskin, Editor

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There are three types of computer users: those who have lost data due to a power problem, those who are going to, and those who have protected themselves against the inevitable surge, blackout or brownout with the most reliable UPS they can buy: Back-UPS by APC. In fact, editors and users alike agree that if your system demands absolute reliability, you can depend on APC Back-UPS.

According to a study by Bell Labs, undervoltages represent the overwhelming majority of power problems likely to hit your computer. The question is not if a failure will occur, but when. Whether due to construction, wiring, weather, other office equipment, or accidents, power problems are as inevitable as death and taxes. That's why you need instantaneous battery backup power from the Back-UPS to prevent data loss, hard disk crashes, and hardware damage.

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PC MAGAZINE UK EDITORS' CHOICE

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August 1993
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"All other brands of UPS die regularly in this lightning prone environment. My APC won't die!" said Paul Sisilli, Systems Analyst, City of Port St. Lucie . "With other brands, users don't find out until it is too late. The power interruptions here are very hard to live with. The other brands are dying off. Typically they last just beyond their warranty period. My Back-UPS is going on three years...no other brand is as reliable."

Don Truax knows first hand about Back-UPS reliability: "It ought to be against the law to buy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked. Each morning I get a surge down the line and both APC's hate it - they simultaneously 'holler 'n clamp' while my 'Brand T' quietly sleeps in. I've relegated that unit to non-critical household stuff like my VCR."

Andrew Wargo, Manager at Baxter Land Company, tried two other brands before Back-UPS. "One lasted a few days, a second one went up in smoke after 48 hours, a third lasted less than 24 hours! I then bought my Back-UPS for less than half of what I had paid for the others. We've purchased three more Back-UPS and for the past 14 months they've been just hummin' away on the same power line that was eating the other brands alive!"

If you're protecting a network server, a communications interface port (on models Back-UPS 400 and higher) provides the security of an automatic shutdown to all major OS including NetWare, Windows, Windows NT, LAN Server, LAN Manager, LANtastic, SCO Unix, OS/2, Banyan Vines, AppleShare/System7 and more, so your data is safe whether the system is attended or not. (PowerChute software and interface kits sold separately.)

And since data processed on networked clients needs protection too, the $139 Back-UPS 280 provides an economical solution for all your LAN workstations. And if you have a new green PC, the price is even better at $119 for the new Back-UPS 200.

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Dept. P3

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Chip Shot, Hazing a Hero, Platform Dogfight

Leader of the Pack

I'm tired of the Intel bashing in your magazine. Intel has given us untold computing power, starting with the 8088 through today's 100-MHz Pentium. There's a constant cry against Intel's prices, but are other manufacturers on the same plane as Intel? History says no. NexGen was the first to offer a feature set that rivals the Pentium's for $100 to $200 less a box. As you noted ["The Pentium Alternative," *Top of the News*, November], it doesn't offer a floating-point unit, which Intel's chips have featured since the 486.

What about AMD, Cyrix, IBM, and TI chips? It appears they're just ripoffs of the original, in functionality if not in micro code. They wait to see what Intel spends millions of dollars developing before launching their own efforts to emulate that instruction set. Engineering is much more than laying out a couple million transistors on silicon; it's understanding what customers want before they realize they need it.

Competition is healthy. If Intel is the company I think it is, it will meet and beat the challenge of the other chip makers. Together they'll give us technologies we haven't even dreamed of.
Thomas P. Brown II, CompuServe

No News Is Bad News

Why has *PC World* buried its head in the sand when it comes to discussing, or even mentioning, problems with the Intel Pentium? I've heard rumors since last summer about difficulties with these chips. For the past couple months, I've read newspaper articles about Pentium problems and have seen them mentioned on network and local TV news. This information is on Internet and on CompuServe.

Why is *PC World* protecting Intel instead of its loyal subscribers? Silly question—I know that it's a matter of money, and Intel has a lot more of it than us little subscribers.
E. Wise, Baltimore

Editor's response: We covered the Intel Pentium's flaw and Intel's response to it in February *News Monitor* and this issue's *Top of the News* (see also "Pentium: A House Divided" in this month's system review for how to replace flawed Pentiums). We do not tailor our editorial to protect the interests of companies, whether or not they advertise with us. The first public disclosure of the Pentium flaw that I'm aware of occurred in mid-November as we wrapped up *PC World*'s January issue.

We have a compact with the reader: You buy the magazine, and we deliver the information you need and want. Keep telling us what you want—via E-mail, mail, fax, or on-line posts—so we can serve you better. —*Russell Glitman*

Top of the News

THE PENTIUM ALTERNATIVE

News Monitor

False Hero

It was ironic to see *PC World* give Corel a "hero" award in "Heroes and Villains." Veteran Ventura users beware: The hype surrounding the long-awaited Corel Ventura version 5.0 does not apply to you. New users may reap some benefits from Corel's efforts, but the rest of us have been forsaken for big-corporation profits.

After you've accepted the predictable shuffling of buttons and commands, your stomach will sink as you realize 5.0 doesn't import all 4.*x* files properly. What should be a necessity of any upgrade—backward compatibility—doesn't exist. The first 4.2 files I opened from 5.0 caused a general protection fault that crashed Ventura, Windows, and DOS. If nothing else, Corel has created an effective system killer.

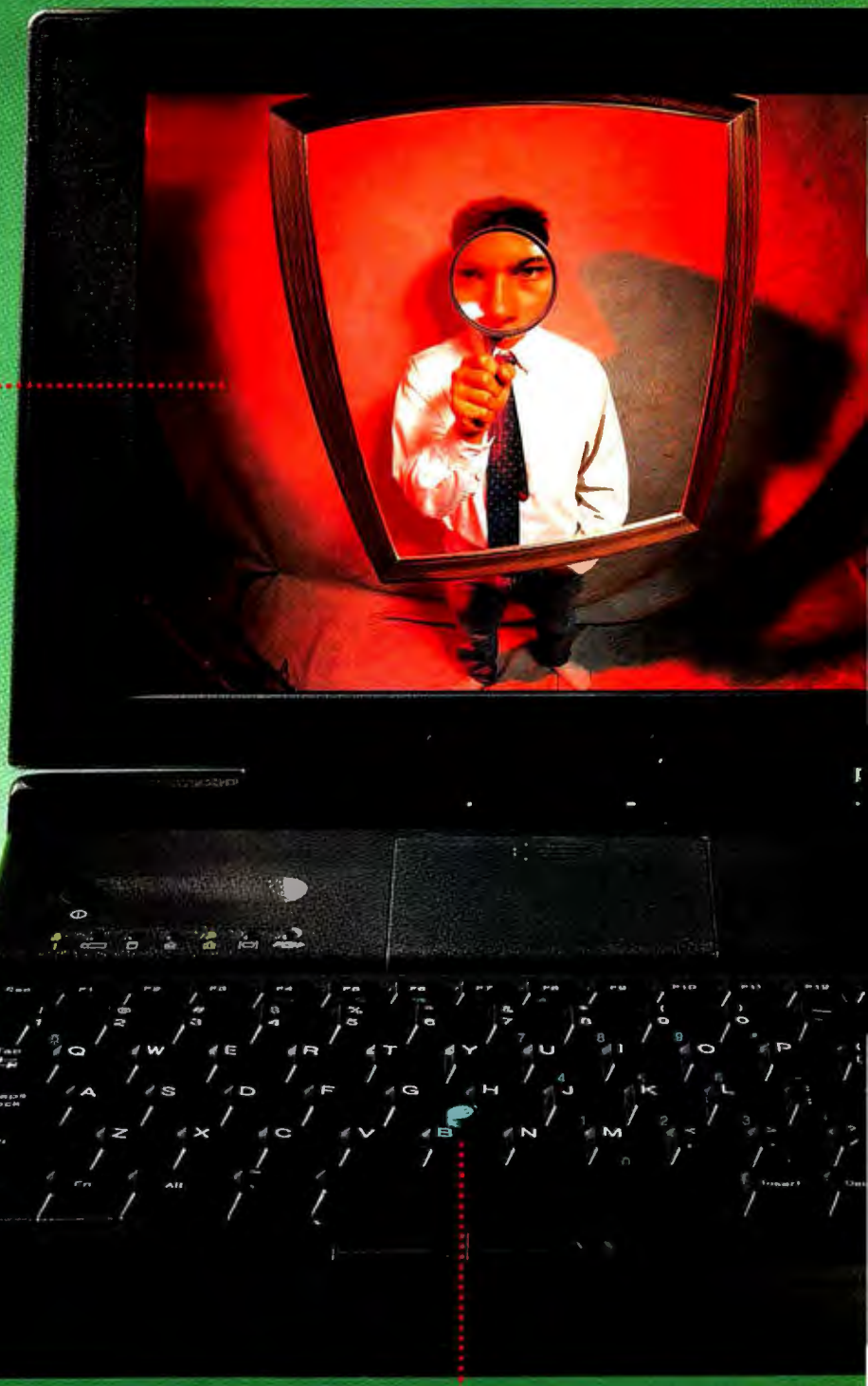
The problems users face when importing older files can be insidious and subtle. Simple files may import without incident, but local text formatting, especially scientific symbols and equations, turns to garbage. Worse, if files contain native Ventura graphics, the graphics import filter does an effective job of trashing them. Lines that once had one rounded end now have two; thin lines become invisible. Even imported graphics such as PCX files don't escape harm, as their scaling and cropping settings are lost or mangled.

Perhaps even more troubling, if you thought Ventura 4.2 was sluggish, wait till you launch version 5.0. Nearly every function takes at least twice as long and sometimes much longer.

Ventura vets like me have thousands of files representing years of labor. We're stuck keeping Ventura around just so we can open old files. But instead of looking forward to the promise of a better, brighter Ventura, I'll be looking for a publishing app from a different vendor—one that at least maintains backward compatibility.
David K. Smith, South Brunswick, New Jersey

JEFF BERLIN

WHAT TO LOOK FOR IN A TOSHIBA, COMPAQ



See how the screen measures up against the one in a Compaq LTE Elite (10.4"TFT vs. 9.5"TFT).

The lithium ion battery will easily outlast a Toshiba T4850CT by over three hours.

With the SmartPoint trackstick your hands never have to leave the keyboard. Try that with a Toshiba T4850CT external trackball.

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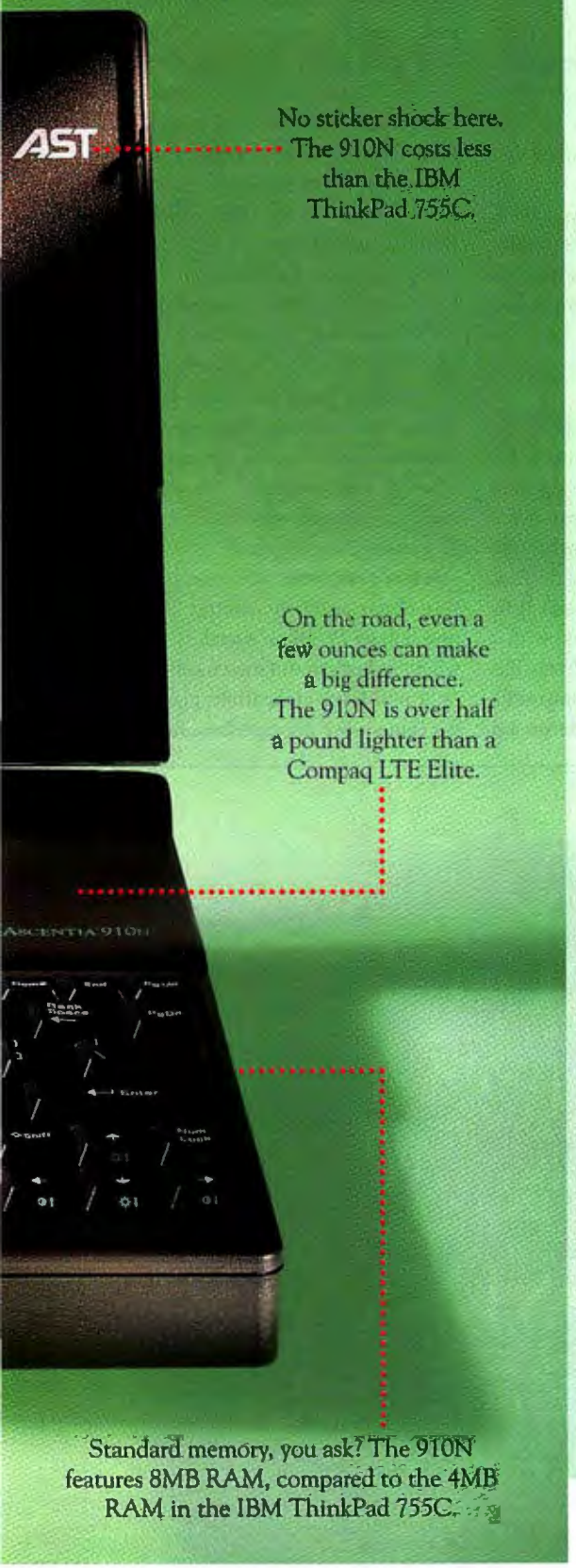
AND IBM NOTEBOOK.



With all the choices out there, you're probably asking yourself, "What to buy? What to buy? What to buy?"

Well, maybe this will help. Pictured to your left are a few comparisons to illustrate how the new AST Ascentia 910N stacks up against the field.

The 910N gives you the muscle of the Intel 486DX4/75MHz processor. Just imagine this kind of power and speed to crunch your facts and figures.

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Circle 87 on reader service card

Author's response: My labeling Corel a hero elicited more than a few letters from users of Corel products. My intention was to acknowledge Corel's attempt to break a cycle of buggy releases, and I wrote the column prior to the release of Corel Ventura 5.0. Since its release, we've received reports of problems with the Ventura module, which we are investigating for a future *Bug Watch* item. —Roberta Furger

No Ifs, Ands, or Buts

I must compliment your staff for the quality of your magazine. I especially enjoy the monthly Top 20s and the reliability and service feature. As someone involved in both programming and tech support, I find myself using something from every issue at work and at home.

After two weeks, my November issue looked like it was a year old from the constant use it had gotten. A coworker recently inherited a 386 and wanted to know if I thought she should upgrade or buy a new one. I just turned to "Upgrades: When They're Worth It, and When They're Not." It's also easier to convince coworkers to spend a little more money on a quality system when I can show them an article like "For Better or Worse" to illustrate how buying a computer that's cheaper at the outset can cost plenty in service and upgrades. Plus, I find the *New Products* and *Here's How* sections useful.

At the risk of being seen as a sycophant, I'll skip the obligatory paragraph complaining about something. You're producing a good, well-rounded magazine. Keep it up! *Steve Glardon, Dayton*

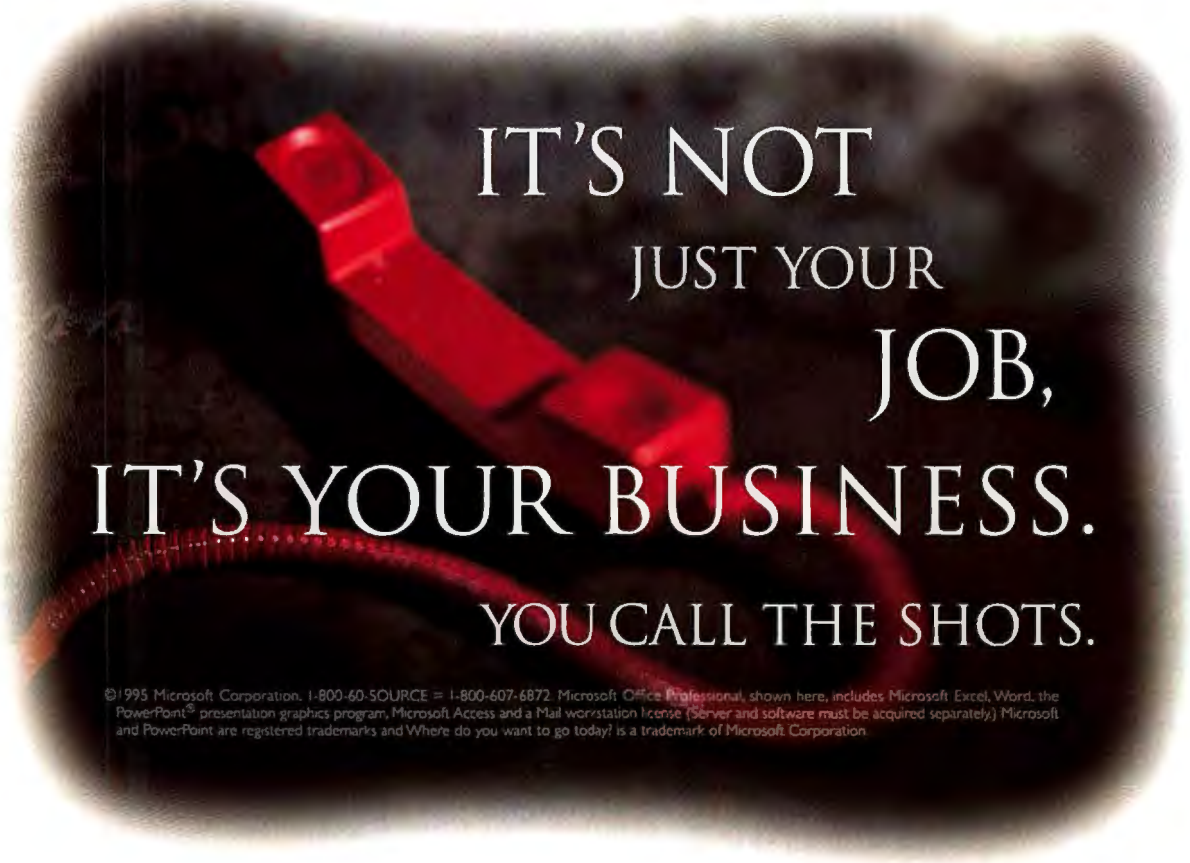
Ask the Right Questions

Regarding *PC World*'s December article "Power Mac Proves No Contest for Pentium PC" [*Top of the News*], I question what was tested and how the tests were conducted. Other articles have reached the same conclusion you did in testing the disk subsystems on both platforms—that IDE is faster. This is true, but it is also true that the SCSI subsystem in Power Macs has not yet been optimized for the PowerPC. The code probably ran in 68K interpreted mode, not native. I expect that when Apple finally gets around to making the port, disk subsystem performance will improve.

Don't blame the sluggish performance of a program on the platform it is running on. Which parts of Excel 5.0 are native code for the PowerPC? For cross-platform product development, Microsoft chose to write its own math library. This makes sense. But it hasn't yet ported that library to the PowerPC. Thus recalculation is done by Excel in 68K emulation on the Power Mac.

I'm not a Mac fanatic, I'm just tired of Mac slamming. I've worked on both the PC and the Mac, and both have their strengths. I want computer articles to inform me so I can make the right choices when I buy products, but this article makes me distrust your whole publication. *T. W. Farley, Austin, Texas*

Author's response: Admittedly, this piece was obnoxiously PC-centric. The main question for *PC World*'s readers, though, is whether they can run their most-used apps on a non-Intel–compatible platform and get competitive price/performance, regard-



less of the reason. At this point, they can't. The unavoidable issue is how today's apps run on existing platforms; if we considered platforms alone, we'd all have RISC processors. —*Eric Knorr*

Spirit of the Law

I'm writing to express my gratitude for the article "Disabling Myths About Enabling Technologies" [*Real Problems, Real Solutions*, November]. Too often the Americans with Disabilities Act is cited in horror stories of abuses by people with questionable disabilities. While you often hear special interest groups proudly proclaiming their place in the world, you're not likely to hear the disabled declaring the superiority of what makes us different. Thus it is both easy and understandable for business to label the ADA as just another piece of troubling legislation. Hooray for author Susan Portugal, who has the courage to act in the spirit of the ADA.

When someone has beaten a disability to the point where he or she is equipped with a competitive level of skill and can knock on your door and ask for a job, that person has already overcome great odds.
Michael P. Masora, Rockledge, Florida

Frequency Fine Points

December's "CD-ROM Drives: The Power and the Glory" contains an error. On page 158, it states that television is broadcast at 22 frames per second (fps). In fact, according to *Van Nostrand's Scientific Encyclopedia*, TV is broadcast at 30 fps. This frequency allows the picture to be synchronized to the standard U.S. power line frequency of 60 Hz and prevents vertically moving patterns from passing through the image, as they would at 22 fps.

One might wonder how a frequency of less than 60 to 70 Hz produces noticeable flicker on a PC monitor when a frequency of 30 fps on a TV screen does not. Each TV picture frame is divided into two fields. Since each field is displayed at 60 fields per second, flicker is minimized.
Robert J. Graesser, Research Triangle Park, North Carolina

Author's response: I regret the error, especially since Graesser's point would have strengthened one I was trying to make in the review—that even the fastest CD-ROM drives we tested cannot match the combined audio/video playback performance of television. —*Melissa Riofrio*

Corrections and Clarifications

In "CD-ROM Drives: The Power and the Glory" (December), the column headings for the Toshiba XM-4100A and the Toshiba XM-3501 in the features comparison were accidentally switched.

In February's "Laser Printers: The Price Is Right," we listed an incorrect phone number for Lexmark. The correct number is 800/358-5835.

In January's "Top 20 PCs," we incorrectly stated that the Micron P90 PCI Home PC comes with 2MB of VRAM. It actually has 2MB of DRAM (but it remains a Best Buy in our book).

PC World regrets the errors.

Letters welcomes your responses and ideas. *See page 12 for contact information.* ■

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Time Is Running Out for Ergonomic Standards

For ten years, Laura Stock has been fighting for state and federal ergonomic standards for office workers. As associate director of the Labor Occupational Health Program at the University of California, Berkeley, she has testified at state and federal congressional hearings, participated in numerous study committees, and preached the gospel of good ergonomics to combat repetitive-strain injuries.

Last year around this time, it looked as though the work of Stock and others was about to pay off. California's Occupational Safety and Health Administration (Cal-OSHA) was poised to adopt an ergonomic standard. The first of its type in the country, it would have mandated work-site evaluations and employee training to reduce the risk of RSI. And Barbara Silverstein, well-known expert on ergonomics and advocate of a comprehensive federal standard, was brought in to head the OSHA effort at the national level. Her goal was to have a draft regulation released for public comment and scrutiny by September 30, 1994.

But what a difference a year makes.

Regulation has become a naughty word in political circles, and the prospects for California's standard look dim. After nearly two years of public hearings and negotiations between labor and management groups, the state committee responsible for approving the standard voted last November on the final draft. Not one member said yea.

"Before the November election, we'd always assumed there would be a standard; the only question was what it would look like," says Stock. She thought that several compromises included in the final draft would guarantee its passage. But after the election, opponents were "emboldened to say we shouldn't have a standard at all."

At press time, it remained uncertain whether the California board would reconsider the standard or if Cal-OSHA would investigate other methods of controlling RSI.

News From the Beltway

Meanwhile, in Washington, D.C.—an area that's gone through major upheaval since November's elections—the proposed federal ergonomic standard is under intense scrutiny at the Department of Labor, which is reviewing the cost to businesses and the feasibility of its implementation.

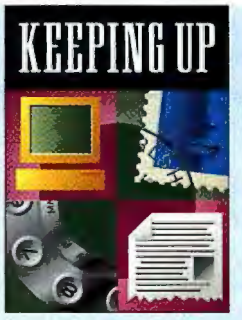
Only after the regulatory impact analysis is complete will the proposed standard be made public. Silverstein, still a newcomer to Washington politics, says the earliest we can expect to see the standard is this May, but she's offering no guarantees. "Clearly, there's an antiregulatory trend in Congress," says Silverstein, adding that it's hard to say what effect the change in the Democrats' political fortunes will have on the ergonomic standard.

Comprehensive Reform

Although Silverstein will say little about what's in the current draft, a June 1994 summary indicated that its goal would be to prevent musculoskeletal disorders (ranging from chronic back pain to arm, hand, and wrist injuries) in workers from all industries. It requires employers to identify problem jobs (those with a high risk of causing injury), develop a plan for improving them, and establish a medical management program that includes prompt injury evaluation by a health care provider, as well as ongoing medical treatment. Employee involvement and training also play an integral role.

Despite its uncertain future, special interest groups are already preparing an assault on the federal standard. One active opposition group is the National Association of Manufacturers, which has established a Council on Ergonomics in response to the OSHA effort. According to one report, NAM has asked

By Roberta Furger



America Online is aggressively staking out Internet turf, acquiring NaviSoft and BookLink Technologies (maker of InternetWorks, a browser) at the end of 1994 and announcing plans to acquire Advanced Network & Services in early 1995. NaviSoft produces development tools for publishing services such as catalogs and classified ads on the Internet. InternetWorks aims to outdo such popular products as NetScape and Mosaic; AOL claims the browser consolidates Internet features into one straightforward interface and speeds up common Internet activities. ANS provides a major network component of the Information highway, ANSnet, which transmits over 3 billion packets a day...Have a legal problem? Check out Nolo's Self-Help Law Center via the World Wide Web at http://gnn.com/gnn/bus/nolo. You can also obtain Nolo Press legal files, such as "Law on the Internet," via America Online (keyword legal, then choose Legal SIG Software Library) and CompuServe (go lawsig).

BUG WATCH

Intel Pentium Floating-Point Unit

Bug: **The 99.9998 percent–perfect Pentium is now infamous (see "Pentium: A House Divided" in this issue's Top 20 systems).**

Work-around: **While you're waiting for a replacement from Intel, avoid math errors by employing Stage Research's $10 SPU-Fix shareware fix. It tricks most DOS and Windows apps into thinking no FPU is present, resulting in error-free (albeit slower) performance. Find it in the National Computer Security Association forum on CompuServe (go ncsa).**

For its part, Microsoft has released a utility that lets you test for the faulty chip, and you can patch Excel to avoid using the error-prone FPU. The patch works with Excel versions 4.0, 4.0a, 5.0, 5.0a, and 5.0c, but not with Excel 5.0 for Windows NT. The utility also unpatches Excel after you install the corrected chip. The patch is in the self-extracting archive file WW1136.EXE on CompuServe (go msl), GEnie (in the Microsoft Software Library), the Microsoft Download Service, and via the Internet at ftp.microsoft.com. You can call Microsoft at 800/426-9400 and Intel customer service at 800/628-8686.

DOS 6.0, 6.2, 6.22 DoubleSpace and DriveSpace

Bug: **Both the DoubleSpace disk compression utility included with DOS 6.0 and 6.2 and the DriveSpace utility that replaced it in DOS 6.22 are capable of creating compressed volumes as large as 512MB. However, if you attempt to create a DoubleSpace or DriveSpace volume on a partition between 1028MB and 1153MB in size (a range that includes many of the new 1GB drives), the setup program for either utility will create a much smaller compressed volume file and display an error message saying that the utility ran out of free space and left some files on the (uncompressed) host drive. In addition, once created, these compressed volume files cannot be increased in size, and the maximum estimated compression ratio that you can enter (using the DBLSPACE /RATIO or the DRVSPACE /RATIO command) is 1.5.**

Work-around: **Microsoft is aware of the problems but as of press time did not have a patch or an update. You can work around the problem, however, by reducing the size of the initial partition before running the compression utility. For example, to create two large compressed volume files on a 1050MB hard disk, divide it into two 525MB partitions using FDISK, and run DoubleSpace or DriveSpace on each partition separately.**

–Scott Spanbauer

Scott Spanbauer is a contributing editor for PC World. Have you run into a software bug or hardware incompatibility? Call us at 415/978-3253 with the details. We'll investigate problems and report on those with the broadest interest. Due to the volume of queries, we may not be able to return your call, and we cannot provide technical support.

each member company to contribute to the organization's fight against the standard.

At two conferences held in Washington, D.C., in January, NAM officials outlined the ergonomic standard's tentative provisions and discussed the effects of November's elections on the likelihood of its passage. Like many employer organizations, NAM is concerned about the potentially high costs of buying new equipment and establishing employee training programs.

But good ergonomics doesn't have to be expensive, says Neal Taslitz, president and CEO of The BackCare Corporation, a Chicago-based firm that develops, tests, and sells computer ergonomic products to businesses. Taslitz and others note that many larger firms, including Blue Cross of California, Pacific Bell, and L. L. Bean, have adopted comprehensive ergonomic programs, but that small and midsize employers are not likely to do so without OSHA standards. "For small companies it's a money issue," says David Rempel, physician and director of the ergonomics laboratory at the University of California, San Francisco and Berkeley, and the principal ergonomic consultant to Cal-OSHA.

Silverstein warns businesses not to think the absence of a standard means they won't have to address the issue. Repetitive-strain injuries represent 62 percent of all worker's compensation claims, according to December 1993 figures from the U.S. Bureau of Labor Statistics. Many experts—including Silverstein—believe that those numbers drastically underrepresent the actual scope of RSI.

"If OSHA has to issue citations using its General Duty Clause [to ensure that employees are provided a safe and healthy work environment], that's what we'll do," says Silverstein, citing the fines levied in April 1994 against Lehman Brothers, a New York investment firm she described as operating a "data entry sweatshop." She emphasizes that an ergonomic standard makes more sense for everyone concerned. "Without one there wouldn't be the information people need to be proactive and get on with improving the work environment; companies wouldn't know what OSHA expects—until they were slammed with a fine. That seems like a stupid approach, but maybe that's the way it's going to go," she adds.

Maybe not, though. Silverstein and others believe if enough people pressure their senators and representatives and write to Secretary of Labor Robert Reich, the draft standard may yet see the light of day. (Reich's address is U.S. Department of Labor, Honorable Secretary Robert B. Reich, 200 Constitution Ave., Rm. S. 2018, Washington, DC 20210.) If you're concerned about the growing number of work-related injuries and want to see the issue publicly debated, make your opinion heard. Send a letter—or two, or three. Personal letters are always best, but if you don't have time to write your own, you can download the letter that we've drafted—you'll find it in the PC World forum on America Online and CompuServe. All you have to do is sign your name and put a stamp on the envelope. And think what a difference it will make.

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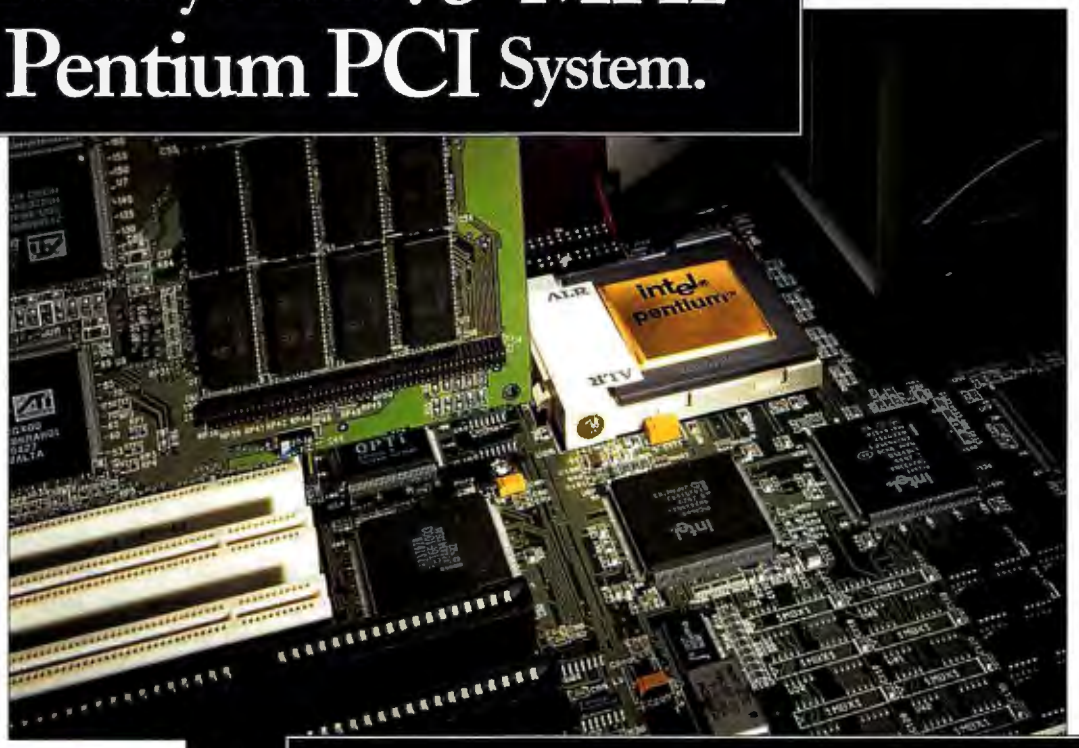

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Circle 9 on reader service card

Shop Talk

Forget About the Memory

After purchasing a scanner for my 66-MHz Pentium computer, I decided to increase the RAM for better color resolution on large images at 2400 dots per inch. In the August 1994 issue of *PC World*, I saw an advertisement for California Memories Plus of Tustin, California. The ad listed the memory chips I needed, and since I live close by I went to the local outlet and ordered 192MB of RAM for $6712.83 (including credit for the 32MB already installed in my PC). The salesperson told me that the chips weren't in stock but that he would order and install them, so I left my multimedia computer with him. Two days later, a representative called and asked me to bring in my new scanner and all the documentation for my PC so he could test everything and make sure that it all worked together. Rather innocently, I did. During the more than eight weeks that followed, I left countless messages—to no avail.

I have now lost a total of $17,500, including the cost of the memory chips, scanner, and computer (which had a 1.8GB hard drive, a CD-ROM drive, a fax-modem, and other costly upgrades).

Rolfe O. Reinhart,
Fountain Valley, California

Editor's note: We received four letters over a two-month period from customers of California Memories Plus who were unable to get either the goods or the money that the company owed them. When we contacted it for an explanation, vice president Marty Shappard said that "the president of the company ran off with the money." At the time we first spoke with Shappard in November, he said he intended to repay all his customers. But when we called the company a few weeks later, no one answered the phones—and Reinhart's problem remained unresolved.

Reinhart finally got his computer back, but it had been stripped of all the peripheral boards and memory. Despite many attempts to contact Shappard's attorney, he has not retumed our calls.

Making Good From Mad

I bought an Intel 14.4 internal fax-modem, assuming that I could use it at 14.4 kbps. But despite all my attempts to correct the problem, I could send faxes only at 9600 bps.

Frustrated, I attempted to fax a description of my problem to Intel so it could send me directions on how to rectify the problem. After 6 hours and I don't know how many attempts to fax my question to the number Intel provided, I discovered that the number no longer receives faxes. I am giving up on my Intel 14.4 fax-modem and on Intel.

Stephen Kirkpatrick, New Orleans

Editor's note: We forwarded Kirkpatrick's letter to Intel, and a representative promptly contacted him to help set up his modem so it would fax at 14.4 kbps. But Kirkpatrick had already returned his Intel modem and purchased another brand. Anxious to repair his opinion of Intel, the representative proceeded to solve an unrelated system upgrade problem. The extra effort paid off: Kirkpatrick told us he felt

that Intel went beyond the call of duty in its effort to satisfy a customer.

As for the nonworking fax number, Intel discontinued fax support in August 1994, noting that it was a slow method of answering questions. Customers should call 503/629-7000 with technical questions.

Out in the Cold?

I purchased a used Toshiba laptop from an out-of-state seller who assured me he had used the unit for only a short time, but had to sell due to a change of job. The unit arrived in the original box with what appeared to be all the manuals and accompanying documentation. It looked new.

Within two months, however, the display stopped working properly, and a search through the documentation revealed no warranty card or registration. I had no bill of sale and could no longer track down the seller, since he had relocated. Uh-oh.

I posted a message on the Toshiba forum on CompuServe and called the company. That got me through to several helpful people, including a manager who was able to determine the age of the laptop and authorize a local service center to make the necessary repairs—under full warranty.

Support of this kind is what makes loyal and repeat customers.

Hal Skurnick, Chappaqua, New York

Holiday Blues

During the holiday season, one computer company—Ares Industries—quietly closed its doors, and another—Swan Technologies—filed for bankruptcy protection.

Swan, which is based in Marlborough, Massachusetts, voluntarily filed for Chapter 11 on December 6 but continued to do business as usual. At press time, Zenith Data Systems (ZDS) had finalized plans to purchase Swan, though it was still too early to predict what continued-support arrangements ZDS would make. Swan has sold computers since 1984, making it a veteran in the cutthroat mail-order-PC business.

Ares Industries (formerly known as Ares Microdevelopment) of Farmington, Michigan, posted a farewell message in America Online's Hardware forum on December 19. The letter, posted by screen name "Ares CEO," stated that Ares Industries would "cease business operations" on December 21 and plaintively remarked that "there's no room for the 'small guy' in today's computer industry, and quality simply can't compete with the 'big guys'' pricing." Immediate reaction to the farewell letter ranged from anxiety to outrage over unresolved problems with Ares systems.

Ares also posted a contact list on America Online of the manufacturers of its systems' components (to locate this file, use the keyword **hardware**, then choose *software libraries, other hardware files,* and *technums*).

On December 23, Ares filed Chapter 7 in U.S. Bankruptcy Court in Detroit.

Shop Talk *is written and researched by* PC World *Associate Editor Christina Wood with assistance from Reader Liaison Peggy Nauts. Think you've gotten a raw deal—or a great one?* Consumer Watch *wants to hear the details. We'll investigate complaints and publish the letters with the broadest interest.* *See page 12 for contact information.* ■

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The Never-Ending Schedule

Setting up meetings can be more frustrating than trying to get a straight answer from the IRS. First you pick a time that might work. Then you leave voice-mail messages for everyone involved. Norman can make Tuesday at 4:30, but the only time Sue has open is Monday at 1:30. So you aim for Monday of the following week. Finally, you find a time everyone agrees on. All you need now is the conference room—which turns out to be booked.

Most businesses need to automate their group scheduling, but finding a software package that everyone will use and that does everything it needs to is easier said than done. This month Anne Salmon, human resources manager for the New Mexico Medical Review Association, a peer-review organization for medical professionals in Albuquerque, describes what she and her colleagues learned when they switched from paper calendars to an electronic group scheduler. —*Ed.*

MARK HANSEN

Anne Salmon, human resources manager of the New Mexico Medical Review Association

The Meeting-Go-Round

As human resources manager for a 52-person company, I don't have the luxury of a personal secretary to put meetings together for me. So I know what a pain it can be to organize collegial confabs. My company is in the business of performing medical review and claims administration services in an effort to ensure necessary, economical, and high-quality health care for New Mexico. I generally schedule five to ten meetings a week to discuss compensation, benefits, and other issues with prospective and existing employees and managers.

You might think that teaching courses in time management would give me an advantage. Not so. Even the most orderly person in the world can run into trouble when trying to arrange a meeting with busy people.

In the past, scheduling a meeting required half a dozen phone calls. I'd leave messages with the CEO, his secretary, and the other directors and managers, offering a few time options. If I ran into open schedules, setting up a meeting might take as little as 45 minutes. Some days, however, I would spend hours trying to round up participants. And finding a meeting site could be just as daunting. The CEO's secretary kept a schedule for the company's two conference rooms. If a room was booked when I needed it, I'd have to bargain with the people who had reserved it.

Naturally, spending so many hours on this task affected my work. Often I'd have to stay late because so much time had been eaten up playing phone tag.

Last April, our company decided to get organized. We agreed to purchase a personal information manager with group scheduling that could connect to our existing E-mail system. The idea was to provide everyone with a computerized calendar that would run on our 386 and 486 machines and allow us to schedule meetings in our conference rooms. Because we already used Lotus's cc:Mail, we felt it made sense to opt for Lotus's Organizer 1.1.

Organizing the Organization

Almost immediately we ran into problems. Organizer is fine for personal schedules, but it doesn't allow you to set up meetings on other employees' calendars. If the CEO was making appointments in his calendar, his secretary couldn't access it. If the secretary was working in his own calendar, the CEO could not get at it until the secretary closed it. And there was no way to reserve a conference room.

Frustrated by these limitations, we decided to look further. Our PC support manager gave a demo of Campbell Services' OnTime for Networks (800/345-6747), which would allow both the CEO and the secretary to use a calendar at the same time. The CEO was sufficiently impressed to buy the $1770 25-user package practically on the spot. Because ours is a benign dictatorship, everyone switched to OnTime.

During this experimentation with different software, I sat skeptically on the sidelines, clinging to my Franklin Planner. Though I was a fluent computer user, I dreaded not having my manual planner tucked under my arm. I also hated the idea of others looking at my personal schedule. Meanwhile, OnTime for Networks was catching on

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around the office. Our network administrator had installed it so the calendar appeared as soon as we turned on our computers. When I saw I was being scheduled for meetings, I'd dutifully copy the information into my Franklin Planner. But I soon realized I was duplicating my effort.

I decided to swallow my pride and learn the program, which turned out to be a simple matter. To my relief, I found I had worried needlessly about my privacy. Although I can see the times when others aren't available, I can't see *what* they're doing unless they make the information public.

On-Screen Scheduling

Now I spend my time doing real work instead of scheduling meetings. Rather than playing phone tag, I click on an icon to access people's calendars or to see the times conference rooms are reserved. I can see a list of people on the network and select those whose schedules I want to view. To see when they have free time, I just click OK to display all the calendars in a grid.

To send a request for a meeting, I click on Add Group Message and type the message in a dialog box; I can add a personal note as well. Then I go into the Category list and select Meeting or Appointment; a button gives me a list of all the personnel on the network, from which I select the people I want to invite. When I click on OK, OnTime sends out the message.

Among other blessings, I no longer worry whether someone has seen my message: The RSVP function informs me who has checked in. Currently our network administrator is setting up a remote capability so I'll be able to access the system from my home office. Meanwhile, I print my schedule and take a hard copy with me.

Just because I've switched to a computer-based scheduler, however, doesn't mean I've surrendered my Franklin Planner. Where else would I stash my credit cards?

Edited by Bronwyn Fryer

Bronwyn Fryer is a contributing editor for PC World. *If you use PCs to manage people and other resources in a business environment, we want to hear from you—we pay $300 for published columns. See page 12 for contact information.*

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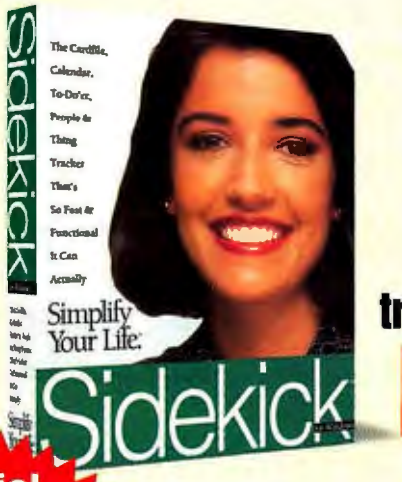

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Circle 63 on reader service card

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Circle 54 on reader service card

Can You Spot the Next Quicken?

It's popular these days for software entrepreneurs to state their fantasy in the following way: "We want to be the Quicken of (*insert category name here*)." In most cases, such a bold comparison is an insult to Intuit's great personal and small-business finance software. But not always.

Every so often, someone makes good on the promise. I've already written about Portable Software's QuickXpense, the expense-reporting software that reduces the hassle of tracking business travel costs. The second "almost Quicken" product I've seen is called Cashé, from Business Matters. Touted as "Quicken for CFOs," Cashé helps make sense of complicated corporate financial figures. Although designed (and priced) for corporate financial types, the program makes understanding complex financial issues much simpler than a spreadsheet ever could.

Non-CFOs will find Cashé useful for comparing annual reports. Business Matters also plans to publish comparison data so that a company can compare its performance with that of competitors or with industry averages. You'll also be able to factor various economic forecasts into what-if scenarios. Cashé lists for $1995.

Wall Street Journal Online

Dow Jones, publisher of the *Wall Street Journal*, has been a laggard in online services—charging too much and making its excellent data too difficult to access. Its newest service, called Personal Journal, is a step in the right direction: You get a personalized daily dose of the *Journal* online. Personal Journal, based on software developed for the ill-fated Microsoft WinPad platform, allows you to follow 10 companies or regular *Journal* features, along with 25 stocks. You also get world headlines, business news, sports scores, and worldwide weather reports. The software is very nice and for those who require a daily *Journal* fix, alleviates the guilt of not having spent enough time skimming the newsprint version every day. Its price was not set at press time.

Hardbody Software

Pete Peterson, who led WordPerfect during its glory days, is back in the software business, this time with a title he paid $500,000 to develop because he wanted to use it himself. Life Form is a health and fitness program that promises "total personal health management"—and it pretty much succeeds. It's great for keeping track of what you've eaten, your blood pressure and body measurements, and how much exercise you've done. It has nine sections: general information, food, exercise, measurements, chemistry, ratings, history, graphs, and reports. The user interface makes it easy to use as much of the program as you like.

Life Form comes with the most complete database of foods—including brand-name and fast-food items—I've seen. And the new nutrition labels on food packages make it easy to add items, create recipes, and build menus.

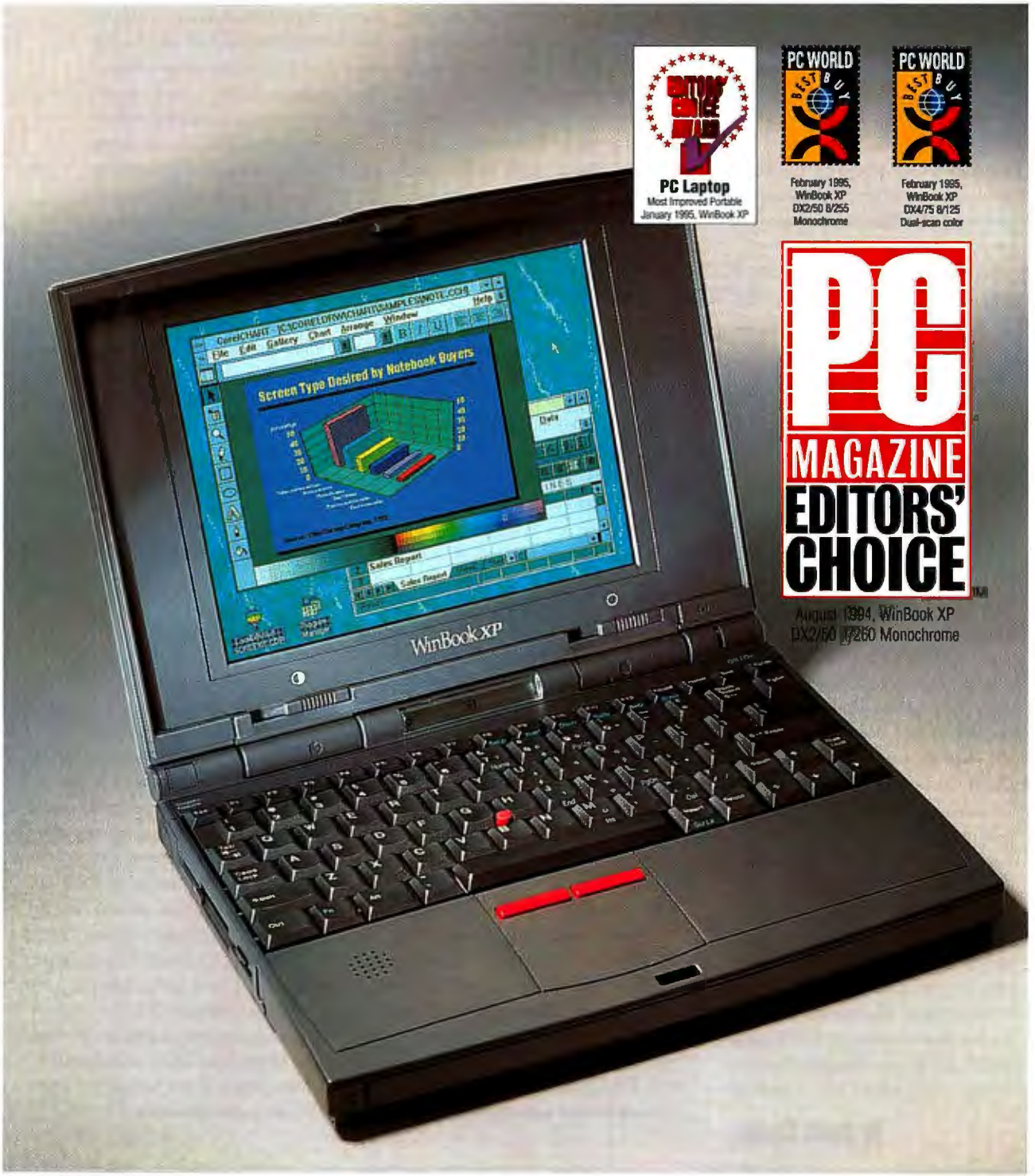
The program is due out this spring and is likely to change a bit between the beta I played with and the final release. I'm hoping for more educational content and for sport-specific versions in the future. Nevertheless, Life Form is the first serious software tool I've seen for people who want to take more responsibility for their health and well-being. Life Form, from Fitnesoft, should be available on the street for $49, and it's covered by a 90-day money-back guarantee.

- **Cashé** $1995; Business Matters; 617/899-8700
  Reader service no. 784
- **Personal Journal;** Dow Jones & Co.; 800/203-0706
  Reader service no. 785
- **Life Form** $49; Fitnesoft; 801/221-7777
  Reader service no. 786

By David Coursey

If you'd like to do multimedia presentations, but you find PowerPoint and Freelance Graphics lacking and you aren't ready for "professional" tools, here's a tip: Consider Gold Disk's Astound. It does much more than the standard presentation tools do but is almost as easy to use...After a long dry spell, I've started to see cool notebook computers again. My favorites are the Hewlett-Packard OmniBook 600 (which I've been carrying around lately) and the new subnotebooks from, of all people, Digital Equipment Corporation...If you can possibly justify the cost of a fast communications connection, get one. I've just set up an ISDN connection at home, and the difference between using dial-up 14.4-kbps connections and cruising at about 118 kbps is as staggering as you'd expect. The problem is that these connections are still relatively expensive. The cost: about $1000 in hardware, a $400 installation fee, $80 a month for service, and a penny-a-minute connect fee.

Don't take our word for what a great value and performer the WinBook *XP* is. Read what the experts have to say:



PC WORLD "Exceptional battery life, fast, lightweight, low price, modular design" *PC WORLD*, Systems Top 20, Feb. 1995

PC MAGAZINE "...the two DX4/100-based portables from WinBook Computer deliver three things that every buyer wants: attractive features, top performance, and a competitive price." "Both units posted extremely competitive scores in our tests." *PC MAGAZINE*, Cover Story: Color Portables. Jan. 1995

"With plenty of processing power, (and) enough battery life to handle a transcontinental flight easily,...the WinBook XP...is a value winner." "...the WinBook XP is the lightest full-size notebook in the roundup; it also had excellent battery life..., optional audio and a good price..."

PC MAGAZINE, Cover Story: Notebooks, Aug. 1994

LapTop COMPUTER MAGAZINE "...WinBook has gone on to offer a notebook that everyone seems to want. The reason is simple: value."

PC LAPTOP, 1994 Editor's Choice Awards, Jan. 1995

"The WinBook XP is a color notebook that's designed well, feels sturdy and offers great value." *PC LAPTOP*, Review: WinBook XP, Dec. 1994

WINDOWS MAGAZINE "The WinBook XP represents the best kind of innovation in the rapidly changing field of notebook computers. It keeps the best of proven technologies, such as a sharp display, and complements them with new technologies, such as those employed to stretch battery life. The long battery life makes it a good choice for anyone who needs a basic notebook that also delivers solid performance."

WINDOWS MAGAZINE, WinLab First Impressions, Dec. 1994

COMPUTER SHOPPER "In terms of value,...(the WinBook XP) ranks above many famous-name notebooks. And in terms of pointing devices, it's definitely got them out-numbered." "...if you're looking for a well-equipped, wallet pleasing portable, the WinBook XP deserves a spot on your short list." "...the WinBook with modem is $700 less than a comparably equipped, modemless (Dell Latitude XP) 475C."

COMPUTER SHOPPER, PC Reviews, Nov. 1994

Choose the standard dual-button pointing stick or add an optional 19mm dual-button trackball or touchpad!

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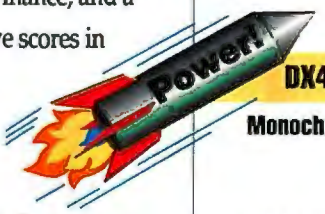

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OS/2 WARP VS. WINDOWS NT 3.5

Is Buying Either Better Than Waiting for Windows 95?

Edited by Russell Glitman

Tired of waiting for Windows 95? Both IBM's OS/2 Warp 3 and Microsoft's Windows NT Workstation 3.5 give you the advantages of a 32-bit operating system—reliability, true multitasking, long file names—right now. But is either of them a better choice than Windows 95?

The two programs are very different. While Warp is aimed at the average user and can run in only 4MB of RAM, NT is targeted at power users with heavy security, reliability, or networking needs. And it's big, requiring at least 12MB of RAM.

After looking at beta releases of both products last year, we finally had the chance to compare the two based on shipping versions. One important discovery we made is that neither operating system is satisfactory if you consider speed to be important. Both of these programs proved slower at running Windows applications than Windows for Workgroups.

There's a good chance you'll be able to install either system without problems, but it's far from a given. That's because 32-bit protected-mode operating systems need their own 32-bit protected-mode drivers for your hardware peripherals, and neither NT nor OS/2 drivers are as plentiful as those for DOS and Windows. On the Micron Pentium-90 system we used, we encountered driver problems with both operating systems, although we found fixes on CompuServe.

Running under Warp, Micron's Diamond Stealth 64 VRAM graphics card couldn't get us anything better than standard VGA. The computer came with a video driver for OS/2 2.1, but the instructions for installing the driver didn't work in Warp. In Diamond's CompuServe forum, we found updated instructions in a message from a Diamond support representative.

With Windows NT, the problem was with the Mitsumi CD-ROM drive. Since NT itself comes on a CD-ROM, completing the installation without the new driver would have been an incredible hassle. Luckily, we found the driver in CompuServe's CD-ROM vendor forum.

Windows 95, by the way, probably won't have this problem. Unlike OS/2 Warp and NT, Windows 95 will work with DOS's and Windows 3.1's 16-bit real-mode drivers as well as with its own 32-bit protected-mode drivers. The downside is that real-mode drivers pull Windows 95 out of protected mode and make it more susceptible to crashes.

If you can't stand another day living with Windows 3.1 and crave the advantages of a 32-bit operating system, you now have two choices. But be warned—it's a decision not to be made lightly.

What about the user interface? If you use Windows, NT will fit like an old glove. The interface is almost identical to Windows 3.1's.

OS/2 Warp follows all the latest theories on good user-interface design yet still manages to be counterintuitive. For instance, you can print a file by simply dragging it to the printer icon—once you've gotten used to the idea of dragging objects with the right mouse button.

Warp's interface is built around an object-oriented desktop, which is a directory where you can put files, folders (directories), and programs, as well as *shadows*—links to files, folders, or directories that are located elsewhere on your hard drive. (Windows 95 will use a similar approach, including a linking feature called Shortcuts.) Warp also has a new LaunchPad, which resembles any one of a dozen cheap Windows shells and gives you easy access to frequently used programs.

Breaking News

FIRST APPLE CLONES: Apple is licensing its Macintosh System 7.5 operating system, a move that paves the way for the first Macintosh clone systems. As of mid-January, Apple had announced two licensees. Power Computing Corporation, which is partly owned by PC maker Olivetti, will sell Mac clones by mail order beginning in March. Power Computing will also sell Mac motherboards to computer vendors, opening the door for other vendors to enter the market. Radius, maker of monitors for Apple computers, will offer high-end Mac clones designed specifically for video editing. The Radius and Power Computing systems will use PowerPC processors.

MODEMS FOR RELIABLE WIRELESS COMMUNICATIONS: Rockwell International released its first cellular digital packet data (CDPD) V.32bis modem chip set. Rockwell expects vendors to ship modems using the chip set in June or July. The products should cost between $400 and $600, says Mark Chapman, a Rockwell product manager. CDPD uses the existing cellular phone network to send information, such as E-mail and faxes, in short bursts at speeds up to 19.2 kbps.

TCI BUYS INTO MICROSOFT NETWORK: Tele-Communications, Incorporated, the nation's largest cable television operator, has acquired a 20 percent stake in The Microsoft Network, Bill

(continued on page 49)

LEFT: JEFF BERLIN; ABOVE: JEFFREY PELO

But Warp's object-based approach is botched by the clumsy way the OS handles the day-to-day details. For instance, when you minimize a window, it disappears—hiding in a folder where the uninformed would never think to look for it. And some aspects of setting up the LaunchPad are as difficult to figure out as an Agatha Christie novel.

Both OS/2 Warp and NT allow long file names, so you can finally save a file as "Letter to Murray about Alice" instead of LETMUAL.DOC. (Actually, in NT you'd have to call it "Letter to Murray about Alice.doc," but the principle's the same.) You can even use long file names in a DOS drive partition (though in Warp you won't see long file names with the DIR command), with the operating system tracking both the long name you give a file and an abbreviation that DOS can understand. This greatly speeds up finding the right file and is one of the best things about both Warp and NT.

Can I Get My Work Done?

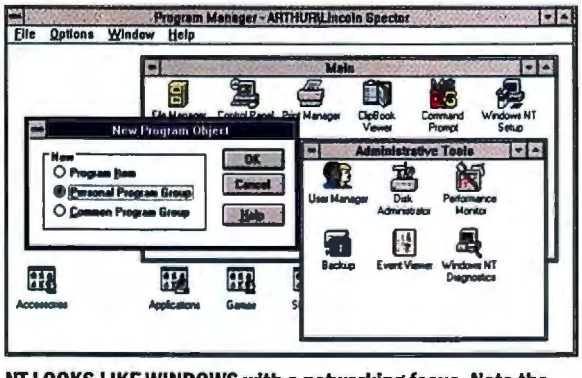
An operating system that can't run your applications is like a Mercedes-Benz without an engine—it might look nice, but who cares? Both Warp and NT run DOS programs just fine. The issue is how well they run Windows apps, and whether many new apps will be designed to take full advantage of the NT or Warp environments.

There are two ways to run Windows 3.1 applications in a 32-bit environment: You can put each one in its own isolated area (called a virtual machine, or VM), which will protect the application from other programs but demand copious amounts of RAM. Or you can run all the apps in one VM, conserving RAM but running the risk that one bad app might take down the rest.

OS/2 Warp wisely gives you the choice—you can set up a Windows application to run either in a communal virtual machine or by itself. No Microsoft operating system does that: Windows NT trades conservation for reliability, and Windows 95 will make the opposite trade-off.

Both Warp and NT sacrifice speed when running Windows apps, although NT is by far the worse. Warp outperformed NT by a wide margin in our WordPerfect for Windows test, coming in only 10 percent slower than Windows for Workgroups, compared to NT's 85 percent. In our 1-2-3 for Windows tests, however, NT came out the winner, if being 45 percent slower than Windows can in any way be called a victory. OS/2 Warp was about 67 percent slower.

At press time few major 32-bit applications have been developed for either operating system. There's Lotus SmartSuite for OS/2, but it lacks some features of the Windows version—including 1-2-3's Version Manager and the Approach database program (although Lotus promises that the features of SmartSuite for OS/2 and Windows 95 will sync up better in future releases). Not surprisingly, a version of Mi-



NT LOOKS LIKE WINDOWS with a networking focus. Note the title bar and option to create common program groups.

FEATURES COMPARISON

Which Operating System Is Best for You?

● Yes
○ No

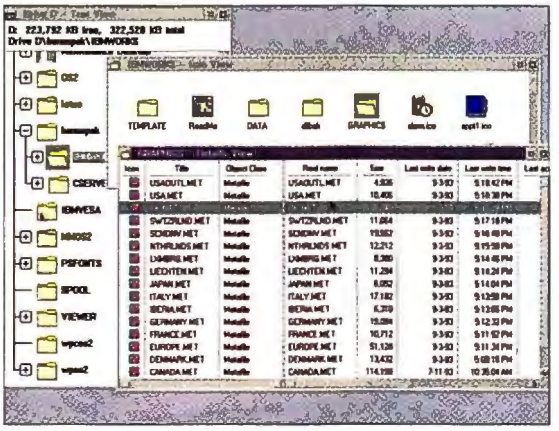
	OS/2 Warp[3]	Windows NT 3.5	Windows 3.11	Windows 95[1]
Standard features				
Street price	under $80[2]	$99[3]	$150	under $100[4]
RAM required	4MB	12MB	4MB[5]	4MB[4]
Minimum installation	35MB	75MB	6MB	about 30MB[4]
User interface				
Object model	●	○	○	●
Long file names	●[6]	●	○	●
Drag-and-drop printing and deletions	●	○	○	●
Applications supported				
DOS applications	●	●	●	●
Windows 3.1 applications				
Together in one virtual machine	●	○	●	●
Each in its own virtual machine	●	●	○	○
OS/2 2.x applications	●	○	○	○
Full Windows 32-bit applications	○	●	○	●
Windows 95 applications	○	●	○	●
Applications included				
Business applications	●	○	○	●
Internet connection	●	●	○	●
Peer-to-peer network	○	●	○	●

[1] Not shipping at press time.
[2] About $130 with Windows 3.1.
[3] Windows 3.1 upgrade; otherwise $279 to $319.
[4] Microsoft estimates.
[5] 2MB without 386-specific functions.
[6] Except at DOS prompt.

crosoft Office for NT is also available, although it comes with the 16-bit, Windows 3.1 version of PowerPoint.

New, 32-bit applications are more responsive than the old, 16-bit ones, and that's the one key difference between the NT version and the Windows 3.11 version of Office. Thanks to NT's *multithreading* ability (multitasking within an application), I was able to return almost instantly to editing a document I was printing. To get the advantage of multithreading, you need both a 32-bit application and a 32-bit operating system.

Neither Warp nor NT ever crashed on me, even when I had five or six applications going at once; that's a lot more than I can say for Windows 3.1. And programs really did work in the background. In both Warp and NT, I could download files or format floppies instead of staring dully at the screen, waiting for the computer to finish working.



FILE MANAGEMENT IN OS/2 is tough. Tree, icon, and table-like detail views confuse more than they inform.

A Surprise in Every Box

These days operating systems come with extra programs to tempt you into buying them. Not that these goodies alone are worth the hassles and risks of upgrading your operating system, but they can help you decide a close choice. For instance, both Warp and NT come with Internet access tools, but Warp's are more complete and integrated. Windows NT's documentation doesn't even mention the Internet.

And Warp comes with plenty of other stuff, too. There's a modest word processor and spreadsheet, a very nice PIM, a CompuServe front end, and versions of FaxWorks and HyperAccess Lite. NT, on the other hand, comes with only the same old accessories that Windows users have come to know and hate, plus a few safety-oriented utilities and a tape backup program.

32 Bits for More Than $4

Which is the winner? Neither one. They both run today's 16-bit applications slower than Windows. But if you must have a 32-bit operating system, here's the score: OS/2 Warp takes less hard disk space, it's cheaper, and it comes with a useful bundle of business programs and a great suite of Internet tools. On the other hand, you already know how to use NT, and it's a safe bet that it will run more future applications. Me, I'm waiting for Windows 95.

—Lincoln Spector

OS/2 Warp 3, Windows NT 3.5

These two 32-bit operating systems provide true multitasking, but performance drags.

OS/2 Warp 3

Key Features: Internet access
- Bundled business applications
- Long file name support

Street Price: Under $80
Availability: Immediate
IBM, 800/342-6672

Windows NT 3.5

Key Features: Windows interface
- Long file name support

Street Price: Windows 3.1 upgrade $99; otherwise $279 to $319
Availability: Immediate
Microsoft Corp., 800/426-9400
Reader service no. 796

JEFFREY PELO

Breaking News

(continued from page 47)

Gates's upcoming foray into the world of online services. The TCI/Microsoft deal is the latest in a series of technology trysts involving online services and cable companies. The reason for the pairing? Cable companies can market online access to their subscribers, while online services get the high-speed bandwidth of cable networks—essential for transmitting video and other multimedia services to subscribers. Meanwhile, Intel and other companies are currently testing "cable modems" that will link the PC to cable networks.

MEDIA VISION EMERGES FROM BANKRUPTCY: Media Vision has emerged from bankruptcy under an agreement that frees the number-two maker of PC sound boards from the bulk of its outstanding debt by issuing new stock to its creditors—thus converting its debt into equity. Media Vision will continue to sell multimedia kits and other hardware, including its Reno portable CD-ROM drives, Pro 3D sound cards, and a new PCMCIA audio card. The Fremont, California, firm has sold its CD-ROM software operations—which produced last year's Critical Path—and will discontinue its Pro Graphics series of graphics boards.

CAERE-CALERA MERGER IS FINAL: Despite an ongoing U.S. Justice Department inquiry, Caere reports that its

(continued on page 51)

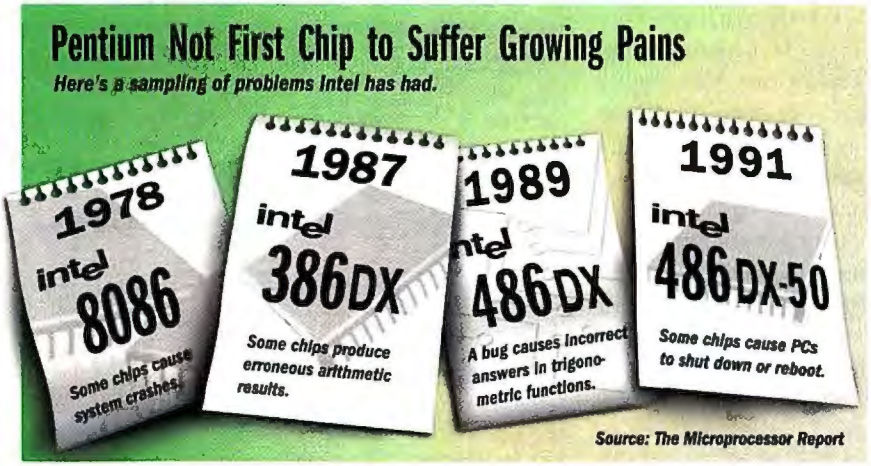
Pentium Flaw: A Wake-Up Call?

When news of a flaw in Intel's Pentium chip grabbed national attention a few months ago, the ensuing public uproar made the computer industry sit up and take notice. Consumers were furious over the way Intel executives handled what the company characterized as a minor bug that would only rarely affect a very small percentage of users. Eventually even Intel realized it had to bow to the power of the new generation of PC users and replace the chip, no questions asked.

The message from consumers was clear: Improve the quality of your products and respond quickly to problems if you want our business.

It was a dramatic change in perception for the industry. For years MIS veterans and experienced computer users were conditioned to expect bugs in new hardware and software and to deal with inconveniences such as software patches. But the installed base of computer users is growing rapidly, and the newcomers aren't so patient. Suddenly the risks associated with introducing buggy products are huge. Analysts say vendors will be forced to reevaluate their marketing claims, product testing, and product cycles. "Amen," say users we talked to—novices and veterans alike.

"I'm not willing to compromise on quality. I am willing to wait," says Michael Polikoff, a senior technology officer at a large New York City bank. Vendors will lose customers unless they introduce stable products, he says.



Industry Listens and Learns

On the same day Intel announced that it would replace defective Pentium chips, Microsoft said it would again delay shipment of its Windows 95 operating system, with a new target release date of August. Coincidence or smart marketing? Microsoft's delay was overshadowed by Intel's woes, but the two events aren't related, says Microsoft's Windows 95 group product manager, Rogers Weed. Still, the message behind the delay is clear: Bill Gates knows he has to get it right the first time—because this generation of consumers may not give him a second chance.

"The Pentium problem has heightened awareness, and customers are going to become much more aggressive about demanding a correction now that they see what Intel has done," says Jeff Silverstein, editor and publisher of the *Software Industry Bulletin.*

Based on its own experience, Microsoft is also more mindful than ever of bugs. The Redmond, Washington, giant has had its share of bruises: Because of problems

GORDON STUDER

The Joke's on Intel

Question: How many Pentium designers does it take to screw in a lightbulb?

Answer: 1.99904274017, but that's close enough for nontechnical people.

That's a sample of the tenor of messages that traversed the Internet in December, as the Pentium flaw rattled public confidence in both Intel and computer technology. As in any crisis, people found comfort in humor, and out of the online angst came a number of wry jokes. Here are some of the best.

Q: According to Intel, the Pentium conforms to IEEE standards 754 and 854 for floating-point math. If you fly in aircraft designed using a Pentium, what is the correct pronunciation of IEEE?

A: *Aaaaaaaiiiiiiiiieeeeeeeeeeee!*

Q: What's another name for the "Intel Inside" sticker they put on Pentium systems?

A: The warning label.

Q: What do you get when you cross a Pentium PC with a research grant?

A: A mad scientist.

ranging from the miserably buggy DOS 4.0 to the flawed DoubleSpace feature in DOS 6.0, the company has taken its share of knocks. Now that Microsoft has seen the fuss that 4 million to 6 million Pentium users can kick up, it surely doesn't want to upset 60 million Windows users.

The kind of consumer uprising Intel has witnessed can bloom easily today, due in part to online services and the Internet. Accessible by millions, they provide an easy way for consumers to quickly compare information and band together. That puts additional pressure on vendors to be honest and respond rapidly to consumer complaints.

LONGER PRODUCT CYCLES would improve quality, argues ITT's Andy Kiolbasa.

Lasting Impact

NEC is one system vendor that says it has learned some lessons from the shock waves caused by the Pentium incident. "PCs are now a much larger part of people's everyday lives," says Murali Dharan, director of marketing for consumer PCs at NEC. "Hardware vendors have been able to get away with techie explanations of problems in the past. That doesn't work anymore. The onus is on the industry to wake up and admit we make appliances that people depend on for their everyday lives."

Dharan predicts we'll see a series of dramatic changes by hardware vendors to improve product quality. The first will be longer product cycles on home-oriented PCs to allow for more design time and more testing, and testing will become more rigorous, Dharan says. Second, marketing will change, with ads focusing less on features and more on building brand loyalty. Finally, companies will institute plans for dealing with flawed products. Just as General Motors has a system in place for product recalls, so too will computer companies.

As for the software market, many buyers wish product cycles would become longer. "I'd love to get a piece of software that doesn't have bugs," says Andy Kiolbasa, manager of end-user computing at ITT Fluid Technologies, a manufacturing company in Morton Grove, Illinois. He's willing to wait for new versions of applications that deliver major improvements rather than two or three small new features. "I would prefer greater leaps at longer distances," he says.

Kiolbasa's wish probably won't come true this year. Vendors are going to have to be very careful of bugs as they release new applications designed to run with Windows 95. If that means cutting features or delaying them, companies will do it. "Features that are requested by customers but cause problems and open the floodgate for quality control problems may be left out," says the *Software Industry Bulletin*'s Silverstein.

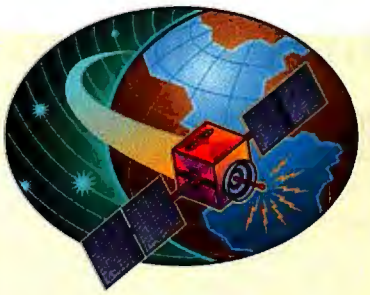
The risk in having longer product cycles is a slowdown in technological innovation. But the competitive nature of the computer business makes that unlikely, especially when it comes to hardware, which has become increasingly price driven.

All this genuflection to quality has one potential downside: Products may cost more due to increased testing and support for consumer-oriented systems. But that's a price users say they are willing to pay.

The users we talked to all said it's time the computer industry improved quality. "I think they realize we're a lot more hip than we used to be," says Polikoff.

—Laurianne McLaughlin

PHOTO: MICHAEL ABRAMSON; ILLUSTRATION: JEFFREY PELO



Breaking News

(continued from page 49)

merger with Calera is final. This means that 75 percent of the OCR market will be controlled by one company. Caere officials say the company will continue to market its OmniPage and Calera's WordScan OCR programs separately.

HP PRINTER PROBLEM: Some of Hewlett-Packard's DeskJet printers have developed an annoying paper handling problem. The printers' rubber rollers can become slick over time and may not pick up and feed paper consistently into the print mechanism. HP is offering a free paper-feed cleaning kit to fix the problem. In the United States, only DeskJet 550C and 560C, DeskJet 520, and DeskWriter 520 printers that were produced between June 1993 and March 1994 experience the problem, HP says. The affected units have serial numbers beginning with "US3" through "US43." None of these printers are still being sold through retail channels, HP says. The free paper-feed cleaning kit will be sent automatically to all customers who registered their printers with HP before July 1994 and may have one of the problematic units. Others may contact the company at 800/656-2324 or 510/657-1473 (fax) to get information or a free kit.

Edited by Randy Ross
Contributors: Joe Abernathy, Jeff Bertolucci, Michael Desmond, Rex Farrance, and Laurianne McLaughlin

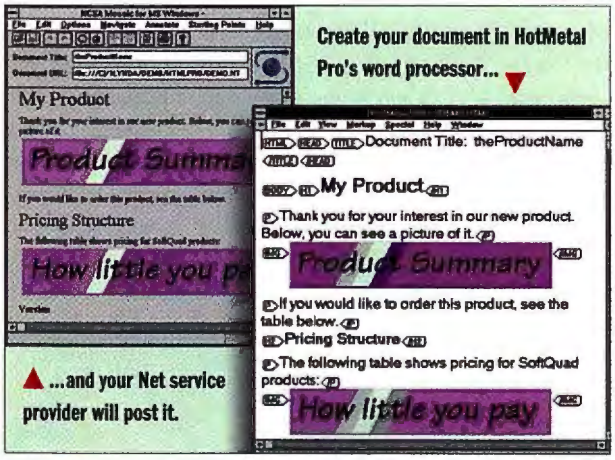
Here's How to Do Business on the Web

TEST DRIVE A new breed of software tools helps individuals and businesses quickly establish a presence on the World Wide Web—the multimedia portion of the Internet hailed as the Net's future. The tools take a programming task and reduce it to the relative simplicity of using a word processor.

While the Web is new, it's the fastest-growing segment of the Internet. Windows Web browsers such as Mosaic and Netscape allow you to interact with the Web and other Internet resources with point-and-click ease. In one stroke, the Web makes the Internet much easier to use and gives you the graphical tools to set yourself up as an information publisher.

All this Internet activity is creating a new medium. Managers are posting multimedia résumés to the Web, companies are creating electronic storefronts, museums are showing exhibitions. Even the Rolling Stones are there. The imagination may be the only limit to the medium.

Underneath all the flash, however, the Web is really just a set of hyperlinked multimedia elements that conform to a standard known as the Hyper Text Markup Language. HTML in turn is a subset of the Standard Generalized Markup Language, a once-obscure Department of Defense standard for cross-platform publishing. SGML also allows you to translate your core information onto other platforms, including CD-ROM. HTML documents can include audio, video, text, graphics, and tables, as well as links to resources like E-mail, Usenet news, and other Web sites.

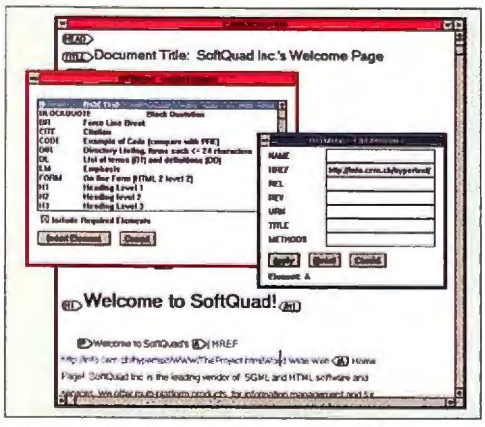


Up until now, creating multimedia documents for the Web was a time-consuming process: The author created the core text documents and then laboriously added codes for page layout and for multimedia and other types of links. But three new software products are designed to ease much of that labor.

Multimedia Home Page

The applications let you build multimedia Web documents on top of a Windows word processor platform. You E-mail the completed document to your service provider, who then puts it on the Web as your *home page*, a site that can contain its own information as well as links to information elsewhere on the Web and the Internet.

The first of the three applications to be released is HotMetal Pro from SoftQuad. (The name is a reference to the old hot-metal-type publishing days that, I'm sad to say, I recall). HotMetal is a complete Windows word processor, with a thesaurus and a spelling checker. It allows you to view embedded graphics as they appear on the Web and offers a visual table editor. And the $195 HotMetal interacts directly with Mosaic, the most popular Web browser, so you can edit source documents within Mosaic and use Mosaic within HotMetal to view works in progress. A variety of preformatted templates makes it a snap to get standard documents online quickly.



CREATING YOUR OWN home page on the Internet is a step-by-step process with HotMetal Pro.

At press time both Microsoft and Quarterdeck were preparing Web authoring add-ins for Word 6.0 for Windows; we'll look at them more closely next month. A beta version of the Microsoft product was not available, but the Quarterdeck HTML authoring tools were available in prerelease form. The Quarterdeck beta lacked the polish and depth of HotMetal but was easier to use, offering a good button bar and a thoughtful presentation of design tools.

What I find especially compelling about HotMetal is that it is just one part of a powerful suite of SGML document authoring and management tools from SoftQuad. In coming months, for example, new and revised Web browsers will provide full SGML capabilities, giving those who publish online much greater flexibility to incorporate multimedia.

—Joe Abernathy

HotMetal Pro

Software to set up shop on the Web.

Key Features: Mosaic interaction • Rules checking • Word processor • Templates

Pricing: $195

Availability: Immediate

SoftQuad, 800/387-2777, 416/239-4801

Reader service no. 792

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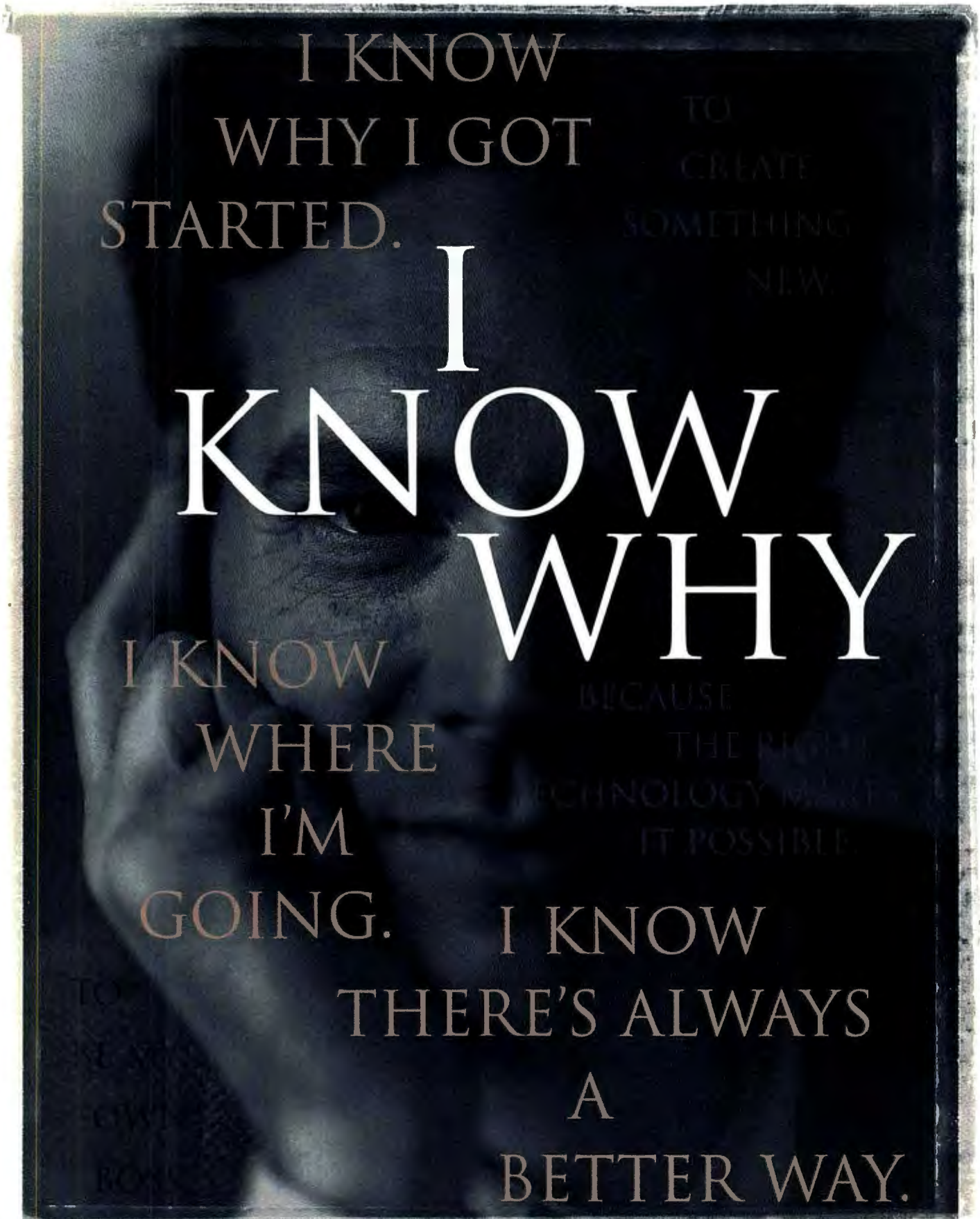

© 1995 Microsoft Corporation. 1-800-60-SOURCE = 1-800-607-6872. Microsoft Office Professional, shown here, includes Microsoft Excel, Word, the PowerPoint presentation graphics program, Microsoft Access.

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A complete set of tools that will make the move to Microsoft easy and hassle-free. You get our *Planning The Move* kit, which includes a pre-planning checklist, information on hardware requirements, success stories about businesses that have already switched, and helpful product information. If you just purchased Microsoft Office, ask for our detailed *Making The Move* kit. Can't work something out? Call our Conversion Support Line and our product support staff will handle your problems over the phone. Need hands-on help? We'll be happy to give you the name of a professional Conversion Expert right in your neighborhood.

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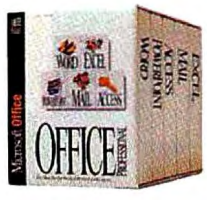

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Micron's Millennia Proves to Be Fastest PC

TEST DRIVE CPUs have become so blindingly fast, it's hard for other components in a PC to keep up—including system memory. That's why Micron, a major system vendor and the only domestic memory chip manufacturer besides IBM, decided to build innovative memory technology into its new P100 Millennia system. The result? Nothing less than the fastest PC you can buy today.

When we fed the Millennia four Windows application benchmarks, it chewed them up in record time—a full 20 percent faster than the average 100-MHz Pentium system. Power users will have trouble resisting the Millennia's combination of muscular configuration and relatively low price: With 16MB of RAM, a 1.2GB IDE hard disk, a 256K secondary cache, a 15-inch monitor, a Diamond Stealth 64 video card with 2MB of VRAM, a SoundBlaster 16 sound card, and a Plextor quadruple-speed CD-ROM drive, this screamer goes for $3695. With a 17-inch monitor it costs $3995.

TEST REPORT

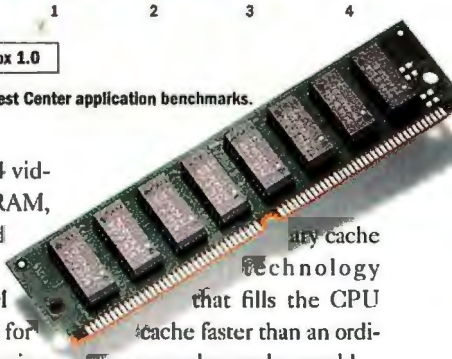
Micron's Millennia Is Top PC Performer

System	Price	RAM (MB)	Cache (K)	Windows application test times
Micron P100 Millennia	$3695	16	256	1:02 :26 :50 :41
Micron P100 PCI PowerStation	$3548	16	256	1:06 :32 :59 :56
Average of three P-100 PCs	$3760	16	256/512	1:06 :32 1:00 1:05

Shorter times are better. Minutes 0 1 2 3 4

Word 2.0 | Excel 4.0 | Freelance 1.0 | Paradox 1.0

Millennia results based on tests of a preproduction system using PC World Test Center application benchmarks.



Two pieces of memory magic account for much of the Millennia's performance edge: Extended Data Out (EDO) memory and SyncBurst memory caching. EDO is designed to reduce the drag on system performance caused by *cache misses*, which occur when a processor can't find the data it needs either in its own cache or in a secondary cache. When CPUs resort to main memory, they incur *wait states*, processor cycles in which the CPU spins its wheels. EDO main memory does a better job of keeping up with the processor, reducing the number of wait states on cache misses.

SyncBurst is Micron's name for a new secondary cache technology that fills the CPU cache faster than an ordinary secondary cache would.

SyncBurst and EDO are innovations now but in a year may be standard features. Intel and Micronics are expected to use Micron's chips in their motherboards. In the meantime, if Micron's Millennia is any guide, these new technologies are blazing a trail to faster performance for future PCs.

—Eric Knorr

THE PC AT ITS BEST: Micron's Millennia offers unparalleled performance.

JOHN GREENLEIGH

Micron P100 Millennia

New memory technology makes Pentium-100 system the fastest PC you can buy.
Key Features: 100-MHz Pentium CPU • 16MB of EDO RAM • 256K SyncBurst secondary cache
Pricing: $3695
Availability: March 1
Micron Computer, 800/223-6571
Reader service no. 793

Top of the News continues on page 66

Will the P5-75 Family PC's new fax/modem call for help during the tumble in the rubble?

Will Anna buy her own Gateway P5-100 with a 1GB hard drive, quad-speed CD-ROM drive and 16MB RAM for only $2,999?

As the Hard Drive Turns

Sponsored by GATEWAY2000

Will the 4DX2-66 Family PC testify against Sheryl?

**Furs pictured are made from artificial materials.*

Featured Gateway 2000 PC: P5-100XL with the new TelePath IIv fax/modem, 1GB hard drive and quad-speed CD-ROM at a new low price of $3,799!

Setting: Lawyer's Office

Characters:
Jonathan Mattison: Lawyer
Kiki: Young wife of Victor
Victor: Kiki's husband who was presumed dead

After the reading of the will, Kiki and Mr. Mattison lock in a passionate embrace. However, they're unaware that Victor wasn't killed in the accident, and he has just arrived in Gateville.

Victor: Kiki! What's going on here? Unhand her, you beast! I thought you really loved me, Kiki! Now Anna tells me you're having an affair with my lawyer and you plotted to kill me just so you could get my beloved Gateway 2000® PC!

Kiki: Why Victor! I thought you were dead! Anna lied! Victor you have to believe me. Of course I would love to have this potent PC with its powerful Intel® 100MHz Pentium™ processor, whopping 1GB hard drive, new TelePath™ IIv fax/modem, 16MB of RAM, ultra-fast quad-speed CD-ROM drive, ACS-31 speakers with heart-pounding stereo sound, 17-inch Vivitron™ color monitor, and Microsoft® Office Professional, Bookshelf® and Money *(inhale)* all to myself. But at its new low price of only $3,799 I could have easily bought it with my monthly allowance. Victor, your fall was an accident! We couldn't find you! We thought you were dead! It's been a whole week since you died. I thought it would be okay if I started dating again. I have needs, you know.

Victor: It was no accident! Some burly guy wearing a ski mask and a shiny three-piece suit shoved me off the cliff.

Mattison: Cool it Victor. Kiki and I had nothing to do with your accident. Anna bribed me to read the will. Man, was she steamed that you willed the P5-100XL to Kiki and she only got Fifi, the Yorkie.

Kiki: Yes Victor, I'm sure Anna hired the hit man.

Victor: This is terrible. To think my own daughter would have me killed. I must go rescue Fifi. And as for you two, I'll have you know Kiki, Mattison is your long lost twin brother! It would have only been a matter of time before you found out through the Internet.

Mattison: Now that you mention it, I do see a resemblance . . .

Kiki: *(faints)*

GATEWAY 2000
"You've got a friend in the business."
800-846-2065

intel inside
pentium

ENHANCED IDE

Featured Gateway 2000 PC:
The P5-75 Family PC with the new TelePath IIv fax/modem, 2MB of video memory and quad-speed CD-ROM for only $2,299!

Setting: Collapsed Office Building

Characters:
Julia: Successful Realtor
Trevor: Sexy Construction Worker

Julia and Trevor are lovers trapped in a collapsed office building. They could easily call for help with the PC's TelePath™ IIv fax/modem, but at the moment neither are in a hurry to be rescued. Julia is frisky, but Trevor's obsessed with her Gateway 2000® PC.

Julia: Trevor! How could you do this to me? You haven't paid any attention to me ever since we discovered my Gateway 2000 P5-75 Family PC™ multimedia system. Are you forgetting about our love child? Come on! Love in the rubble awaits us!

Trevor: Not now Julia! I've just discovered even more bodacious features on this PC! She has a hot new TelePath IIv fax/modem with a Messaging Center. We could really use her out at the construction site. She receives, plays and saves voice messages and even lets you access your computer remotely and check for new voice messages. The Messaging Center can send faxes from any Windows™ application that uses a print command and faxes can also be displayed, manipulated and edited, plus a ton of other really cool stuff!

Julia: Trevor, I never knew you were such a geek! Here we are, totally cut off from the rest of the world — it's the perfect time for love. Come to me you stud muffin!

Trevor: Hot damn! This PC is a beaut! She's been souped up with an ultra-fast quad-speed CD-ROM drive and 2MB of video memory — it's faster than grease lightning and a great value at only $2,299!

Julia: Why Trevor, you've made quite a discovery. These new features plus the powerful Pentium™ processor, an immense 730MB hard drive, 15-inch Vivitron™ monitor, 16-bit sound card and Altec speakers are remarkable. But if you don't get those rugged hands off that PC now, you'll regret it!

Trevor: We have to get out of here! I'll use the modem on the TelePath IIv fax/modem to call for help. I have to get to a phone to order an anchovy pizza *and* a PC from Gateway 2000! I need to ask how Bob's doing, too. Gateway is such a great company! I can't wait to get my own PC. I'll get a 30-day money-back guarantee and a three-year warranty on parts for my desktop PC and monitor. Gateway will provide me with technical support for the life of my PC, and on-site service is available during the first year in most U.S. locations. They'll even send me a free written copy of their warranty if I request it.

Julia: That's it! You'll need your own PC because this one is history!

Trevor: Stop! How could you even think of destroying this incredible machine?

Julia: Trevor, my biological clock is ticking. This may be our last chance! We can fax for help afterwards and then you can order your own Gateway PC.

Trevor: Geez... Julia. Okay, but you're kinda a mess.

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8 0 0 - 8 4 6 - 2 0 6 5

Gateway 2000 FamilyPC

intel inside
pentium

GATEWAY2000
VIVITRON
GATEWAY2000

All soap opera stars portrayed by Gateway 2000 employees.

atured Gateway 2000 PC:
X2-66 Family PC multimedia
with a double-speed CD-ROM,
lePath IIv fax/modem and six
xciting Microsoft software
applications for $1,799!

Setting: A fancy living room in a stately home.

Characters:
Dirk: A debonair businessman
Sheryl: Simone's evil twin sister

Dirk was enjoying a cocktail when he suddenly sensed something was terribly wrong. At the same moment, his wife suddenly whips off a wig revealing that she's Simone's evil twin sister.

Dirk: Sheryl what have you done to me! Where is Simone?

Sheryl: Simone is gone Dirk. Just like you'll be in a few seconds. I poisoned your martini. I want your Gateway 2000® 4DX2-66 Family PC™ multimedia system for myself. Simone always had everything. Flowing auburn hair, a rich husband and a PC that she didn't even appreciate. I desperately need this PC for my eight children. With Microsoft® Encarta™ '95, Penelope will flourish in her studies at the Gateville Junior Academy, and Polly can develop her budding creative talents with MS Fine Artist. Chester can track his stocks with MS Money, and Carlton can use the spreadsheet in MS Works to track his pet iguana's feedings. The rest of the kids can check out movies on MS Cinemania® '95 and sharpen their golf game with MS Golf. The 4DX2-66 will prepare them well for Gateville's competitive job market. If my plan works they'll all support me by the year 2005.

Dirk: You offed Simone?! Why didn't you tell me? I've always loved you. Simone was a raging hypochondriac. She drove me nuts! Quick, get me an antidote. We'll live happily ever after together!

Sheryl: You love *me*? Maybe Simone sensed it and that was why she always said she was me.

Dirk: Sheryl, the antidote, please! I'll give you anything you want. I'll come live with you in Canada!

Sheryl: Oh how sweet. But would we be able to stay in contact with Gateway 2000?

Dirk: Of course! Gateway customers in Canada and Puerto Rico get toll-free telephone service along with technical support. Plus, Gateway has a non-resident importer plan with Canada for easy delivery, and on-site service is available in some Canadian and Puerto Rican locations.

Sheryl: That's nice Dirk, but I'm afraid it's too late. I'm flattered by your offer, but I'd rather have this 4DX2-66 all to myself. Plus, I'll have this house and everything you own since I'm a dead ringer for Simone with this wig. In fact, my eight kids are on a flight to Gateville as we speak.

Dirk: You forgot *(gasp)* one *(choke)* thing. I'm *(cough)* taking *(wheeze)* my Gateway *(choke)* customer *(cough)* I.D. *(gasp)* to my grave! *(THUMP)*

Sheryl: AUUGH!

intel inside

GATEWAY2000 FamilyPC

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Gateway 2000® Family PCs™

4DX2-66 FAMILY PC

- Intel® 66MHz 486DX2 CPU*
- 8MB RAM
- 540MB 11ms IDE Hard Drive
- Local Bus Graphics with 1MB
- Double-Speed CD-ROM Drive, 16-Bit Sound Card & Altec Speakers
- TelePath™ IIv 14.4K Fax/Modem
- 3.5" Diskette Drive
- 14" Color CrystalScan® Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS® 6.22 & WFW 3.11
- MS Works, Encarta,™ Money, Cinemania® '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

$1799

P5-60 FAMILY PC

- Intel 60MHz Pentium™ Processor*
- 8MB RAM, 256KB Cache
- 540MB 11ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Quad-Speed CD-ROM Drive
- 16-Bit Sound Card & Altec Speakers
- TelePath IIv 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Vivitron™ Color Monitor
- Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.22 & WFW 3.11
- MS Works, Encarta '95, Money, Cinemania '95, Fine Artist & Golf
- 3-Year Limited Parts Warranty

$2099

P5-75 FAMILY PC

- Intel 75MHz Pentium Processor*
- 8MB RAM, 256KB Cache
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- Quad-Speed CD-ROM Drive
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P5-60

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- PCI Local Bus Graphics with 1MB
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- 3.5" Diskette Drive
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P5-60 $1999
P4D-66 $1799

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- Quad-Speed CD-ROM Drive
- 3.5" Diskette Drive
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Full-Screen Video Comes to PCs at Full Speed

Remember the first time you ever viewed a video clip on your multimedia PC? Blurred, postage stamp–size images, strange blobs of color streaking across the screen, out-of-sync audio—you probably wondered why you bought a sound card and CD-ROM drive in the first place.

Thankfully, this year will bring improved video playback technologies that display full-screen, full-motion video (30 frames per second, same as broadcast television) on your PC screen. The catch: You'll need to buy an add-in board that costs between $200 and $400 or a 90-MHz or faster Pentium system.

This new video playback technology is based on sophisticated algorithms that go by such names as MPEG, Indeo, Cinepak, and TrueMotion-S.

Among the full-screen video playback technologies, MPEG (Motion Picture Experts Group) has garnered the widest industry support. An open specification available royalty-free to vendors, MPEG is the only video *codec* (industryspeak for "compression/decompression algorithm") that provides full-screen, full-motion video playback on 386- and 486-based systems—including those with slow, single-speed CD-ROM drives. The playback quality of MPEG-compressed video is outstanding and rivals that of VHS video.

MPEG's acceptance had been limited because it requires an expensive add-in board on 386 and 486 PCs. But at the end of 1994, the MPEG market appeared to blossom, as dozens of peripheral makers announced plans to ship MPEG playback boards at prices in the $200 to $400 range—half what they were a year earlier. New graphics accelerator boards from companies such as Diamond Multimedia, Genoa Systems, and Orchid Technology also supported MPEG playback, and chip manufacturers such as C-Cube began offering inexpensive MPEG decoder chips that PC manufacturers could place on motherboards. Furthermore, dozens of MPEG titles became available.

But despite the growth in MPEG products, the demand could be short-lived. "MPEG hardware is still at a price point that's a bit exorbitant to the average consumer," says Dataquest multimedia analyst Kathy Klotz of San Jose, California. Klotz estimates that about 200,000 MPEG playback boards have been purchased so far.

For owners of 90-MHz or faster Pentiums, software codecs that use the CPU to

Just Push Play: Video Playback Moves Onto the PC

Technology	Features	Hardware requirements
MPEG	Full-screen, 30-frame-per-second video playback at 352 by 240 resolution	MPEG decoder chip or add-in board (on Pentiums, MPEG playback software)
Indeo	Video playback at 15 fps and 320 by 240 resolution. Version 4.0, due this summer, will offer full-screen, 30-fps playback on 90-MHz and faster Pentiums	486 PC recommended. Software-only video playback
Cinepak	Video playback at 15 fps and 320 by 240 resolution	486 PC recommended. Software-only video playback
TrueMotion-S	Video playback at 30 fps and 320 by 240 resolution on Pentium-class PCs	Pentium or RISC processor such as the PowerPC

That's Entertainment:

Multimedia is about to take a quantum leap forward this year, thanks to a variety of new software technologies. Among the key developments: the creation of 4-D rendering to animate 3-D images and the ability to project full-screen video at high resolutions on Pentium PCs without added hardware.

Microsoft is behind much of the work. It introduced eight technologies ranging from PlayerNet, which allows people to play games remotely, to 3-D clip art that developers can customize by changing texture and lighting to create distinct objects. Using another Microsoft technology, 4-D rendering, developers can animate these objects. The result will be more realistic games and shorter development cycles. Games created with these technologies should appear by Christmas.

Bill Gates isn't alone in such pioneering efforts. Digital Pictures, a software company in San Mateo, California, is using a process called DigiChrome to produce games, available now, that display full-screen, high-resolution, very fluid video on a Pentium system. The first PC game to employ the technology, Slam City, is a one-on-one street basketball game featuring NBA all-star Scottie Pippen. The four-CD-ROM game should be available for about $60 on the street and contains more than 2 hours of video. Digital Pictures, 415/345-5300. Reader service no. 795

Alexandre Patty had a rather distinctive approach to descending a staircase. Since he obviously preferred doing things the hard way, he probably wouldn't have been interested in faxing with Delrina WinFax PRO.

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Circle 37 on reader service card

decompress MPEG video are also an option. Microsoft may include MPEG playback software in Windows 95, and software developers such as Xing Technologies, MediaMatics, and Com-Corp plan to sell their MPEG software codecs to PC makers for installation on Pentium-class PCs.

Indeo: Intel's Alternative

MPEG isn't the only codec that promises TV-quality video. Intel's upcoming Indeo 4.0, scheduled for release in mid-1995, promises full-screen, 30-fps video playback on 90-MHz and faster Pentiums. "It's playback quality that's comparable to MPEG," says Stan Mo, Intel senior product manager for multimedia in Hillsboro, Oregon.

Although Indeo 4.0 will require an expensive, high-end PC for top-notch video, it will have one major advantage over MPEG boards: It will be free to end users. Indeo uses the CPU to decode the video, so it doesn't require a separate add-in card or dedicated video decoder chip. Windows 3.11 supports the current version of Indeo playback, and Windows 95 may support Indeo 4.0 too.

Indeo 4.0 is expected to offer another advantage over competing software codecs: Even on a 90-MHz Pentium, video playback requires almost all of the CPU's processing power. Indeo 4.0, however, running on a Pentium-90 will offer near-MPEG quality and still leave 50 percent of the CPU's processing power for other tasks, Intel's Mo claims.

Other video playback technologies include Cinepak, a software codec. Its chief advantage is that it allows playback on 386 and 486 systems. Duck Corporation's True-Motion-S codec, introduced last year, promises full-motion video on Pentium-class systems only. Some game developers use proprietary codecs, too. Yet another contender is DigiChrome, a software codec originally developed by Digital Pictures for video playback on Sega systems but now available with the company's new Pentium PC games (see "That's Entertainment").

Eventually TV-quality video will be a standard feature of desktop PCs, and the experts all agree that MPEG hardware boards will have a short life span. "We're looking at a software-only codec market, basically because [the software] is free to the consumer," says Dataquest's Klotz.

—Jeff Bertolucci

MPEG Titles Reach Store Shelves

Title	Vendor	List price	Phone number
Music of the Masters Series	EE Multimedia	$24.95	800/826-6810
Learning Fly Fishing	EE Multimedia	$49.95	800/826-6810
Compton's Interactive Encyclopedia	Compton's New Media	not set at press time	619/929-2500
Flash Traffic: City of Angels	Tsunami Media/ Sigma Designs	$79.99	800/845-8086
Star Trek III: The Search for Spock	Philips Interactive Media	$24.98	800/340-7888
Rain Man	Philips Interactive Media	$24.98	800/340-7888

Executive Suite: The Key to Performance Reviews

Performance reviews must have a clear effect, says Susan Middleton: They should help employees improve performance. Last year her company designed a checklist-style form for performance reviews. But when the forms were put to use, both managers and employees were left frustrated. "The employee was getting a check next to 'meets expectations', rather than descriptions of actual behaviors or situations," she says. As a result, Middleton investigated software that helps managers write performance reviews, choosing KnowledgePoint's Performance Now. She and 30 other managers at her company have been using this $129 Windows program since last November. Her verdict: "Employees are getting much-better-quality reviews" because the reviews are descriptive.

Middleton is human resources director at RTKL Associates, a Baltimore-based architecture, engineering, and urban planning firm with 450 employees. She personally conducts performance reviews for 4 employees. Middleton says Performance Now guides managers through the review process well. "The software is smart. For instance, if someone is given an especially high rating, the manager is prompted to add some supporting text."

Performance Now gives managers structured forms for doing reviews, a ratings system, and a word processor along with sample descriptions. The package includes a log for keeping notes on employee performance, and a feature that pops up flags in response to possibly inappropriate language—helpful for legal purposes. "It's easy to use, even for computerphobes," Middleton says. To foster employee support and understanding, she conducted a focus group session to show the staff how the product works.

A network version, which allows managers to share relevant files and automate parts of the review process, is available. KnowledgePoint, 800/727-1133, 707/762-0333. Reader service no. 794

KATHERINE LAMBERT

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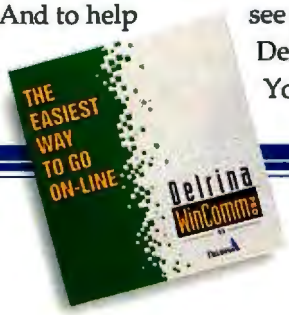

MVP December 1994

May 30, 1994

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PC Magazine, UK
July 1994

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New Products

Edited by Jeff Bertolucci and Randy Ross

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Epson's ActionNotes Offer Innovative TouchPad Pointer

Using a notebook PC can be confining at best, and a few hours with a badly designed pointing device can leave your hand looking like a chicken's claw. Epson's ActionNote 800 Series is built with ergonomic comfort in mind. It features Synaptics' TouchPad pointer embedded in the palmrest, in place of the trackpoint or trackball common to most notebooks. You use the trackpad by simply running your finger across the device's motion-sensitive surface—the cursor follows your touch. You double-click by tapping lightly on the surface of the trackpad. After a half hour or so, you'll notice an absence of fatigue in your hand and wrist—an important consideration for those who have limiting repetitive-strain injuries.

Based on Cyrix's low-power Cx486DX2 microprocessors, the ActionNote 800 Series consists of four models with estimated street prices ranging from $2499 to $4299. The line features two processor speeds (66 MHz and 80 MHz), 4MB or 8MB of RAM, and either a 10.3-inch dual-scan passive or 10.4-inch active-matrix color display. Standard equipment includes the trackpad pointing device, a 340MB hard disk, a PCMCIA slot that accepts either one Type III or two Type II devices, a 32-bit local bus graphics accelerator with 512K of video RAM, an external VGA monitor port supporting 1024 by 768 resolution at 16 colors, and a nickel–metal-hydride battery.

The ActionNote 880CX is the top of the line—it's powered by an 80-MHz Cx486-DX2 and has 8MB of RAM, a 10.4-inch active-matrix screen, an internal 14.4-kbps fax-modem, and a 16-bit Sound Blaster–compatible subsystem.

Epson's competitive pricing makes the ActionNote a good choice, and a solid upgrade path will help the notebook retain its value. The CPU is user upgradable to a 100-MHz Intel DX4, and there's an optional 256K of secondary cache. System memory can be boosted to 24MB. An optional port replicator lists for $299 and provides an additional PCMCIA slot for either one Type III or two Type II devices, as well as a game port, a second serial connector, and separate mouse and keyboard connectors.

The budget price, spacious color screen, overnight replacement policy, and upgradability are probably enough to place Epson's latest mobile offering on the shortlist for many business travelers. But it's the trackpad that sets the ActionNote 800 Series apart. So take your fingers for a stroll.

–Susan Silvius

Epson ActionNote 800 Series

Low-cost notebooks with trackpad pointing device.
Epson America Inc.
800/289-3776
Estimated street prices: $2499 to $4299

FINGER-POINTING IS ALLOWED WITH EPSON'S ACTIONNOTE, one of the first portables to integrate Synaptics' TouchPad pointer.

Canon Ink Jet: Great Output, Price

Canon just made a great monochrome ink jet printer, the BJ-200e, even better. Canon's new BJ-200ex ink jet delivers 720-by-360-dpi resolution with smoothing technology to create better-looking graphics. (Most competitors still offer only 360 dpi.) At an estimated $229 to $249 street price, the BJ-200ex ink jet makes an inexpensive, powerful tool for students and small or home offices.

Canon knows a lot about ink jet print quality, and the proof is in the output. In my tests of the new BJ-200ex, text and graphics samples looked great. I would use this printer for most jobs, including a résumé, though a laser is still best for scanned images. Another significant attribute: The printer requires about as much desk space as a legal pad.

As for speed, the BJ-200ex runs at 4 pages per minute (ppm) in high-speed mode, 3½ ppm in high-quality mode. The sheet feeder holds 100 sheets of paper, 15 envelopes, or 40 transparencies. This is a big improvement: The last version of this printer made you feed in transparencies one at a time. It'll be tough to find a better product at this price.

–Laurianne McLaughlin

Canon BJ-200ex

Laserlike ink jet boasts 720-by-360-dpi resolution.
Canon Computer Systems Inc.
800/848-4123, 714/438-3000
Estimated street price: $229 to $249
Reader service no. 766

NEC's 600-dpi Laser Printer Breaks the $600 Price Point

Attention bargain hunters: NEC has introduced the least expensive 600-dpi laser printers to date, with estimated street prices starting at $599. NEC's Silentwriter SuperScript lasers provide 6-ppm speed, plus an option for printing spot color (such as logos). In my tests, the print quality was excellent.

The $599 SuperScript 660 is a GDI printer, which means its printing is directed by your Windows applications and your PC's processor instead of a dedicated controller in the printer. This saves money, and each time you upgrade your PC, printer performance will improve. GDI allows bidirectional communication between PC and printer, so you'll receive quick feedback on screen if the printer has a problem. It prints from DOS applications using the slower PCL5e emulation mode. The SuperScript 660 holds 50 sheets, and an optional 200-sheet tray costs about $75.

For those who need to print complex graphics, NEC has set another low price point with its 6-ppm $799 SuperScript 660i, which includes a processor, Intel's i960. This is a good value, considering that its main competitor, the slower 4-ppm 600-dpi Hewlett-Packard 4P laser, costs about $900.

The color capabilities for both printers were not available for testing, but NEC says color printing will work as follows: You buy a color cartridge in red, yellow, or blue for about $120. When outputting, say, a logo, print the color element first, then remove the color cartridge and run the page through again to print the text.

—Laurianne McLaughlin

LASER FOR LESS: NEC's $599 SuperScript 660 laser printer is the most affordable 600-dpi, 6-ppm laser to date.

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Two Hot Sound Cards for Fun and Games

Turtle Beach Systems makes some of the best sound boards around. (The MultiSound Monterey recently won a *PC World* Best Buy.) But high prices and lack of Sound Blaster compatibility have kept Turtle Beach out of the entertainment and games markets. Now the company is selling two boards for mainstream users—the $249 Tropez and the $149 Monte Carlo—that feature Sound Blaster compatibility for playing popular DOS games and titles.

Both boards support 16-bit, 48-kHz sound that matches the quality of audio CDs, and provide MIDI playback for handling digital music scores.

The Tropez stands out with wavetable MIDI playback, which uses digitized samples of musical instruments to reproduce notes in a MIDI score. Unlike less expensive FM synthesis, which can't reproduce instrument sounds accurately, wavetable MIDI provides realistic playback.

In addition to 2MB of instrument samples stored in ROM, users can create custom MIDI sounds from standard WAV files, loading them into onboard RAM that you can upgrade to 12MB with standard SIMMs. The board also includes an interface for Enhanced IDE CD-ROM drives, and it features Windows software for playing, editing, and creating WAV and MIDI files.

The Monte Carlo board, meanwhile, takes aim at the cost-conscious home market. The Monte Carlo lacks built-in wavetable MIDI capability, relying instead on lower-quality FM synthesis to handle MIDI playback. However, the board comes with Turtle Beach's V-Synth software, a Windows program that uses the PC's RAM and processor to play back MIDI files using true wavetable synthesis. Note that V-Synth demands significant resources—at least a 486SX-33 PC—and wavetable MIDI playback is only available under Windows. In addition, the Monte Carlo can be upgraded for wavetable MIDI with a Wave Blaster or compatible add-on piggyback card, and it includes an Enhanced-IDE CD-ROM interface.

—Michael Desmond

Tropez, Monte Carlo

Affordable boards with Sound Blaster compatibility.
Turtle Beach Systems
800/645-5640
List prices: Tropez $249, Monte Carlo $149
Reader service no. 768

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Read Compatible	QIC 80/40 & AccuTrak 250/120	QIC 3010/80/40 & AccuTrak 250/120
Models	Internal floppy and external parallel port	Internal floppy and external parallel port
MTBF**	100,000 Power on Hours	100,000 Power on Hours
Warranty	2 years	2 years
Software included	Backup Exec for DOS and Windows	Backup Exec for DOS and Windows

*All capacities assume software data compression of 2:1. **80,000 Power on Hours for external models.

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Circle 59 on reader service card

Add PCMCIA to Your Desktop Without Sacrificing a Floppy Drive

Hello, my name is Michael L., and I am a PCMCIA junkie. I have become totally dependent on the credit-card–size devices that give my 6-pound notebook the expandability of a 40-pound desktop computer. I'm addicted to ease of use: No matter what the device—fax-modem, sound card, SCSI adapter, or hard disk—adding a PCMCIA peripheral, aka a PC Card, is as easy as inserting a floppy disk.

Unfortunately, in the office my needs have gone unmet. Adding a socket that accepts PC Cards to my desktop PC requires me to sacrifice a precious floppy-drive bay. Now SCM Microsystems has my fix. The vendor's SwapBox Classic Combo combines a PC Card slot and a 3½-inch 1.44MB floppy drive that fit into a single bay. The PC Card slot accepts one Type I, II, or III PC Card device. If your habit is as uncontrollable as mine, consider SCM's SwapBox Premium Combo, offering an additional slot on the product's 16-bit card, which slips into an available ISA bus slot.

All these benefits don't come easy. I found installing the Classic to be a pain. The documentation was so skimpy it was virtually useless, so I was on my own, fooling with the device and the cables that had to be connected to my PC's floppy disk controller. And that was the least of my problems. Like many PCs, my Gateway 2000 has a 5¼-inch bay, but this is a 3½-inch device. So I had to get the correct mounting brackets from the local computer store. I didn't discover this until I had removed my PC's cover.

After the hardware was assembled, I needed to install the PC Card CardSoft 3.1 driver software. Because the software was originally created for notebook PCs, I had to resort to tedious trial and error to configure the product for my desktop system.

Once installed in my system, the floppy drive worked without a hitch and the PC Card socket accepted any card—fax-modem, hard disk, flash memory, sound card, and SCSI adapters—without additional hardware tinkering. I avoided the usual worries associated with adding peripherals to a desktop PC: I didn't have to take my computer apart, fret over static charges, wrestle with foot-long boards, or waste time rebooting. I was able to insert a 170MB hard drive card into the front of my computer, copy my multimedia presentation for the road, take out the card, and pop it into my notebook, all within minutes. With this type of installation, I could throw away my screwdriver—and sustain my PC Card habit from the comfort and safety of my office desktop.

–Michael S. Lasky

SwapBox Classic Combo, SwapBox Premium Combo

PCMCIA slot plus 1.44MB floppy drive.
SCM Microsystems
408/370-4888
List price: Classic Combo $199, Premium Combo $279
Reader service no. 769

THE SCM SWAPBOX CLASSIC COMBO and Premium Combo both pack a PCMCIA slot and a floppy drive in a 3½-inch drive bay.

TI's 486 Note Reaches 100 MHz

The TravelMate 4000M/100, Texas Instruments' 100-MHz DX4 addition to its multimedia-capable 4000M series of portables, is well-designed but a little behind in technology and performance. Like the other 4000M notes, this model has integrated 16-bit audio, a speaker, and a microphone. But unlike the latest crop of multimedia notebooks from IBM and Panasonic, the 4000M/100 lacks a built-in CD-ROM drive.

If you need to run CD-ROMs on the road, one option is Texas Instruments' Portable CD-ROM Docking System, a 5-pound, battery-powered multimedia unit that's street priced at $800 and includes built-in stereo speakers and a double-speed CD-ROM drive. But only bodybuilders will appreciate the hefty 11-pound weight of this notebook–docking station combination (IBM's multimedia notebook, by contrast, weighs only 7.2 pounds).

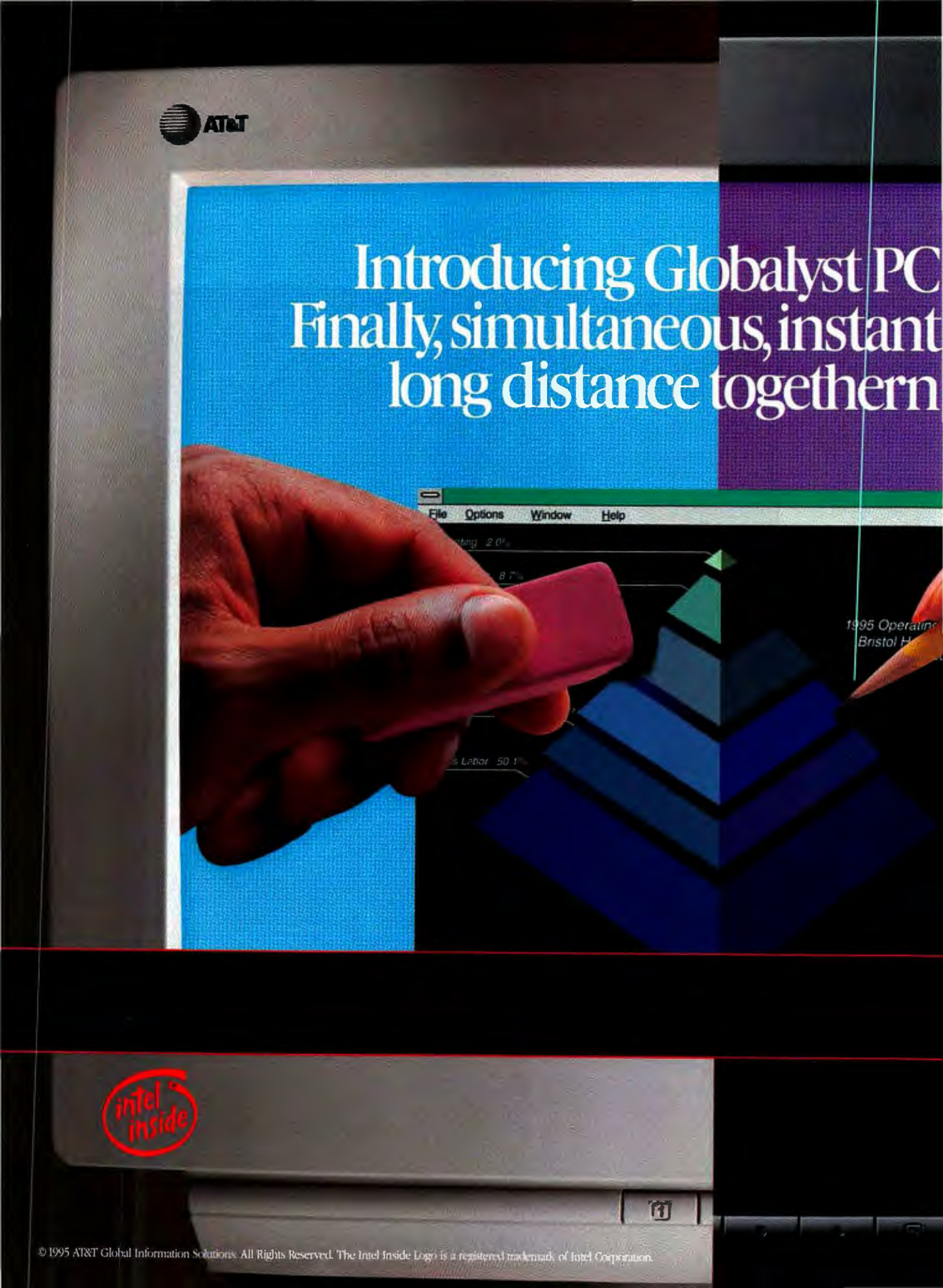
Street priced around $5500, the 4000M/100 includes a 9½-inch active-matrix color display, 4MB of RAM (expandable to 20MB), and a 524MB hard disk. A preproduction model ran PC World Test Center benchmarks roughly 9 percent slower than the average 100-MHz DX4 notebook that we have tested.

–Jeff Bertolucci

TravelMate 4000M/100

Multimedia-ready notebook with 100-MHz DX4.
Texas Instruments
800/848-3927
Estimated street price: $5499; portable CD-ROM docking station $800
Reader service no. 770

Say goodbye
to working in
an isolation
chamber.



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PC World, *November 1994*

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Circle 4 on reader service card

ABC FlowCharter 4.0 Charts New Territory

For years, flowcharting software—which generates diagrams such as organizational charts, time lines, decision trees, and work-process charts—was about exciting as an IRS audit. Then a few years ago, products like Shapeware's Visio and Corel's CorelFlow improved matters by introducing drag-and-drop flowcharting. Unfortunately, these programs lacked some of the heavy-duty process analysis features that flowcharting experts demand.

Micrografx is attempting to change that with a new version of FlowCharter designed to appeal to just about everyone. ABC FlowCharter 4.0 combines many of the easy-to-use drag-and-drop features most users like with the high-end tools for which FlowCharter is already famous.

Several new features make FlowCharter 4.0 easier to use. Bubble help, for example, explains an icon's function when you move the mouse pointer over it. And when you add a new shape to a flowchart, the lines that link the other objects now automatically connect to the new shape. An intelligent routing feature finds the shortest path from point A to point B without making you nibble on the end of your pencil. And you can easily expand a chart, line, or shape: Simply click on the object, draw a box around it, and click on it again; the shape expands to fill the box.

Version 4.0 also incorporates some why-didn't-they-do-this-earlier features. For example, when you draw a line that crosses another one, you no longer have to scratch your head over which direction the lines are headed. Now, a little bridge or arc over the lower line indicates the direction of the flow; the line with the bridge represents a later stage in the flowchart process.

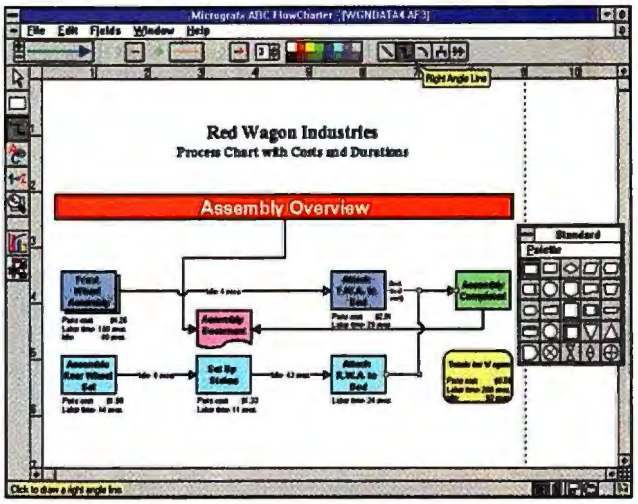
There's also a welcome surprise if you'll be showing your charts to others in a conference-room setting. In the past, you had to save individual sections of a complex flowchart as separate files, then print out every file. When you wanted to see how the whole chart hung together, you had to tape the pages together on a wall. FlowCharter 4.0 lets you see the entire flowchart on screen by loading a single file, or you can view individual charts using the Slide Slow feature.

FlowCharter still provides far more types of charts and data-analysis features than most of us will ever use, offering a lot of bang for the buck. Case in point: The improved Micrografx SnapGraphics product, which helps the artistically challenged to generate flowcharts, is now bundled with FlowCharter (you can also buy SnapGraphics as a stand-alone program). Not a bad deal, any way you look at it.

—Bronwyn Fryer

ABC FlowCharter 4.0

Powerful diagramming package with an improved interface and more tips and tools.
Micrografx
800/676-3110
List price: $495, upgrade $99.95
Reader service no. 747



ABC FLOWCHARTER 4.0's ease-of-use enhancements include bubble help and line bridges that indicate the flowchart's path.

Organize Your Windows Desktop

Tired of browsing through endless levels of subdirectories to find files? One alternative to Windows' File Manager is Ark Workspace, a scaled-down version of Navigator, the graphical Windows shell that Packard Bell preinstalls on its desktop PCs. Ark Workspace is handy for small-business or home users who want to organize files into easily accessible folders.

You label a folder with, say, a project name, then click the Add Document button to add a file to it. A project folder could contain, for instance, a Word document, an Excel spreadsheet, and a Harvard Graphics chart. When you click a file, Ark Workspace launches the appropriate program with the selected file already loaded.

The $39.95 program offers two graphical interfaces: One is 2-D and resembles the OS/2, Macintosh, and Windows 95 environments; the other is a 3-D "office" where you click objects to perform tasks.

While Ark Workspace is useful for Windows neophytes who want to organize documents into folders that are visible on screen at all times, it's not intended to replace the Windows interface. Unlike Navigator, it doesn't load automatically when you start Windows—unless you place the Ark Workspace icon in Windows' Startup group.

—Jeff Bertolucci

Ark Workspace

Graphical file manager for home, small-business PCs.
Packard Bell
800/733-5858
Street price: $39.95
Reader service no. 748

THE PREMMIA GX WITH DUAL PROCESSORS. (This power should be used for good, not evil.)

Just imagine facing the world with, not only one, but two Pentium™ CPUs. You accomplish the most tedious of feats in half the time. Take on multiple tasks all at once. It's like having the strength of two computers.

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Optional dual processors easily let you run the latest 32-bit operating systems.

As for graphics, how speedy is our PCI-based 64-bit subsystem? Over 41 million WinMarks speedy.

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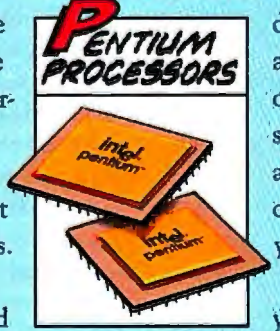

And with an integrated FastSCSI-2 controller, you can quickly connect a hard drive, scanner or whatever peripherals your work demands.

But, of all its features, the real brawn of the Premmia GX may be our network of resellers across the country. Plus, our very own telephone support group is just a call away–24 hours a day. And, of course, there's a three year warranty as well.*

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AST COMPUTER

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Circle 44 on reader service card

Business Plan Pro Helps Novices Create a Successful Strategy

Starting a business is like driving in Los Angeles: You need a good map, because nobody's going to slow down to give you directions. Business planning software can take some of the twists and turns out of this arduous task, but choosing which program to buy can be the budding capitalist's first truly good or truly bad decision.

Many business planning packages provide templates that you load into popular word processors and spreadsheets. Palo Alto Software's Business Plan Pro, though, combines a word processor, a spreadsheet, a charting tool, and business tips—all in one compact program that uses only 2MB of hard disk space.

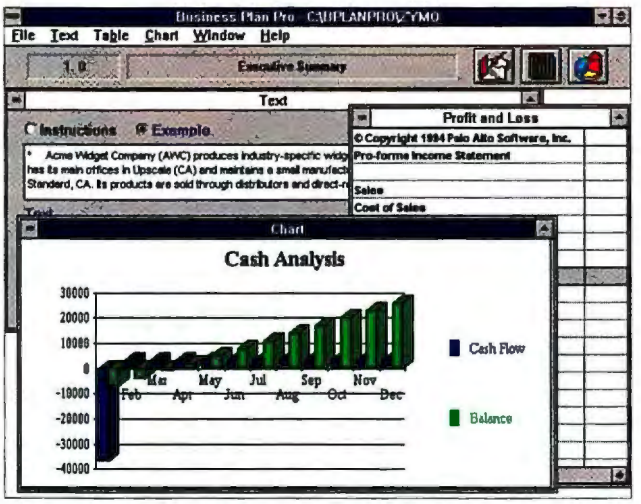
But you might wonder why the designers worked so hard to cut the cord to powerful business applications—including Microsoft Excel and Lotus 1-2-3—that most entrepreneurs already have on their systems. The program's word processor is barely more sophisticated than Windows' Write utility, and its spreadsheet's rigid field structure and persistent error messages are frustrating.

Business Plan Pro lets you create a custom plan for a variety of business types, including service, retail, home office, distribution, and manufacturing. When I tried to input financial data for a community newspaper I once owned, however, I was stuck with the "mixed" business category and faced inventory and sales prompts that weren't applicable.

If you're a fledgling entrepreneur, Business Plan Pro may be an excellent first step toward realizing your business dreams. On the other hand, seasoned business owners who know that success often means changing the rules of the game may feel stifled by the program's limited options.

—Richard Overton

Business Plan Pro
Guide to starting a business.
Palo Alto Software
800/229-7526
List price: $149.95
Reader service no. 749



START YOUR OWN BUSINESS: Palo Alto Software's Business Plan Pro includes tips and tools for budding entrepreneurs.

Power Translator Professional Speaks Your Language

In a world where acronyms like GATT and NAFTA get as much airplay as the latest Top 40 radio hits, American companies have to think about global markets. Communication is key. But now a company won't be at a disadvantage if it can't afford to hire a translator—it can use software like Globalink's Power Translator Professional.

Depending on the version, Power Translator translates documents from Spanish, French, or German into American English, and vice versa. List-priced at $595, the program operates on a sentence-by-sentence basis, which makes it more accurate than direct word-for-word translators that sometimes miss the grammatical structures—like word order and idioms—that languages depend on for meaning. It works with most popular word processors and retains the formatting of the original text in Windows word processors such as Word, Ami Pro, or WordPerfect.

My tests of the program's capabilities were limited to its translations from English to German and from German to English using magazine articles from various sources, but the results were quite impressive. The translations were very accurate and required only a little editing to correct odd characters surrounding proper nouns.

You can translate text without viewing it, or bring documents into the translating window to look at both versions side by side. Power Translator's editor, while not intended to be a full-fledged word processor, is suitable for making small changes.

For complicated documents, you may prefer to work sentence by sentence. That's as easy as highlighting the text you want to translate and clicking the Translator icon.

When preparing documents for translation, remember that you'll need to simplify them; Power Translator works best on short, declarative sentences. You'll also want to avoid complex punctuation, such as dashes or parentheses.

—Peter Scisco

Power Translator Professional for Windows
Translates documents from major European languages into English, and vice versa.
Globalink Inc.
800/255-5660, 703/273-5600
List price: $595, subject dictionaries $89 each
Reader service no. 750

RIGHT NOW, THERE ARE HUNDREDS OF VALUE DESKTOPS. BY THE END OF THIS AD, THERE WILL BE ONLY ONE.

LET'S START BY SAYING THAT this is unashamedly an ad for the AST® Bravo MS. And the assumption we're making is that you're currently weighing the implications of moving over to one of the new 32-bit operating systems, like Windows™95.

On the surface of it, there are hundreds of desktops to choose from.

Obviously, they have to be Plug and Play ready to even be in the running. And, of course, they have to be affordable.

Ideally, they'll have at least a 75MHz Pentium™ Processor. And the processor, cache, graphics, system RAM and hard drive will be easily upgradable.

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And how about a PCI-based graphics subsystem plus a myriad of advanced power management and security features?

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But there's something else we haven't mentioned: AST NetFlash BIOS. It enables you to update all your Bravo MS desktops from a central location.

AST has it, the others don't. With theirs, you'll have to reconfigure each of the computers on the network individually. And the more you have, the bigger pain it will be.

What more can we say? Except that the Bravo comes in low-profile, mid-size and mini-tower versions. And ASToffers 24-hour/7-day telephone support, a 3-year limited warranty* (first year on-site) and comprehensive reseller support in the field.

Talking of resellers, you might want to call us at (800) 876-4AST for the name of the one nearest you.

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Bravo MS

100MHz Pentium™ to 486 processors

4MB, 8MB or 16MB RAM, upgradable to 128MB

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PCI local bus graphics, 1MB graphics RAM upgradable to 2MB for 64-bit access

Up to 7 drive bays and 7 expansion slots (2 PCI, 5 ISA)

AST® COMPUTER

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Circle 6 on reader service card

Astound 2.0 Adds Tools for Creating Multimedia Presentations

How do you take a great multimedia presentation program and make it even better? First, make it easier to use by adding helpful tips for beginners. Then add powerful tools for editing presentation elements, such as images, animation, and video. Throw in a utility for managing media files, add water, and stir. What you get is Gold Disk's Astound 2.0—everything you need to create top-notch multimedia presentations in one $250 software package.

Version 2.0's enhancements range from improved user tips to additional chart templates. But the real bonus here is Astound Studio, a collection of utilities to help you create and edit the audio, video, graphics, and animation files that make up a multimedia presentation. By comparison, version 1.0 required you to use separate applications not bundled with the program to create and edit each presentation component (other than sound). Astound Studio's image, actor, animation, video, and graphic utilities provide all the tools that you'll need in just one box.

Image Editor, as its name implies, is a full-fledged image editing utility complete with filters; special effects; and touch-up tools for painting, airbrushing, erasing, and other tasks. Actor Editor lets you edit and create animated characters, called actors, such as an eagle soaring across the sky or a Harley-Davidson roaring off into the sunset. Animation Editor allows you to create and edit movies with actors and other elements, such as audio clips and graphics backgrounds. Video Editor helps you assemble video clips, and Graphic Editor is a drawing module that supports Bézier editing and special effects, such as morphing and 3-D extrudes (images that appear to push out from a surface to create a 3-D look).

Astound's new Media Manager is a utility for managing your motley collection of multimedia files. This file manager includes standard search capabilities on file names, keywords, and extensions. And you can view video, graphics, and animation files in thumbnail—handy for finding the right image without having to load each file.

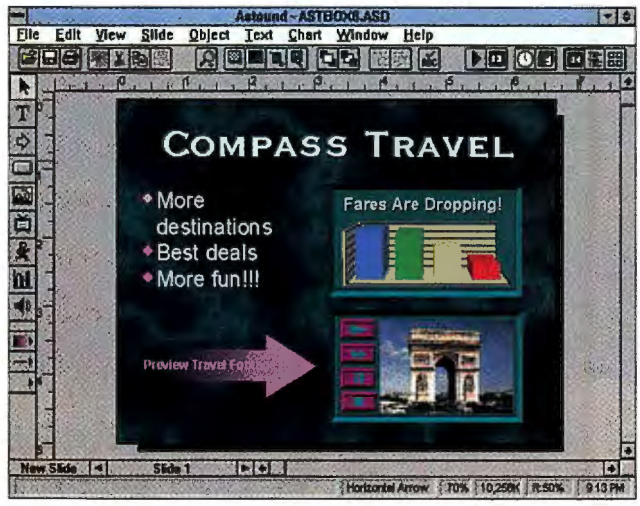
Like its competition, Astound 2.0 has come a long way in usability. Most of its dialog boxes now contain user hints, shortcuts, and design tips. While these aren't as advanced as the context-sensitive help found in Software Publishing Corp.'s Harvard Graphics and Microsoft's PowerPoint, they do help the novice get up and running quickly.

Except for its slightly inferior help system, Astound 2.0 is a solid multimedia presentation program at a reasonable price.

–William Harrel

Astound 2.0 for Windows

Multimedia presentation package with powerful integrated utilities.
Gold Disk, Inc.
800/835-5889
List price: $299
Reader service no. 751



ASTOUND 2.0 HELPS YOU BUILD MULTIMEDIA PRESENTATIONS that incorporate audio, video, graphics, and animation.

Do-It-Yourself Trust Maker

Every year, the nation's lawyers rake in millions in probate fees. One way to avoid probate—and contributing to some legal eagle's next Lexus purchase—is to create a living trust.

A trust lets your family inherit your property without going through probate, which is notoriously slow and expensive. If a will isn't in dispute and no angry creditors are pursuing your property, probate is a total waste of time and money.

If you've ever used a tax preparation program, Living Trust Maker 2.0 (from legal self-help publisher Nolo Press) will strike a familiar chord. Like a tax program, the software does its work by "interviewing" you and then using your responses to produce the final trust document.

In addition to standard program help, Living Trust Maker also provides an online legal glossary and legal assistant. It's like including an attorney in the shrink-wrap.

And for those who hate reading manuals, Nolo has included an online tutorial that guides you through the essentials of the software.

Living Trust Maker is very easy to use—so easy you'll wonder why lawyers get paid so much money to do these things in the first place.

–John P. Mello Jr.

Living Trust Maker 2.0

Easy-to-use program helps you avoid probate by creating a living trust on your PC.
Nolo Press
800/992-6656,
510/549-1976
List price: $79.95
Reader service no. 752

"Cleans up Windows™ and boosts performance."

Safely uninstall any Windows or DOS application...

WHY YOU NEED TO UNINSTALL

Getting programs into Windows is easy. Getting them completely OUT has been hard until now. By ignoring old files or programs, you waste hard drive space and could slow Windows down. Simple file or directory deletions still leave parts of the program behind. Now, you don't have to hunt around for leftover files. Landmark **Uninstall-it!** successfully eliminates unwanted programs, gets rid of unneeded files, frees up hard drive space and boosts performance. Easy-to-use **Uninstall-it!** makes you the Windows expert.

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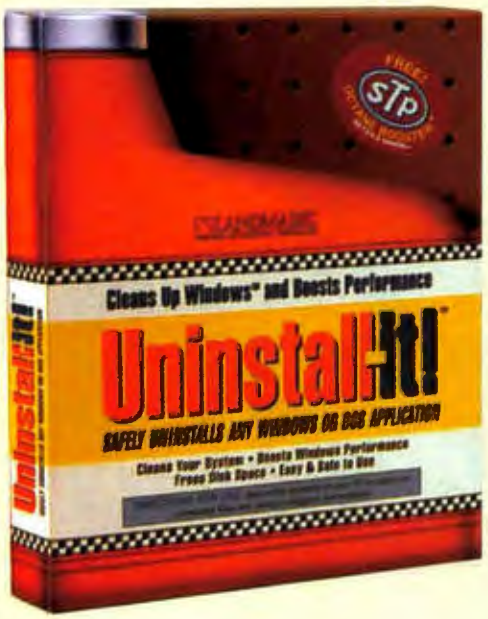
Getting rid of old programs is just the beginning. Landmark **Uninstall-it!** gives you more control over Windows or DOS programs so you can manage your system better. Get more disk space by backing up and compressing rarely used programs. Restore them when you need them. Move programs from one location to another without worry. Landmark **Uninstall-it!** keeps track of and logs everything, automatically updating Windows references. Landmark **Uninstall-it!** keeps you informed and helps you manage your system to its optimum performance.

- **Uninstall Applications:**
  Eliminate unused or unwanted Windows or DOS programs and files quickly and easily.
- **Backup and Restore Applications:**
  Backup rarely used programs to free up valuable drive space. Restore them effortlessly when you need them.
- **Move Applications:**
  Move Windows programs with ease, without losing their references or properties.
- **Find Duplicate Files:**
  Quickly find and delete duplicate files safely. Know if and where they are referenced before you delete them.
- **Find Stray Files:**
  Uninstall or restore "stray" programs or references you thought were lost or deleted previously.



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Circle 138 on reader service card

The detail of EPSON's 2400 dpi, scanner really stands

Actual 30-bit scan

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30-bit color out.

When it comes to detail, the new EPSON ES-1200C is in a class by itself. It's the only personal scanner with both 2400 dpi and 30-bit color internal scanning for crisp, clear image reproduction.

To ensure the best results with any image you scan, the ES-1200C provides one and three pass scanning, and standard parallel and SCSI ports allow you to connect simultaneously with two PC's. All this means the ES-1200C gives you more power than anything else in its price range.

The ES-1200C Pro for PC. The highest detail of any personal scanner.

The ES-1200C Pro includes top-ranked Adobe Photoshop, Kai's Power Tools, and EPSONScan II and TWAIN driver, cable and interface. There's also a Mac version.

Feature	EPSON ES-1200C Pro	HP ScanJet IICX	Microtek II HR	Umax UC1260
Optical Resolution	600	400	600	600
Max Resolution	2400	1600	2400	2400
Bits Per Pixel	10	8	8	8
One & Three Pass	yes	no	no	no
Dual Connectivity	yes	no	no	no

To see what a difference the details can make, visit your local authorized dealer or call 1-800-BUY-EPSON.

EPSON

QuickBooks Delivers Easy Accounting for Small Businesses

Keeping the books isn't the most exciting job in a small business. (If it is, you're probably in the business of accounting.) While the newest version of Intuit's QuickBooks 3.0 for Windows won't make accounting as engaging as, say, the hallways of Doom, it can make the task a lot easier.

To start with, QuickBooks 3.0 tracks product inventory—useful for keeping tabs on goods you plan to resell to customers. But if you manage finances for a service business and don't need inventory reporting, you can turn off this feature with just a mouse click.

You can also modify portions of important forms, such as customer invoices. However, QuickBooks lacks the full-featured forms-design capabilities of some accounting programs, including Peachtree Accounting 3.0 for Windows.

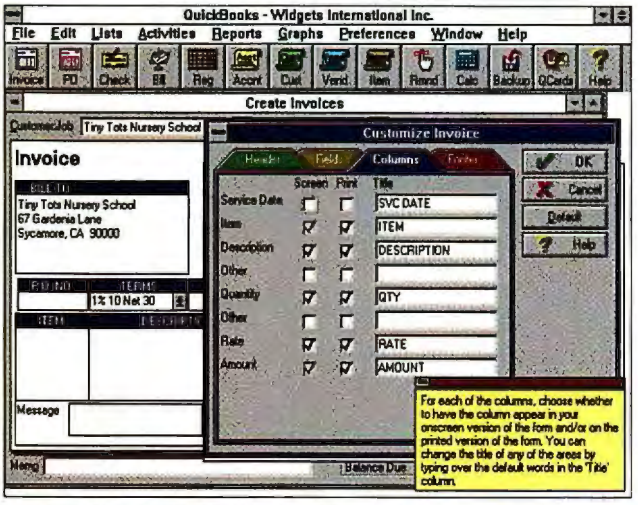
If your auditor gets the willies at the way QuickBooks allows you to easily modify transaction figures, you can activate an audit trail in the program to create an electronic report for your CPA.

QuickBooks is still just about the easiest small-business accounting program to use.

—Richard Morochove

QuickBooks 3.0 for Windows, QuickBooks Deluxe

Improved small-business accounting program; Deluxe is CD-ROM version.
Intuit Inc.
800/624-8742, 415/322-0573
Street price: $99, Deluxe version $129



BOOKKEEPING SIMPLIFIED: QuickBooks 3.0 lets you make simple modifications to certain key forms, such as customer invoices.

VoiceLock Uses Your Voice as a PC Password

Generally speaking, computer security is like castor oil: It may be good for you, but it's not much fun. With QVoice's VoiceLock 1.1, however, protecting any PC equipped with a sound card and a microphone becomes an entertaining experience.

The program lets you encrypt disk directories and hide the Windows desktop with a screen saver. But rather than relying on typed-in passwords to unlock them, VoiceLock creates an identifying "signature" based on your voice's unique characteristics. Anyone who tries to move the mouse or press a key hears a warning and a request to speak into the microphone; the program permits access only after it matches the signature to the voice.

VoiceLock's directory encryption should safeguard your files from everyone except professional code crackers, since the encrypted directories appear empty when you try to view the contents in, say, File Manager. While it takes only a little computer knowledge to defeat the screen saver, it's still handy for securing your PC while you're off getting a cup of coffee.

The voice signature technology proved uncannily effective in my tests. When I ratcheted the voice-identification sensitivity down from the default setting, VoiceLock always turned intruders away.

—Harry McCracken

VoiceLock 1.1

Enjoyable voice-protected file encrypter–screen saver for PCs with sound cards.
QVoice Inc.
201/786-6878
List price: $79.95
Reader service no. 753

INTRUDERS BEWARE: VoiceLock uses voice security to deny snoops access to your desktop and sensitive files.

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- Slim 8.66" x 11.4" x 2.1" Case Weighs 6.4 lbs, Including NiMH Battery Pack
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The AcerNote 760 series offers all the expandability of the 780cx and more power than many current desktop PCs. This notebook packs the Intel 486DX2/50MHz processor into its sleek housing, along with the speed of local bus architecture. So you can take all your major projects on the road with you—not just the lightweights.

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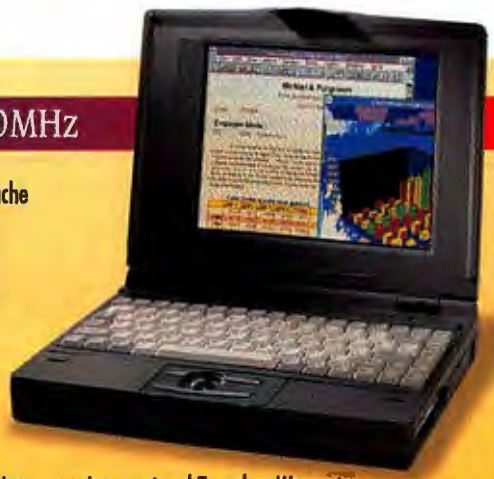
The AcerNote series is backed by a one-year, 24-hour replacement warranty in the U.S. and Canada. And if your travels take you farther, you'll appreciate the free one-year Acer International Travelers Warranty for service support in over 20 countries worldwide. When it comes to satisfaction, Acer is with you every step of the way.

AcerNote 760cx i486DX2™/50MHz



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AcerNote 760c i486DX2/50MHz

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- Easy-to-Remove Keyboard
- EasyTrac Centrally Located Removable Trackball
- 2 PCMCIA Type II Slots/1 Type III Slot
- 1.44MB Diskette Drive
- Local Bus Accelerated Graphics
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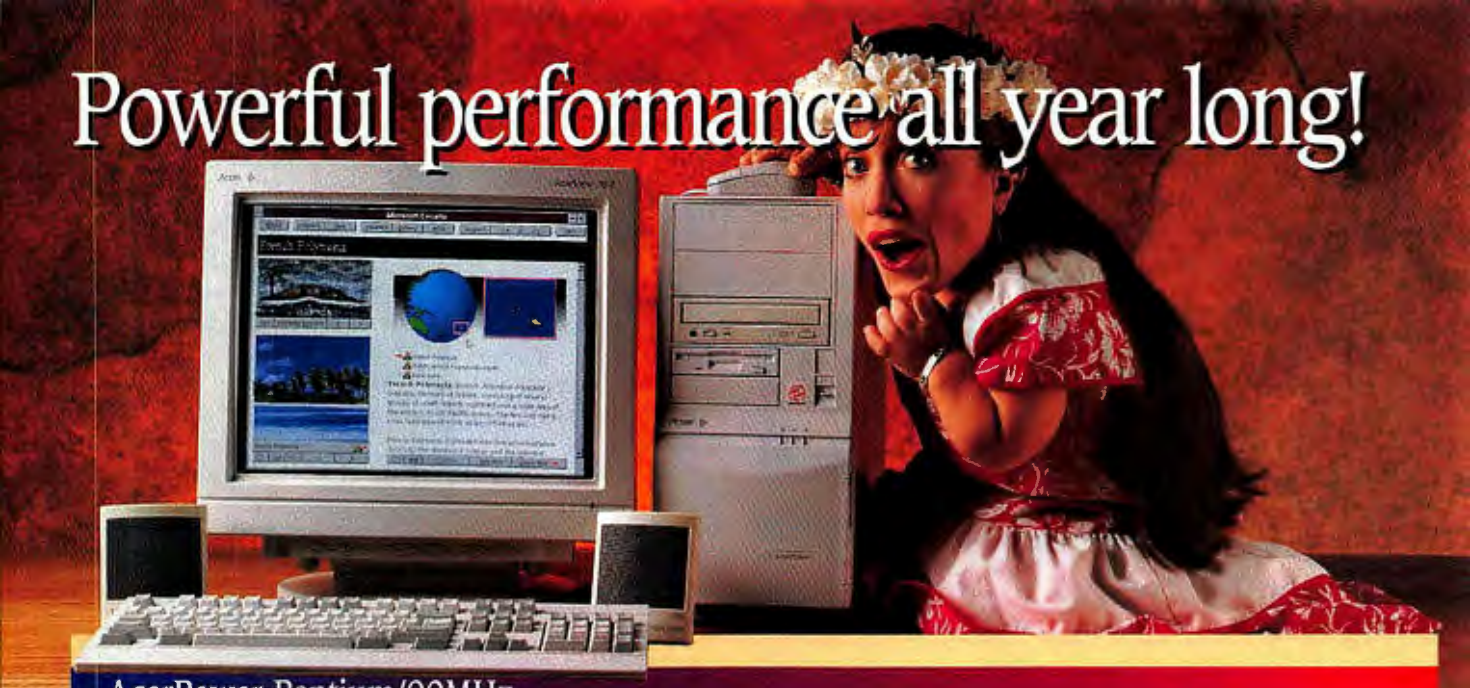

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- 4 ISA Expansion Slots
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The Home Or Office Powerhouse

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CNN Time Capsule: All the News That's Fit for Disk

From the panic over flesh-eating bacteria to the murder indictment of a former football star, 1994 was a year for the books. But never mind the books; with all the electronic coverage of these and other sensational events, 1994 was a year tailor-made for television—and CD-ROM.

CNN Time Capsule 1994, a CD-ROM containing news videos from each of the year's top 100 stories, is a significant improvement over the 1993 edition. The 1994 version includes news articles from *U.S. News & World Report* and *USA Today* to augment the video clips. The interface controls are much easier to follow, and there are more ways to find information. You can arrange the sequence of news stories by category or by date. Then you can call up a list of the CD-ROM's stories and click on the one you want. The search capabilities are efficient but rudimentary; the word you're looking for doesn't show up highlighted in the text, for example.

The video clips are the CD-ROM's best feature. Using Apple's QuickTime 1.6 for Windows, the news footage flows smoothly in a 288-by-216-pixel window. Users of high-end 486 and Pentium systems can even double the video window's size without much impact on the frame rate or audio synchronization, although the image pixels become noticeably chunkier. And the videos aren't simply retreads; they've been edited especially for this CD-ROM.

—James A. Martin

CNN Time Capsule 1994

MULTIMEDIA **The year's top stories in news clips.**
Vicarious
800/696-0507 ext. 900, 415/610-8300
Price: $29.95
Reader service no. 691

TOP NEWS STORIES OF '94: The CNN Time Capsule features 100 news videos produced specifically for CD-ROM.

Stephen W. Hawking's Guided Tour of Time

Like most people, when it comes to science, I learn concepts best by seeing them demonstrated—which is why I would read a scientific text only if a physicist held a gun to my head. So when I sat down with the CD-ROM version of Stephen W. Hawking's book *A Brief History of Time*, I was skeptical. But despite my prejudices, this disc may well be worth your time and money.

The CD-ROM contains the entire text of Hawking's 1988 best-seller, which presents the basic tenets of physics and astronomy. Creative Labs didn't just plop the book on a disc and sell it for triple the book's price. You can browse the text, then jump to the disc's illustrations and glossary. You can also get a brief rundown of scientific theories by Galileo, Einstein, and Copernicus—which lead into Hawking's own theories. The program's colorful and lively interface is easy to use.

Most of the topics are illustrated with animations or pictures. You can watch scientific concepts in action while listening to Hawking's "voice" explain them. (He has Lou Gehrig's disease and speaks with a voice synthesizer.) If you're interested in physics and astronomy, you'll want to check out this CD-ROM.

—Arden M. Hoffman

A Brief History of Time

MULTIMEDIA **Best-selling book moves to CD-ROM.**
Creative Labs
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PC MAGAZINE EDITORS' CHOICE
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TM4000M/25

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July 1994

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Circle 220 on reader service card

HyperAccess 2.0: Communications for Both Beginners and Power Users

HyperAccess 2.0, the newest Windows version of Hilgraeve's venerable communications program, combines an unusually easy-to-use interface with advanced connectivity and scripting features geared toward developers and hard-core business users. What's missing are the fancy bells and whistles that few folks use or that are available elsewhere in Windows (for example, a GIF viewer).

The product is one of the simplest communications programs to configure and use. HyperAccess supports more than 300 makes of modems and comes with preconfigured, icon-launched scripts for the most popular online services. The program asks you for access numbers, a user ID, and a password while it creates an automated log-on script. For subsequent sessions, a quick click on the service icon automates the connection process.

HyperAccess offers a lot of control over the look and feel of your screen: It can be clean or cluttered. For example, invoking the Zoom feature maximizes your viewable screen area and hides the status bar, scroll bar, and other screen elements for easier viewing. The message pad, an editing area at the bottom of the screen, now includes chat capabilities and line-wrapping features.

A new CommSense feature lets you dial into an online service even if you know only the phone number. The program automatically determines the correct data bit, stop bit, and parity settings for you.

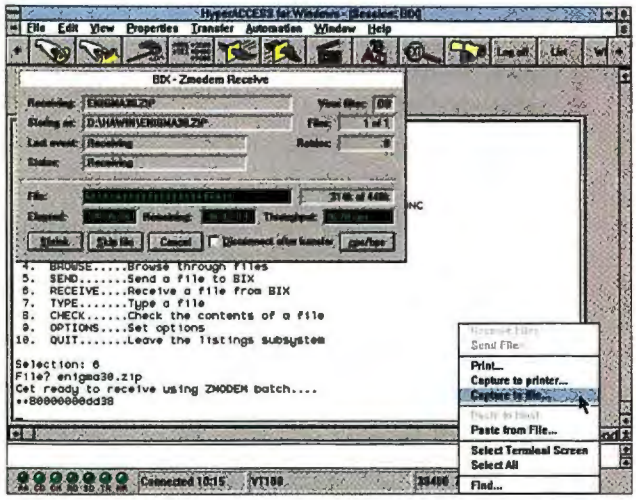
Other features in HyperAccess 2.0 can make life easier for corporate users. For those on a network, the product now supports modem sharing through a variety of standard network protocols. And for organizations that want to provide users with standard communications scripts, HyperAccess is one of the few products in its class that use the standard C language for scripting, according to Hilgraeve. Scripts that the program creates during log-on sessions can be tweaked, and you can create new ones from scratch. The product also has an application programming interface that lets other programs, like those written with Visual Basic, invoke commands in HyperAccess. This feature can save your IS people time and aggravation.

Significantly, HyperAccess doesn't overlook that ubiquitous yet elusive information highway. It provides an Internet icon for access through shell accounts (Internet service providers). And if you're lucky enough to be connected to a TCP/IP network, HyperAccess supports Microsoft Winsock–compatible TCP/IP stacks for direct Internet access.

–Stan Miastkowski

HyperAccess 2.0 for Windows

Quick and easy configuration and high-end features make this program a winner.
Hilgraeve, Inc.
800/826-2760,
313/243-0576
List price: $149
Reader service no. 754



COMPLETE ONLINE ACCESS: HyperAccess 2.0 for Windows couples impressive communications power with a straightforward interface.

This Phone Thinks It's a PC

When SmartPhone Communications urges its customers to reach out and touch, they mean it literally. The company's sleek SmartPhone sports an LCD touch screen that lets you dial any of up to 100 phone numbers with a few taps of your finger. You can create speed-dial lists and sort your phone book either by ID number (00 through 99) or alphabetically.

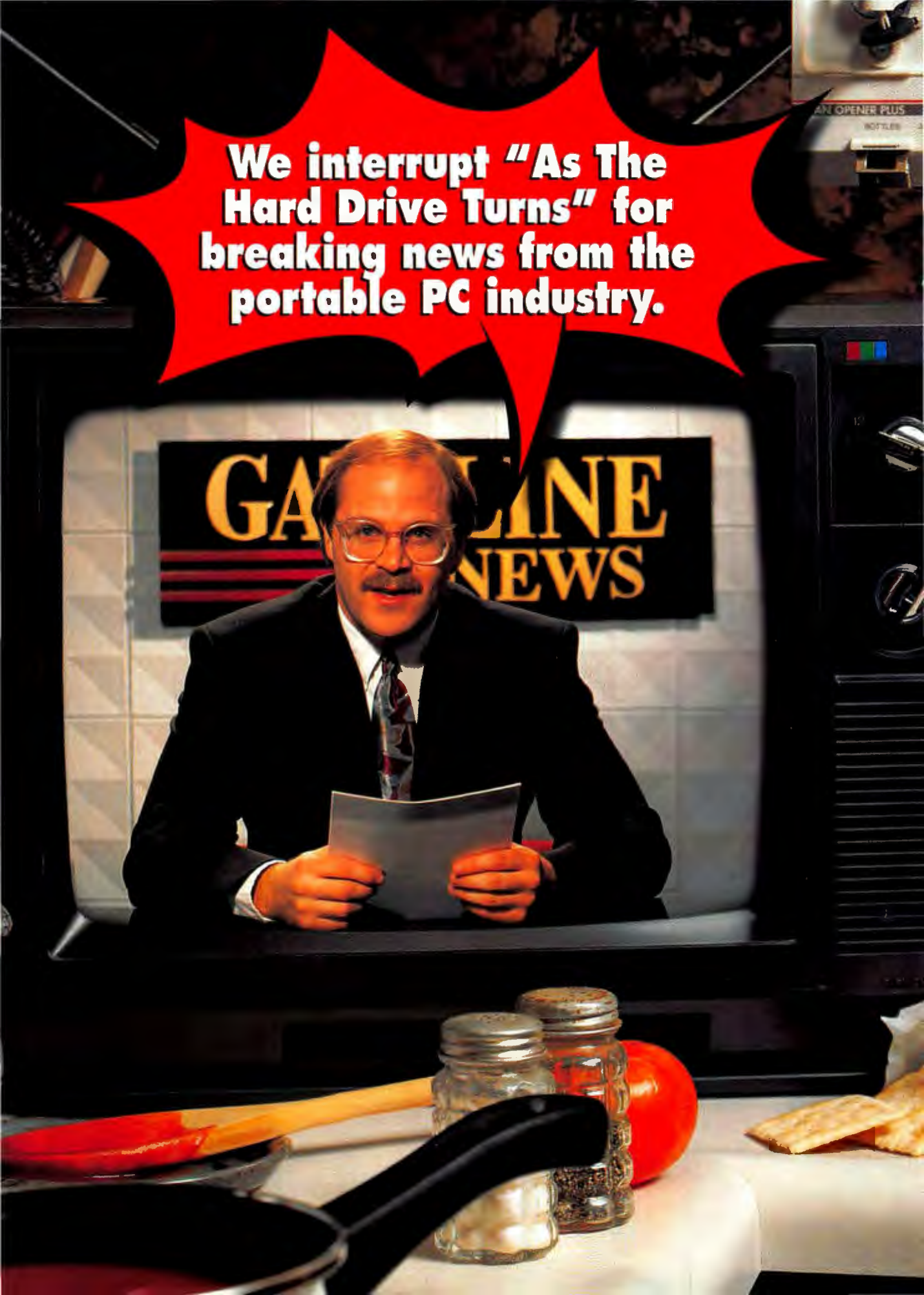
But the SmartPhone is more than a fancy speakerphone—it's a push-button interface to SmartServ, an online service that you access via the phone's built-in 2400-bps modem. For about $30 a month plus an hourly fee, you can display the latest news headlines, pay bills, and track overnight mail. Another $10 lets you tap into a wealth of financial information, such as Standard & Poor's research. And for about $50 a month you can obtain Dun & Bradstreet reports, access real-time stock quotes, and send E-mail over the Internet.

At press time SmartPhone Communications was preparing services that let you check airline flight information and perform stock transactions.

–Daniel Tynan

SmartPhone

This LCD-based phone lets you access a wide variety of online information.
SmartPhone Communications
800/353-4599,
203/353-5950
List price: $199 to lease phone, plus $29.95 to $49.95 per month and connect-time charges of $3.50 to $4.50 per hour
Reader service no. 755


We interrupt "As The Hard Drive Turns" for breaking news from the portable PC industry.
NEWS

Microsoft Word - LIBERTY.DOC
File Edit View Insert Format Tools Table Window
Help
Normal
Times New Roman
Portable PC Users Kick Themselves For Not Buying The Liberty
ANYTOWN, USA -- Portable PC
Microsoft PowerPoint
File Edit View Insert Format Tools Draw
Window Help
LIB.PPT
Why I Love My Liberty...
Infrared Technology
Unprecedented Screen Size in a 4-pound machine.
Long Battery Life
Liberty
Competitor A
Competitor B
Battery Life
Hard Drive
CPU
Video
Arial
10
A B
1 Liberty DX4-100
2 100MHz processor
3 10.4" display
4 540MB hard drive
5 MS Works
6 $3,499
CardView
BattSta
GATEWAY2000
intel inside

Reporter: We have an exclusive interview today with a person who wishes to be identified only as John Doe. Now tell me John, is it true you purchased a portable PC from one of those "other" companies?

John Doe: Yes sir, I'm afraid it is. I'm so foolish. I settled for a portable PC with a tiny 8.4-inch screen, a 250MB hard drive and minimum software applications. It sounded good at the time, but that was before I knew about the 4.2-pound Liberty™ from Gateway 2000.® Its impressive 10.4-inch screen has 53 percent more active viewing area than the 8.4-inch screen and it features amazing infrared technology that lets you use many cool IR features including wireless transfer. I'll still be transferring files with those darn cables while Liberty users can simply beam files back and forth between their desktop PC or another Liberty. Plus, the Liberty DX4-100 Best Buy has a powerful 100MHz processor combined with a massive 720MB removable hard drive, 24MB RAM, a TelePath™ 14.4 XJACK® fax/modem, leather carrying case and Microsoft® Office Professional. How could I have been such a sap? I relish the thought of having a Liberty for about the same price. Now I have to enroll in the Portable PC Protection Program and start a new life. If only I had gotten the Liberty from Gateway 2000!

Reporter: Well, there you have it. This is just one of many portable PC buyers distraught because they bought a PC from one of the "other" companies. Remember, the Liberty is the latest and greatest development in portable computing. Unless you want to end up like this poor fellow, don't settle for anything less than a Liberty from Gateway 2000. Call them today! We now return to "As The Hard Drive Turns."

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- 2 PCMCIA Type II Slots
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- MS-DOS 6.22 & WFW 3.11
- Microsoft Office Professional 4.3**

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Two Software "Secretaries" Manage Your Messages

Getting in touch with others used to be simple: I'd stuff a letter into an envelope and drop it into a mailbox. Now I've got E-mail to contend with. Don't get me wrong, I love E-mail. But I hate the requisite slicing, dicing, and formatting of documents and then having to log on to transmit them. I can spend more energy on this nonsense than I do actually writing.

A prerelease version of Qualitas Dispatch does just about everything I need. Through its clean interface, Dispatch lets me send documents from any Windows application directly to my E-mail addresses, to my fax addresses (via my fax board), or to any of my printers.

On the surface, it's simple: When I've completed, say, a WinWord document, I click on WinWord's Print icon. But instead of the usual Print dialog box appearing, the Dispatch dialog box pops up.

By letting me broadcast the same document from an address book to multiple individuals, organizations, or groups, Dispatch takes the drudgery out of sending my documents around town. The shipping version is expected to import data from some existing personal information managers, including Act, SideKick, and Organizer, as well as Novell NetWare Bindery and OBDC-compliant applications.

Another big time-saver: Behind the scenes, Dispatch formats your document to match the requirements of its E-mail or fax destination, then routes it accordingly. Pretty cool.

Dispatch supports most popular E-mail services, including MCI Mail, CompuServe, Microsoft Mail, and cc:Mail.

I also checked out a prerelease version of Connectware's Cruiser. It acts as a secretary, reminding me of events and group meetings, keeping tabs on all my incoming and outgoing E-mail and faxes, and alerting me when new correspondence arrives. Cruiser has other skills, too. You can use it as a telephone dialer, and switch between voice and data when you're connected to another person who has Cruiser.

But the neatest part of Cruiser is its status feature. If you leave the office, you can let other Cruiser-equipped people track you down, based on their status. So a Cruiser-initiated call, fax, or E-mail message from, say, your boss is routed to you wherever you're hiding.

–Steve Bass

Qualitas Dispatch

A slick utility to manage E-mail, electronic faxes, and documents.
Qualitas
800/733-1377, 301/907-6700
List price: $99
Reader service no. 756

Cruiser

Powerful E-mail, fax, and voice messaging tool for geographically dispersed workgroups.
Connectware
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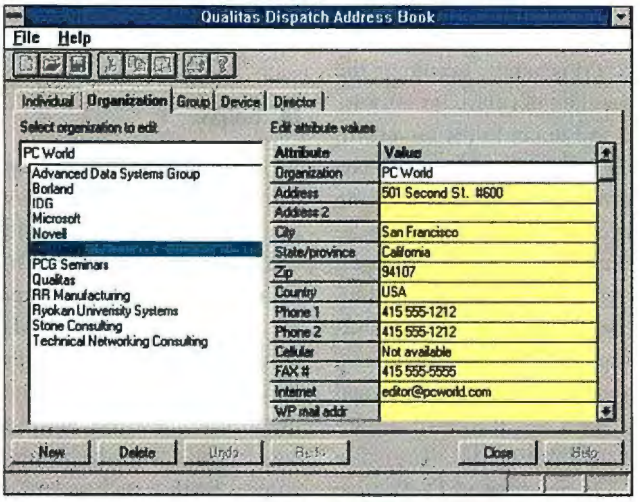
List price: $199
Reader service no. 757



QUALITAS DISPATCH'S ADDRESS BOOK features a clean, easy-to-use interface for listing your important contacts.

Wireless E-Mail, Fax, and Paging

Traveling E-mail users can sever their ties to the phone network with a new service called WyndMail that combines elements of wireless messaging and faxing.

Available for DOS and Windows machines, Macintoshes, and Hewlett-Packard's LX family of personal digital assistants, WyndMail provides an Internet E-mail address at which you can receive messages from any online service that has an Internet gateway, such as CompuServe. Filtering features let you download just the messages you want.

You can receive messages on an alphanumeric pager or a laptop equipped with a suitable modem. Your pager can also notify you when you have E-mail waiting. With a compatible radio modem, WyndMail works over the RAM Mobile Data wireless packet network.

WyndMail supports outgoing fax messages and allows you to receive incoming faxes as data files. However, your laptop must have an appropriate file viewer to see the fax.

WyndMail pricing is based on usage, not distance; monthly fees start at $49 and top out at $139, with an additional per-page charge for faxing.

–Joe Abernathy

WyndMail

A wireless service that combines messaging, paging, and faxing.
Wynd Communications
800/549-6000
List price: $99 for setup; software $29 for DOS, $59 for Windows; $49 to $139 per month for messaging, plus per-page fax fees
Reader service no. 758

Corel CD Creator

MULTIMEDIA Thanks to low manufacturing costs and voluminous storage capacity, CD-ROM is rapidly becoming the medium of choice for software distribution. Prices for recordable CD-ROM drives will soon drop below $1000, allowing even small businesses to create their own CD-ROMs. Targeting this market, Corel has introduced CD Creator, a software package designed to help you record CD-ROM data and audio CDs. It runs on a standard multimedia PC with a CD-recordable (CD-R) drive and a sound card. CD Creator's interface resembles that of a multimedia presentation application, such as Macromedia Action. You arrange files by dragging and dropping icons; the program's Disk Wizard guides you through the disc creation process. CD Creator has a list price of $249. Corel Corp., 800/772-6735, 613/728-8200.

Reader service no. 771

EtherFlash

Silicom Connectivity Solutions' new EtherFlash combines an ethernet adapter and flash RAM on a single PCMCIA Type II card. Convenient for notebooks that have only one PCMCIA slot, EtherFlash lets you stay connected to the LAN while providing 1MB or 2MB of flash RAM for storing files. EtherFlash's dual-function design offers several advantages. For instance, since the card ships with its drivers and configuration software preloaded in flash memory, you don't have to load software from a separate floppy. The EtherFlash card comes in a variety of configurations, with prices ranging from $349 to $479. Silicom Connectivity Solutions, 800/474-5426.

Reader service no. 772

Dr. Gauss

As if radon, asbestos, and cat hair haven't made people wary enough of hidden dangers in the home, along comes Dr. Gauss, a $39.95 Geiger counter for electromagnetic fields (EMFs). Electricity produces EMFs naturally, and some medical studies have found a correlation between high exposure to EMFs, such as you'd get living near overhead power lines, and certain types of cancer. Common household devices like computer monitors and microwave ovens emit EMFs too. Dr. Gauss is a handheld gauge that's about the size and weight of a microcassette recorder. Wave it at your monitor to determine a safe distance. Like a speedometer, Dr. Gauss uses a needle to measure EMF emissions (in milligausses). The product includes guidelines to help you determine a safe EMF rating. Safe Concepts Corp., 800/989-7233.

Reader service no. 773

SST Super Show & Tell 2.0

Multimedia presentation programs are notoriously hard to learn, but Ask Me Multimedia Center's SST Super Show & Tell is the exception to the rule. SST 2.0 is easier to use than the previous version and corrects some of its shortcomings. While version 1.5 lacked a charting module, SST 2.0 includes charting capabilities and 12 chart templates. Another impressive feature is Auto Record, which lets you record actions and commands for later use. You can also create "hot buttons" that you click to jump to different areas of a presentation. And version 2.0 lets you preview a presentation file before opening it—a real timesaver. SST 2.0 lists for $199. Ask Me Multimedia Center, 800/275-6311.

Reader service no. 774

Syncware Fill

The software market is packed with programs that create electronic forms, but Syncware Fill works with *existing* hard copy forms—the kind you get from customers, suppliers, the government, and other departments in your organization. Once Syncware Fill acquires a bit-mapped form—either a scanned-in or a faxed image—you fill in the form by typing directly on the page in Syncware Fill. You create a text field on the form and can link it to a variety of databases or spreadsheets. The $149.95 program then compresses the bit-mapped form and saves it separately from the text, allowing you to print either the form or the text by itself. Syncware, 800/690-9609, 303/369-6900.

Reader service no. 775

Touch Talk e-Voice for cc:Mail

Ever lugged a 7-pound notebook on a business trip for the sole purpose of retrieving E-mail? If so, you should consider Touch Talk Systems' new Touch Talk e-Voice for cc:Mail, a software utility that lets cc:Mail users listen to their E-mail messages from a touch-tone phone. Using speech synthesis and text-to-speech conversion, Touch Talk runs on a Windows PC and includes a SoundBlaster-compatible sound card. When you dial into your PC, Touch Talk answers with a synthesized human voice and reads your E-mail messages to you. You use phone keypad commands to listen, skip, rewind, replay, and forward messages. The $995 package runs on either an E-mail server or a Windows desktop PC. Touch Talk Systems, 800/624-5760, 215/222-6600.

Reader service no. 776

SST SUPER SHOW & TELL 2.0, a $199 program for creating multimedia presentations, adds a charting module and other features.

How to bring out the CD in a CD-ROM.

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Today, CD-ROM discs are engineered with high quality sound. To fully enjoy it, you need multimedia speakers made by a company that really knows sound. Speakers like the new MediaMate™ computer speakers from Bose®.

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A multimedia system can be a fantastic adventure for entertainment and games, as well as a valuable tool for education, business presentations or professional MIDI applications. So don't shortchange yourself on your speakers. Call for the name of a dealer near you, and hear an ear-opening demonstration.

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In PC Magazine's latest Service and Reliability survey, Micron received the highest scores in all four categories: Satisfaction with Reliability, Satisfaction with Repair Experience, Satisfaction with Technical support, and Future Likelihood of Buying. (PC Magazine, January 1995.)

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- Intel 90MHz Pentium processor
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- 14" Micron 14FG, 1024NI, .28mm
- "Tool-Free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
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- Microsoft Encarta® CD
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- On-line trial services: Compuserve, Prodigy and America On-Line
- 3 LucasArts CD games: Rebel Assault, Indiana Jones and the Fate of Atlantis& Day of the Tentacle

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466 HOME MPC

- 486DX2 66MHz processor
- 8MB RAM, 128K cache
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- SoundBlaster16, joystick & speakers
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- Local bus graphics (1MB)
- 14" Micron 14FG, 1024NI, .28mm
- Low profile desktop case
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS Works Multimedia CD, Encarta CD
- Quicken Deluxe Edition CD
- On-line trial services: Compuserve, Prodigy and America On-Line
- 3 LucasArts CD games: Rebel Assault, Indiana Jones and the Fate of Atlantis & Day of the Tentacle

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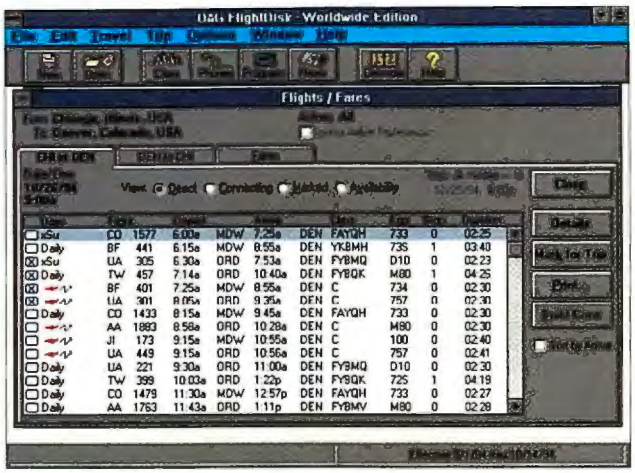
Circle 217 on reader service card

Quick Takes

OAG FlightLine

OAG FlightLine is a new online service that provides fare and schedule information for commercial airline flights in North America. To use the service, you need OAG FlightDisk, a software program that allows frequent fliers to find the best connections by typing in their originating and destination cities, travel dates and times, and preferred airlines. Though OAG FlightDisk information is updated every few weeks, the volatile, competitive nature of the airline industry can make the program's information obsolete in a hurry. Subscription rates are $269 for 12 monthly updates of OAG FlightDisk Worldwide Edition, and $216 for the North American edition. All FlightDisk users can call the FlightLine online service. You get two free calls to the service each month; additional searches cost $2 apiece. Reed Travel Group, 800/323-3537.

Reader service no. 777



FAST ACCESS TO AIRLINE SCHEDULES: OAG FlightLine provides fare and schedule information for most North American flights.

Presenter 3 Series

Computer-to-TV adapters that display a computer image on a television screen usually produce flickering, low-resolution images. But Consumer Technology Northwest's new line of Presenter 3 adapters promises improved image quality and reduced screen flicker. An external device roughly the size of a fax-modem, the Presenter 3 connects to your PC and TV and converts the computer's VGA signal to the NTSC signal used by U.S. television. The company's Video Stabilizer and Sharp View technologies help cut down on flicker and create sharper text and truer colors (although the original VGA image is still superior). The Presenter 3 costs $349. The Presenter 3 Sound ($429) can play Windows WAV files using the TV speaker. The Presenter Mac/PC ($429) will work with both Macintoshes and PCs. Consumer Technology Northwest, 800/356-3983.

Reader service no. 778 ▶

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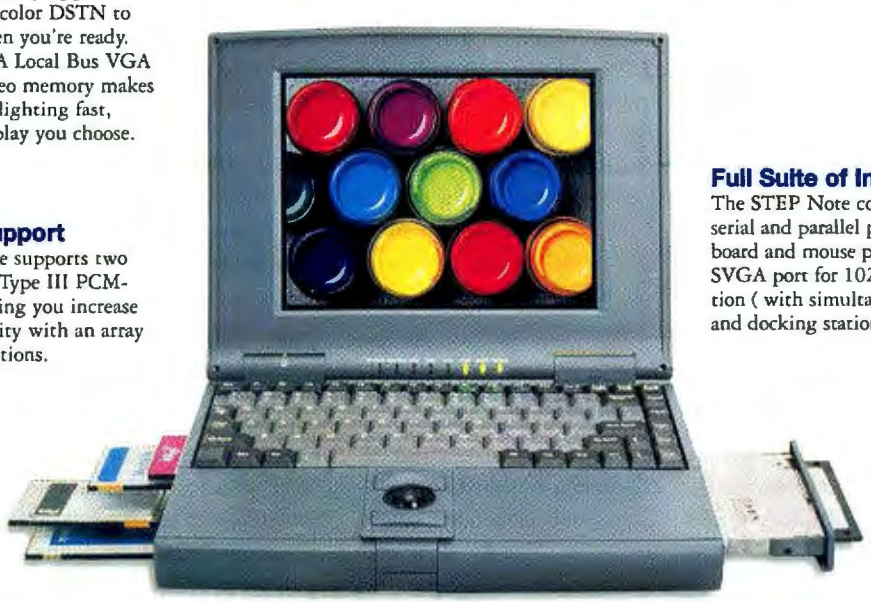
The STEP Note supports Intel CPUs from 486SX-33 to 100MHz Intel DX4.



PCMCIA Support
The STEP Note supports two Type II or one Type III PCMCIA cards. letting you increase your productivity with an array of PCMCIA options.

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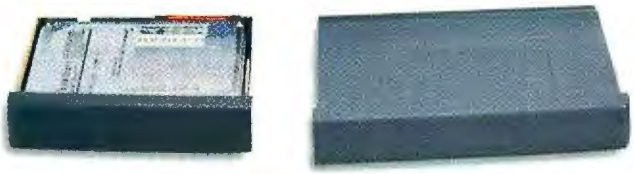

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Circle 107 on reader service card

Quick Takes

Hitachi MultiPad

One day computing may be as simple as using a pen and paper. Hitachi Digital Graphics' $249.95 graphics tablet is a good step in that direction. The MultiPad, a 6-by-9-inch pressure-sensitive tablet with a cordless pen, enables you to sign faxes in a word processor and apply natural-looking brush strokes in a paint program. Setup is easy: You just plug the pad connector into a system's COM port, connect the AC adapter, and then install the drivers. To click the left mouse button, you tap the pen's tip; to click the right mouse button, you press the button on the pen's barrel. Hitachi Digital Graphics (USA), Inc., 408/747-0777.

Reader service no. 782

Phaser CopyStation

If you've already shelled out big bucks for Tektronix's new Phaser 540 color laser printer, you might consider the company's Phaser CopyStation, a hardware add-on that lets the $8995 Phaser 540 work as a color copier. The $1695 CopyStation connects to the printer's SCSI port and lets you create up to 99 copies at a time in four-color, monochrome, or gray-scale formats. Tektronix, 800/835-6100.

Reader service no. 781

Visio Technical 3.0

If you need to make construction plans, networking diagrams, or engineering schematics, then Shapeware's Visio Technical may be for you. This drawing package lets you create technical illustrations and view AutoCAD drawings. It includes 1500 predrawn technical shapes and all 750 of the business shapes found in Shapeware's Visio 3.0 business graphics program. The program supports OLE 2.0 and lets you choose from three user interfaces: Visio's own, Microsoft Office, and Lotus SmartSuite. Visio Technical 3.0 costs $349. Shapeware, 800/446-3335.

Reader service no. 780

Umax PageOffice

If your home office is drowning in paper, Umax Technologies' PageOffice may be your lifeboat. Street priced at around $400, PageOffice is a 300-dpi scanner with OCR capabilities and three bundled software modules to help organize your documents. A Windows-based customizable filing system lets you create electronic filing cabinets, drawers, and folders. PageOffice's simple image editing utility enables you to work with scanned graphics, while the forms module makes it easier to scan a form and fill in the blanks. PageOffice's drag-and-drop capabilities allow you to scan a document and then drag its icon to a program icon for faxing, mailing, printing, or filing. The product has a list price of $499. Umax Technologies, 800/562-0311, 510/651-8883.

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*Requires Microsoft Word for Windows 6.0/2.0 or WordPerfect for Windows 6.0a or 6.1.
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Desktop VIDEO CONFERENCING

Being There without Going There

While fax machines, cellular phones, and modems have allowed people to stay in touch without being right there, it will never be the same as being there. Face-to-face contact and the give and take of working together in person are important human factors that are simply lacking in the long-distance transfer of information today.

But as the telephone once revolutionized the world by allowing people miles apart to speak to each other at any given moment, affordable and accessible technology now allows two people to see each other, and work together, in real-time.

Once the material of futuristic movies, desktop video conferencing has become a reality. The hardware and software of ShareVision PC3000 include a complete suite of two-way communications tools for audio, video, and data that functions over a standard phone line and personal computer. The video component, paired with the ability to perform collaborative computing, changes the whole dynamic for two parties working at locations across town or across the globe.

The time and expense of travel are relieved when a presentation to the board

VIDEO CONFERENCING: How it works

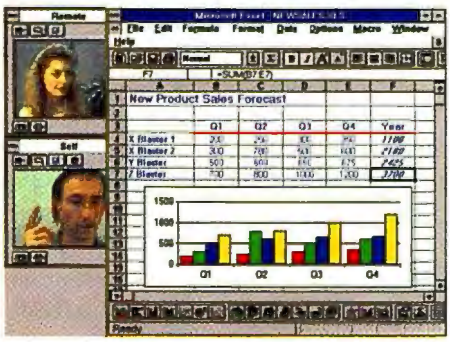
ShareVision PC3000, a standard phone line, and a PC unite sites with truly interactive point-to-point communications. Real-time video and audio, shared applications and Whiteboards, and high-quality color image capture provide flexibility and functionality.

of directors can be done from a satellite office. And cross-country partners can make last-minute changes on a proposal simultaneously, on screen, without the hassle of back and forth faxes. While being there may not be possible, the impact and input of being there to verify data and conceptual executions are possible through interactive video and communication.

Real-time video is combined with a host of interactive and user-friendly features designed to create an experience as seamless and uncomplicated as using the telephone. With today's technology, a feature as familiar as auto-dialing is accomplished by a mouse click, while a built-in phone book stores the names, numbers, and even faces of frequently called business associates. Users can opt for one window to show the video of either party or two windows to show both parties, while the central window displays the function being shared; not just viewed, but literally shared.

Real-time Application Sharing

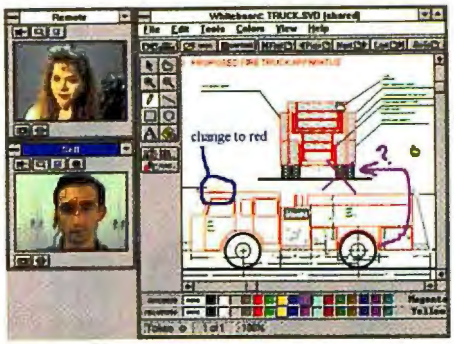
Any popular Windows program can now be shared with colleagues or clients at remote locations using ShareVision PC3000 with a standard phone line and a PC. Two people can work on the same



document in the same program simultaneously. Both parties can edit a file and access the application's tools and features, even if only one user has that application on their computer. The video and audio connection continues while they work.

Interactive Whiteboard Sharing

The same technology that allows application sharing is utilized to allow the sharing of an interactive Whiteboard. Users can quickly and easily annotate documents or brainstorm on new ideas using graphic illustrations. Familiar tools like the pointer, pencil, magnifying glass, and text are built



into the Whiteboard feature to enhance interaction. In addition, users can copy multipage documents to the Whiteboard, print from other applications to the Whiteboard, capture any image on screen, or import images from any TWAIN-driven device, including most scanners.

High-Quality Color Fax

ShareVision PC3000 also has the capacity to digitize, annotate, store, and forward full-color snapshots from local or remote video cameras. Up to two composite and one S-Video source can be connected at each side. The technology utilized pro-

Sharing the Vision with W.H. Sim

W.H. Sim, Chairman & CEO of Creative Technology, Ltd., parent company of Creative Labs, Inc.

These days, business is regularly conducted on a long-distance basis. While modems and faxes let the business keep going, these technologies lack the critical components of true interactivity and high-quality visuals. Technology has recently found a way to bridge those gaps.

Functional and affordable desktop video conferencing means that we really can work together, wherever we are. As you read this, creatives at ad agencies are already presenting new work to clients and refining it by sharing QuarkXPress and Photoshop files. It is real-time, but they are not traveling to the client's office. In the higher end of customer support, technicians are using ShareVision PC3000 to perform remote diagnostics, looking at hardware and monitors from miles away and witnessing problems firsthand to find solutions quickly.

In the field of education, the 40 ShareVision PC3000 packages purchased by Ngee Ann Polytechnic in Singapore means lecturers can offer remote tutoring to students in their homes. One nationwide executive search firm uses ShareVision PC3000 to practice interview skills and jointly brush up resumes with job candidates, illustrating strengths and weaknesses on screen.

This communication revolution is set to continue even at home, where the PC is very much a part of the home, much like the TV and stereo set. I am certain that very soon grandparents will be talking to their grandchildren and watching them play on the other side of the country, oblivious to the miles separating them.

Body language is such an integral part of human interaction, and desktop video conferencing systems like ShareVision PC3000 do a good job of facilitating that. I think, at some point, not having that connection will be as foreign a concept to us as living without computers would be now.

For the most part, we have mastered the interactive transfer of sound, data, and even graphics. With the addition of the video component, not only will business be more fluid and efficient, but the world may just get a lot smaller and a lot friendlier, too.

vides such high-quality color image capture from sources like photographs and scanners that it functions, in essence, as an interactive color fax machine. Important graphics of all kinds no longer need to be overnighted for a meeting tomorrow when two people can now instantly view the visuals together, right from their desks.

The central window displaying the shared function can be reduced and expanded to full screen, creating an exceptional tool for long-distance presentations when used with the Whiteboard function. The video boxes for the two user locations are adjustable, offering three size options: 160 x 112 pixels, 128 x 96 pixels, and 96 x 80 pixels. The video camera also has the capacity to zoom in and out, as well as pan over 90 degrees, making it easier to show and see exactly what the users want.

Without interrupting the communication established with ShareVision PC3000, either party can send or receive files or entire directories of data quickly and efficiently. Without the need to learn complicated modem commands, simply selecting and sending allows users to relay ancillary information without missing a beat.

ShareVision PC3000 comes with an external high-speed fax/data modem, so in addition to its collaborative features it serves to communicate data, automatically send and receive faxes, and offer convenient access to remote network services, bulletin boards, and remote E-mail.

The ShareVision PC3000 package includes a video capture and compression card, ShareVision 1/3" CCD color video camera with stand, ShareVision PC Audio Card, High-Speed Fax/Data Modem (28.8 kbps), ShareVision software, Hands-Free Audio Headset, Delrina WinFax Lite software, and all necessary cables, etc.

The telephone requirement is a standard phone line with an RJ-11 jack or adapter. The systems requirements are a 486SX-33 with 8MB of RAM (486DX2-66 recommended), a 6MB hard disk, two available ISA bus slots, VGA or Super-VGA display (16- or 24-bit VGA display card recommended), and Microsoft Windows 3.1 or above.

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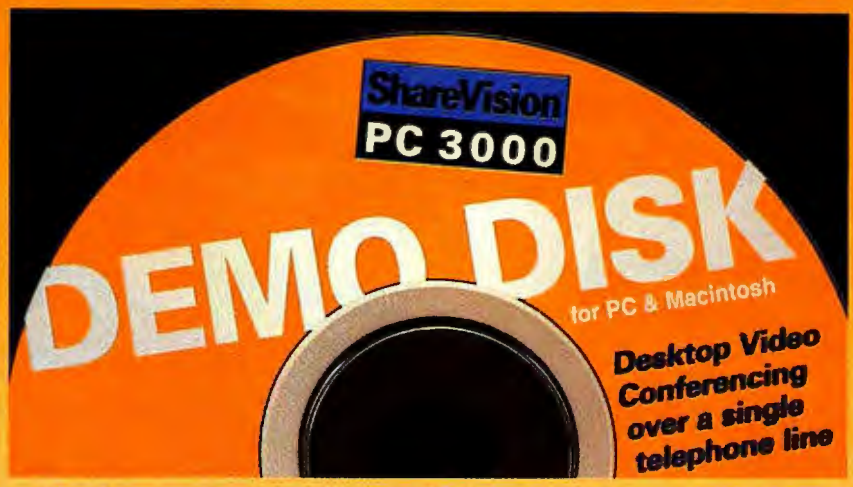

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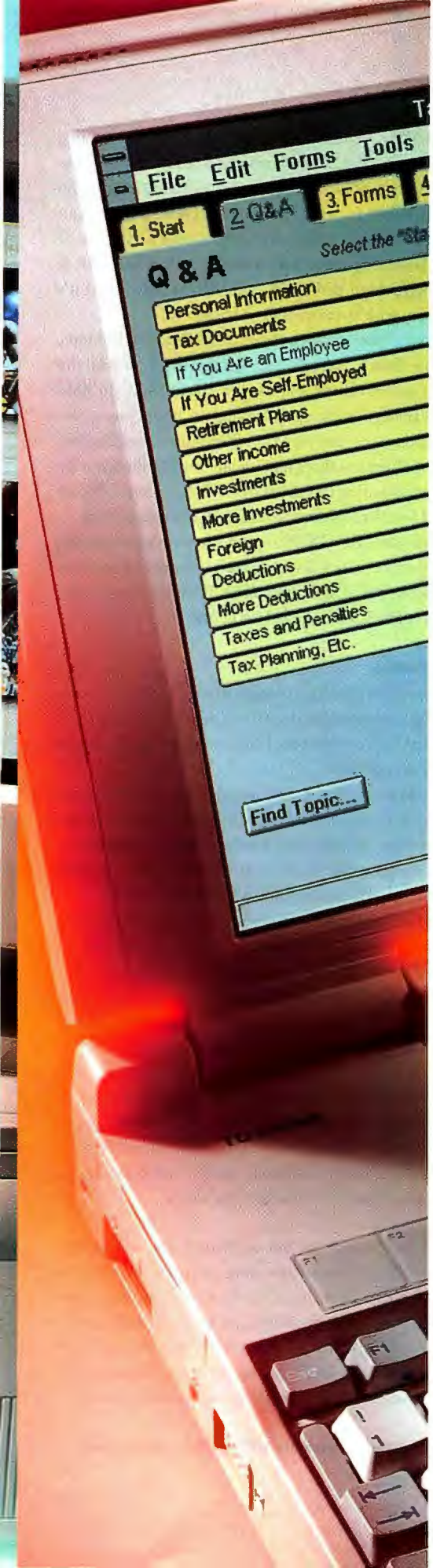
BUDGET DESKTOPS pg. 128

MOBILE PCs pg. 136

FOUR OF THE ELITE GUARD IN THE PENTIUM INVASION: the Everex Step SP/100, our number three power desktop; Dell's Dimension XPS P90, the fourth-place power desktop; Micron's two-time power desktop Best Buy PC90PCI PowerStation; and Toshiba's number one power mobile, the T4900CT.



MARC SIMON

TOP 20 PCs: THE PENTIUM TURNS 100

Despite its floating-point flaw, Pentium is still the chip to buy. This month we compare 102 Pentium PCs, including the all-new, record-breaking Pentium-100s.

BY BRYAN HASTINGS AND ANITA HAMILTON

TESTING BY DEAN ANDREWS, DAVE CASINI, ULRIKE DIEHLMANN, AND SUSAN SILVIUS; RESEARCH AND SUPPORT BY MIKE SALAYKO

Last year we introduced the monthly Top 20 roundup to help you in the Herculean challenge of choosing a PC. Thirteen roundups later, we've tested over 400 desktops and notebooks and added particulars about them to our databases. Each month we pit the latest systems not only against each other but against previously reviewed machines. From our charts you can tell at a glance our top picks in desktops and notebooks among the current group as well as among *all* the systems we've reviewed over the months—a group that includes nearly all PCs available from national vendors.

A Fistful of Pentiums

Over the months, one chip has steadily increased its presence on our charts: the Pentium. That advance is now more like an assault. All eight new Top 20 power desktops as well as a new Top 20 budget desktop and a new power mobile winner are based on Pentiums.

Two new Pentium chips make dazzling debuts this month—the top-of-the-line 100-MHz processor, and the 75-MHz chip, which is expected to replace its slower 60- and 66-MHz siblings.

Three of the four PCs based on the 100-MHz Pentium zoomed onto our Power Desktops Top 20, including the third-place Everex Step SP/100. Polywell's new Pentium-100 tower, the Poly 5100P5, by far the speediest unit we've reviewed, finished lengths ahead of our previous performance champ. Gateway 2000's P5-100XL also fared very well, performing significantly better than the typical Pentium-90 PC.

We expected Intel's new 75-MHz Pentium chip to show up in force in notebooks, but the first review units we received bearing this CPU were desktops—and they're doing quite well. Two of the three Pentium-75 desktops reviewed here—ALR's Evolution X/75 and Gateway 2000's P5-75 Family PC—landed on our Power Desktops Top 20. And the one Pentium-75 mobile PC we got for this roundup hit the top of the Power Mobile PCs chart. Its $7499 sticker may take your breath away, but Toshiba's T4900CT is class all the way. It's the second-fastest notebook we've ever reviewed, and it comes with a wonderful 10.4-inch vivid active-matrix color screen that displays over 65,000 colors at once; a huge 810MB hard drive; and topflight support. Meanwhile, MidWest Micro wowed us with its Elite Pentium SoundBook Plus, the first Pentium-90 notebook we've tested; its performance blows every other reviewed mobile out of the water.

Everyone's heard about the Pentium flaw. The real question is, do you need a "fixed" chip or not? Here's the straight story.

Chip flaws are fairly common, and there is a real flaw in the initial version of the Pentium. The bug is in the floating-point unit, and it affects the division of particular rare combinations of numbers, producing an error in the 4th to the 19th decimal place of the result. If you never use the floating-point feature, or you use it only rarely, this flaw won't affect you.

A Simple Test

If you want a new chip, Intel will issue you a replacement at any time in the chip's life, so there is no rush. First, find out if you even have a flawed Pentium. To test it out, perform the following calculation either in Windows' calculator or in any spreadsheet: 4195835/3145727*3145727-4195835.

If the answer is 0, you're fine. If it is –256, you have a flawed Pentium and may want to replace it. To do so, call Intel or your PC manufacturer. If you are willing to replace the chip yourself, call Intel at 800/628-8686. You'll need to provide a credit card number as a guarantee that you'll return the old chip to Intel after the replacement (if you don't, you'll be charged up to $1000).

If you don't feel comfortable making the change yourself, Intel is setting up a network of service providers to do it free of charge; however, the details had not been worked out at press time.

Most major manufacturers will also perform the replacement for you. IBM customers should call 800/426-3389, Compaq customers should call 800/652-6672, and Dell customers should call 800/403-3355.

This Month's Best Buys

The 90- and 100-MHz Pentium systems pretty much own this month's Power Desktops Top 20 chart, where all but three machines are based on these CPUs. Micron's P90PCI PowerStation retains the top Power Desktops spot for a second month. This compact is an astounding value for $3199. It ranks among the top half-dozen most powerful PCs available; it's packed with features, including 16MB of RAM, a massive 1GB hard disk, and a CD-ROM drive; and it's backed by a company with an excellent service record.

Last month we put a more stringent price cap on budget desktops, dropping the ceiling from $2500 to $2250, but this barely slowed the influx of Pentiums into our Budget Desktops Top 20. Still, the 486-DX2-66s are the VIPs in this category, locking up all but one of the Best Buy slots. Topping the chart is MIS's Slimline 66, holding fast for a second month. There's nothing fancy about the Slimline, but it's solid in all respects, including its 420MB hard disk, decent DX2-66 performance, and 15-inch monitor, and it sells for a bargain $1523.

Meanwhile, WinBook's XP DX2/50 heads up the budget mobile PCs for the second month. Its 9.5-inch screen is monochrome, but this capable notebook, which includes a 255MB hard disk and long, long 6.8-hour battery life, is a stellar deal for $2249.

Pentium Peaks and Pebbles

The Pentium is now clearly the lead processor for new business computers. The table at the right lists the 102 currently available Pentium-based PCs that we've reviewed, broken out into price groups and put in order by overall value.

Just as we finished putting this review together, the bug in the initial Pentium chips was discovered and rapidly created a flurry of public outrage. The protest subsided when Intel promised to replace any Pentium that had the flaw. "Pentium: A House Divided" explains how to tell if you have a problem chip and what to do about it.

Despite this bump in the road of the Pentium's smooth ascent to dominance, this chip is clearly the processor of choice for most business purposes and even for home users looking for power and longevity in their PC. This year should see the first wave of real challengers to the Pentium from manufacturers other than Intel, and that pressure can only keep performance up and prices down.

Bryan Hastings is an associate editor and Anita Hamilton is an assistant editor for PC World. *They can be reached on PC World Online (see page 12 for contact information).* PC World *staff members Michael Desmond, John Goddard, Arden Hoffman, Owen Linderholm, Melissa Riofrio, and Susan Silvius contributed to this article.*

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For more information about all products in this article, circle reader service no. 905.

102 Pentiums From 60 MHz to 100 MHz

Over the past year, we've tested more than 150 Pentium-based PCs. This table lists all the Pentium systems available on the market that are currently in the running for spots on the Top 20s. While you can buy a very basic Pentium PC for under $2000, the majority of Pentium desktops fall in the $2000-to-$2500 range. For $2500 you can buy a lightning-fast Micron P90 Home MPC or one of the first systems equipped with the 75-MHz Pentium, Gateway 2000's P5-75 Family PC. Ponying up close to $3000 gets you to where most P90 systems are priced. If you want to accelerate power and performance, be prepared to pay slightly more—in the $3000-to-$3500 range. Anything over $3500 takes you to the stratosphere of PC power, where you pay extra-high prices for unusual technology, outstanding performance, and in some cases the top-of-the-line 100-MHz Pentium.

Pentium notebooks are still rare, but as the Pentium-75 chip rolls out, expect to see more of them on our Top 20.

AVERAGES	Performance rating	Price	Overall rating	Hard disk size (MB)	Installed RAM (MB)
Pentium 60s (35 systems)	59	$2658	74	470	10
Pentium 66s (14 systems)	68	$2644	77	524	13
Pentium 75s (4 systems)	67	$2653	84	793	11
Pentium 90s (45 systems)	77	$3247	81	710	14
Pentium 100s (4 systems)	85	$3948	86	1125	20

DESKTOPS		Overall rating	CPU	Price	Performance rating	Issue reviewed
$1500—$2000						
Vektron	PCI Power Station/60	73	Pentium-60	$1785	62	Dec 94
Intelesys	P5-60	72	Pentium-60	$1999	58	Dec 94
Micro Express	MicroFlex-VL/P60	72	Pentium-60	$1899	60	Jan 95
MidWest Micro	Elite P560	70	Pentium-60	$1879	57	Oct 94
Insight Direct	P60 PCI TW	68	Pentium-60	$1859	61	Jan 95
MicroSource	Tempest Premier/PCI	65	Pentium-60	$1649	50	Jul 94
$2000—$2500						
Micron	P90 PCI Home MPC	86	Pentium-90	$2499	79	Jan 95
Gateway 2000	P5-75 Family PC	84	Pentium-75	$2499	69	current
Quantex Microsystems	QP5/60PM-2	81	Pentium-60	$2398	61	Jan 95
USA Flex	PT-90	81	Pentium-90	$2365	73	Feb 95
Dell Computer	Dimension XPS P75	81	Pentium-75	$2273	62	current
Zeos	Pantera 60	81	Pentium-60	$2145	66	Dec 94
Gateway 2000	P5-60	81	Pentium-60	$2349	62	Oct 94
Netis Technology	N590P PCI System	80	Pentium-90	$2249	76	current
EPS	P-60 Phantom	80	Pentium-60	$2295	75	Dec 94
Zenon	Z-Titan Pentium 66	80	Pentium-66	$2462	78	Dec 94
Gateway 2000	P5-60 Family PC	80	Pentium-60	$2297	60	Dec 94
Quantex Microsystems	QP5/60W-2	79	Pentium-60	$2215	63	Dec 94
Netis Technology	N566 Best Buy	78	Pentium-66	$2188	72	current
DFI	Diamond P60	78	Pentium-60	$2395	64	Feb 95
CompuAdd	CP90p	78	Pentium-90	$2464	72	Dec 94
Polywell Computers	Poly 560MPC	77	Pentium-60	$2250	65	Jan 95
Polywell Computers	Poly 586-66V1	77	Pentium-66	$2288	72	Oct 94
Acer	AcerPower Minitower	77	Pentium-60	$2429	56	Jan 95
CompuAdd	CP60p	77	Pentium-60	$2299	61	Dec 94
Acma	P90	76	Pentium-90	$2325	76	Dec 94
Robotech	Cobra RS p60 Graphics Workstation	76	Pentium-60	$2499	63	Jan 95
MIS	M5P/60	76	Pentium-60	$2223	52	Sep 94
MIS	M54PI System	75	Pentium-90	$2379	57	Nov 94
USA Flex	Flex Pentium 60MHz System	75	Pentium-60	$2098	60	Nov 94
Insight Direct	PCI P60 DT	75	Pentium-60	$2017	66	current
Netis Technology	N566 Best Buy	75	Pentium-66	$2035	76	Dec 94
Insight Direct	P90 Special PCI	75	Pentium-90	$2099	69	Jan 95
Acma	P60	74	Pentium-60	$2040	64	Nov 94
ATronics	ATI-Pantera-66	72	Pentium-66	$2204	63	Nov 94
National Micro	NMC Expert System 2	72	Pentium-66	$2145	65	Dec 94
Insight Direct	PCI P60 CD	71	Pentium-60	$2256	61	May 94
Epson	Endeavor P60	71	Pentium-60	$2024	57	Dec 94
Xinetron	X/Lan XP66	69	Pentium-66	$2335	63	Nov 94
Diamond Technologies	DT 586-90	69	Pentium-90	$2380	63	Aug 94
DTK	Quin-32	68	Pentium-60	$2200	56	Nov 94
Tangent	Pentium P560	64	Pentium-60	$2419	54	Jul 94

		Overall rating	CPU	Price	Performance rating	Issue reviewed
$2500—$3000						
Quantex Microsystems	QP5/90W-3	89	Pentium-90	$2999	79	current
Zeos	Pantera 90	85	Pentium-90	$2995	80	Aug 94
Acma	P90	84	Pentium-90	$2972	88	Feb 95
Tagram	Thunderbolt XL	83	Pentium-90	$2929	86	Feb 95
Gateway 2000	P5-90 Family PC	83	Pentium-90	$2799	70	current
Austin	P5-66	82	Pentium-66	$2729	74	Sep 94
Zeos	Pantera 66	81	Pentium-66	$2765	70	Jun 94
Zenon	Cinema A/V 90	81	Pentium-90	$2699	84	Jan 95
Diamond Technologies	DualPower	81	Pentium-90	$2795	79	current
Intelesys	P54C90	80	Pentium-90	$2624	73	Feb 95
EPS	P-90 Explorer	80	Pentium-90	$2595	80	Nov 94
Axik	Ace Cache 586-66PCI/MPC	79	Pentium-66	$2895	67	Jun 94
Polywell Computers	586-90VIP	79	Pentium-90	$2920	78	Aug 94
Packard Bell	Multimedia Pentium PC	77	Pentium-90	$2900	66	current
Mitsuba	Premiere Pentium 90	77	Pentium-90	$2975	70	Jan 95
Axik	AcePower 586-90V	76	Pentium-90	$2728	69	Aug 94
Compaq	Deskpro XE 560 Model 525/w	75	Pentium-60	$2948	60	Jul 94
Comtrade	PCI Dream Machine 90	74	Pentium-90	$2635	87	Dec 94
Blackship	Pentium-90 VLB/PCI	73	Pentium-90	$2650	63	Nov 94
Empac	Magnum	72	Pentium-60	$2812	60	Sep 94
Packard Bell	Pentium Computer	69	Pentium-60	$2729	51	Jul 94
$3000—$3500						
Micron	P90PCI PowerStation	90	Pentium-90	$3199	86	Feb 95
Everex Systems	Step SP/100	88	Pentium-100	$3295	86	current
Austin	P90	87	Pentium-90	$3499	83	Oct 94
Acer	AcerPower Minitower	85	Pentium-90	$3285	80	Feb 95
Robotech	Cobra RSp90 Graphics Workstation	84	Pentium-90	$3160	84	Jan 95
Advanced Logic Research	ALR Evolution X/75	83	Pentium-75	$3188	70	current
MidWest Micro	Micro Elite P590	83	Pentium-90	$3276	84	Jan 95
HiQ	Neptune P90	81	Pentium-90	$3434	79	Jan 95
Gateway 2000	P5-90	80	Pentium-90	$3338	72	Jul 94
Polywell Computers	Poly 590-P3	78	Pentium-90	$3030	83	Dec 94
NEC	Ready P60M	77	Pentium-60	$3204	65	Feb 95
AST	Premmia LX P/60	74	Pentium-60	$3158	61	Jul 94
Acer	AcerPower 9000T	71	Pentium-60	$3359	50	Jul 94
Wyse	Forte GSV	71	Pentium-60	$3400	58	Jan 95
$3500—$4000						
Dell Computer	Dimension XPS P90	88	Pentium-90	$3687	83	current
Dell Computer	OptiPlex XMT 590	87	Pentium-90	$3779	82	Jan 95
Dell Computer	Dimension XPS P100	86	Pentium-100	$3899	77	current
DFI	Diamond Home P90	84	Pentium-90	$3795	84	Feb 95
Hertz Computer	P90e	81	Pentium-90	$3695	74	current
Paragon Development Systems	PDS Netstation 90	81	Pentium-90	$3843	87	current
Insight Direct	PCI P90	80	Pentium-90	$3509	79	Oct 94
DataStorage	DataStor P5-90 Pentium	80	Pentium-90	$3564	84	Feb 95
Advanced Logic Research	ALR Evolution V ST/90	80	Pentium-90	$3709	77	Oct 94
DEC	Celebris 590	79	Pentium-90	$3548	84	Jan 95
AT&T	Globalyst 590	76	Pentium-66	$3758	66	Nov 94
Advanced Logic Research	ALR Evolution V ST/66	72	Pentium-66	$3689	63	Jun 94
Micro Express	MicroFlex-VL/Pentium	72	Pentium-66	$3546	58	Jun 94
Compaq	Deskpro XL 560	71	Pentium-60	$3539	57	Oct 94
DEC	DECpc XL560	70	Pentium-60	$3823	49	Sep 94
$4000—$5000						
Gateway 2000	P5-100XL	84	Pentium-100	$4299	84	current
Polywell Computers	Poly 5100P5	81	Pentium-100	$4297	94	current
DEC	DECpc XL590	80	Pentium-90	$4299	76	Sep 94
ZDS	Z-Station EX	77	Pentium-90	$4077	79	Jan 95
$5000 UP						
Hewlett-Packard	Vectra XU 5/90C PC	77	Pentium-90	$5709	80	Oct 94
Intergraph	TD-3	66	Pentium-90	$8300	66	Aug 94
Dolch	A-Pac 586-60C	51	Pentium-60	$8695	39	May 94
NOTEBOOKS						
Toshiba America Information Systems	T4900CT	92	Pentium-75	$7499	54	current
MidWest Micro	Elite Pentium SoundBook Plus	85	Pentium-90	$5049	65	current
BSI	NP3656T Pentium Notebook	76	Pentium-66	$4110	50	Feb 95

This Month's Contenders

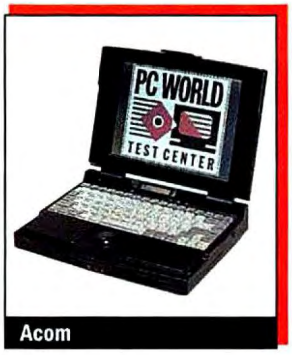
Our look at this month's contenders for the Top 20 Power and Budget Desktops and the Top 20 Mobile PCs. Icons show where systems placed on the Top 20 charts.

Acom Patriot 4000

PC WORLD TOP 20 9 BUDGET MOBILE PC

PROS: Great performance, large hard drive, built-in audio
CONS: Dull screen colors, heavy, no established turnaround time for repairs

If you're looking for top performance in a budget mobile computer, be sure to check out Acom's latest. For $2560, the Acom Patriot 4000 DX2-66 notebook delivers performance nearly equaling that of a DX4-75 mobile. And this Top 20 ranker has some high-end features, such as a 324MB hard drive, a large 10.3-inch color screen, and built-in audio. We also got a reasonably long 3.5 hours of battery life in our tests, and you can double that by replacing the floppy drive with a second battery pack.



Acom

Not surprisingly, Acom cut a few corners to keep the price low. The display uses an early passive technology that yields paler-than-usual colors and relatively low contrast. This Patriot's weight is a hefty 8.4 pounds, and its trackball can be awkward to use. Support policies, which include a relatively short one-year warranty, are unexceptional.

Despite these drawbacks, the Acom Patriot 4000 gives you a great deal of notebook for the money. *Acom, Inc., 800/898-2665, 408/727-8577* **Reader service no. 651**

ALR Evolution X/75

PC WORLD TOP 20 18 POWER DESKTOP

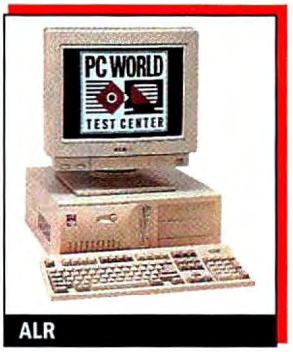
PROS: Big hard drive, great support
CONS: None

You don't need a raving hotshot PC to nab a spot on our Power Desktops Top 20. Witness ALR's latest system, the Evolution X/75. While it's exceptional in only a couple of areas, this compact is at least very good in all categories.

Performance, for example, is essentially what you'd expect from a system that's based on Intel's new 75-MHz Pentium chip. The ALR Evolution X/75 bested the typical 66-MHz Pentium desktop. For $3188, this isn't bad performance, especially considering that the reasonable price also buys you 16MB of RAM and a prodigious 1GB hard drive. In addition, you get a 2MB ATI Mach64 PCI graphics controller along with a 15-inch monitor.

We were pleased to find so much expandability in a compact computer. The ALR Evolution X/75 has six free expansion slots (four ISA, one PCI, and one that can be used for either PCI or ISA), and all but one of the five free ISA slots accept full-length cards. Also, three drive bays remain at your disposal, all of them externally accessible. ALR even offers a Pentium-90 upgrade.

This fine specimen is backed by equally fine service and support. ALR covers parts and labor for five years and peripheral components for three—one of the best warranties in the business. It also includes a year of on-site service for $9.95 and a 30-day money-back guarantee. The toll-free support hours are respectable: 12 hours each weekday, 6 hours on Saturdays. Best of all, ALR scored consistently high across the board on the Reliability and Service Monitor, our reader fax-back survey.



ALR

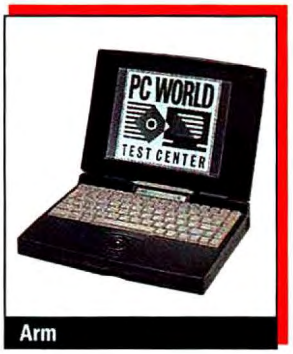
The Evolution X/75's decent price and performance, fine engineering, and excellent support all add up to a solid Power Desktops Top 20 value. *Advanced Logic Research, 800/444-4257, 714/581-6770* **Reader service no. 652**

Arm ArmNote TS30M

PC WORLD TOP 20 5 BUDGET MOBILE PC

PROS: Low price, enhanced presentation features, reasonably good battery life
CONS: None

Balancing fine performance, an exceptionally low price, and decent audio and video tools, the ArmNote TS30M easily captures a spot in the budget section of our Mobile PCs chart. This handsome notebook, equipped with 8MB of RAM, posted the test scores you'd expect from a DX2-50 unit. And its $1549 price is exceptionally low, even considering the 9.5-inch monochrome screen. You can display 16 million colors at 640 by 480 on an external monitor, obtaining remarkably smooth color gradients, and the notebook's bright dual-scan screen offers more than 65,000 shades of gray. You can also use the internal and external monitors at the same time. If you need audio to deliver your message, the TS30M's record-and-playback capabilities can help out. The notebook also comes with a 200MB hard drive and a PCMCIA slot that accepts one Type III or two Type II cards.



Arm

Mobility? You'll appreciate the TS30M's comfortable design. The keyboard is quiet, and the trackball and mouse buttons, located in the middle of the wrist rest, are easy to use. Travel weight is a light 7.2 pounds, and the battery runs for a respectable 4 hours. An LCD panel below the screen makes it easy to monitor system activity, such as hard drive access and battery charge.

Arm's warranty covers parts for one year and labor for three years—a notch above the norm—and toll-free technical support is available 11 hours on weekdays as well as 8 hours on weekends. It's Arm's policy to push repairs through the factory in a single business day. Low priced and smartly designed, the ArmNote TS30M is an excellent budget mobile system. *Arm Computer, 800/765-1767, 408/428-9800* **Reader service no. 653**

THE TOP 20

PC WORLD POWER DESKTOPS

1 **Micron P90PCI PowerStation**
Fast and spacious desktop.

➤ New this month ◀ No change from last month ▲ Up from last month ▼ Down from last month

BEST BUYS	Last month	Months on chart	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus slots
1 ◀ Micron P90PCI PowerStation	1	2	90	86	71/85	$3199	Pentium-90	16	1080	ISA, PCI
2 ➤ Quantex QP5/90W-3	–	1	89	79	73/78	$2999	Pentium-90	16	1083	ISA, PCI
3 ➤ Everex Step SP/100	–	1	88	86	75/65	$3295	Pentium-100	16	1275	ISA, PCI
4 ➤ Dell Dimension XPS P90	–	1	88	83	77/81	$3687	Pentium-90	16	1080	ISA, PCI
5 ▼ Austin P90	2	6	87	83	71/75	$3499	Pentium-90	16	1057	ISA, PCI
6 ◀ Dell OptiPlex XMT 590	6	3	87	82	77/81	$3779	Pentium-90	16	1083	ISA, PCI
7 ➤ Dell Dimension XPS P100	–	1	86	77	77/81	$3899	Pentium-100	32	1083	ISA, PCI
8 ▼ Micron P90 Home MPC	4	3	86	79	71/83	$2499	Pentium-90	8	528	ISA, PCI
9 ▼ Zeos Pantera 90	5	8	85	80	71/76	$2995	Pentium-90	16	720	ISA, PCI
10 ▼ Acer AcerPower MiniTower	7	2	85	80	78/68	$3285	Pentium-90	16	730	ISA, PCI
11 ▼ Acma P90	3	2	84	88	78/68	$2972	Pentium-90	16	540	ISA, PCI
12 ➤ Gateway 2000 P5-100XL	–	1	84	84	73/72	$4299	Pentium-100	16	1063	ISA, PCI
13 ▼ DFI Diamond P90	10	2	84	84	[2]	$3795	Pentium-90	16	1080	ISA, PCI
14 ➤ Gateway 2000 P5-75 Family PC	–	1	84	69	73/72	$2499	Pentium-75	8	730	ISA, PCI
15 ▼ Robotech Cobra RS p90	11	3	84	84	[2]	$3160	Pentium-90	16	730	ISA, PCI
16 ▼ Tagram Thunderbolt XL	8	2	83	86	[2]	$2929	Pentium-90	16	540	ISA, PCI
17 ▼ Zeos Pantera DX4-100	14	6	83	75	71/76	$2695	DX4-100	16	720	ISA, PCI
18 ➤ ALR Evolution X/75	–	1	83	70	78/74	$3188	Pentium-75	16	1088	ISA, PCI
19 ➤ Gateway 2000 P5-90 Family PC	–	1	83	70	73/72	$2799	Pentium-90	8	730	ISA, PCI
20 ▼ MidWest Micro Elite P590	12	3	83	84	[2]	$3276	Pentium-90	16	545	ISA, PCI

[1] Call 800/434-4495 (for payment by Visa or MasterCard) or 900/903-2972 (for telephone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews ($4.95), a single capsule review plus features table and test report ($4.95), an entire month's review ($9.95), and a list of all systems tested by the PC World Test Center ($4.95). In addition, you can order next month's Top 20 charts and capsule reviews in advance (The Top 20 Flash Report, $9.95). Touch-tone phone required.

2 Quantex QP5/90W-3
Home PC with power.

3 Everex Step SP/100
Powerful Pentium-100.

4 Dell Dimension XPS P90
Revamp of hot Best Buy.

5 Austin P90
Great setup, 17-inch monitor.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number [1]	Reader service no.	Comments
15"/.28	800/223-6571	Feb 95	3184	695	Last month's no. 1 Best Buy still has top combination of power, price, and features.
17"/.26	800/288-0566	current	3200	668	Big monitor in a loaded system. Lowest-price Best Buy, but also the slowest. Top-rated home PC.
17"/.28	800/821-0806	current	3201	659	Top-rated Pentium-100, with huge hard drive, large monitor, and great performance.
15"/.28	800/613-3355	current	3202	656	Newest version of the Dell Pentium that claimed top Best Buy honors for seven months.
17"/.28	800/752-1577	Oct 94	3142	696	Loaded system with large hard drive merits serious consideration.
15"/.28	800/613-3355	Jan 95	3173	697	Corporate version of Dell's solid Pentium-90 design is as good a value as the no. 4 Dell.
15"/.28	800/613-3355	current	3203	657	The 100-MHz version of the successful Dell Pentium posted disappointing scores despite a great feature set.
14"/.28	800/223-6571	Jan 95	3172	698	Great home PC, but could use a little more RAM in a power configuration.
15"/.28	800/554-5220	Aug 94	3123	699	Solid value at a great price.
15"/.28	800/368-2237	Feb 95	3186	700	Solid minitower needs to be a few hundred dollars cheaper to earn a Best Buy.
15"/.28	800/786-6888	Feb 95	3185	701	No longer the fastest system we've tested, but still the fastest PC on the Top 20.
17"/.26	800/846-2065	current	3204	661	Most expensive system on the Top 20, but one of the fastest and loaded with extras.
17"/.26	800/275-3342	Feb 95	3188	702	Very fast, fully loaded home system.
15"/.25	800/846-2065	current	3205	662	Top-ranked Pentium-75 is a tad expensive; one of the slowest systems on the Top 20.
15"/.28	800/255-2215	Jan 95	3174	703	Fast system comes with a generous bundle of graphics software.
15"/.28	800/824-7267	Feb 95	3187	704	Fast and cheap—a solid office system.
15"/.28	800/554-5220	Oct 94	3140	705	The lone 486-based survivor on the Top 20 manages to best many Pentiums for performance.
15"/.28	800/444-4257	current	3206	652	Pricier than the Gateway Pentium-75 above but has a huge hard drive.
15"/.25	800/846-2065	current	3207	660	Latest incarnation of the Gateway Pentium-90 could use more RAM.
17"/.26	800/728-8582	Jan 95	3178	706	Lots of RAM, nice monitor, and good performance, but a lavish price to match.

[2] Insufficient customer responses to gauge service performance and reliability. For our overall evaluation, we use an average rating derived from all companies for which we have received fewer than 125 responses.

For more information about all products in this table, circle reader service no. 906.

Axik Ace Cache 466 VG2 Cutlass

PC WORLD TOP 20 3 BUDGET DESKTOP

PROS: Low price, good expandability
CONS: 14-inch monitor, one-year warranty

Jumping straight in as a Best Buy on our Budget Desktops chart is this month's entry from Axik. Christened the Ace Cache 466 VG2 Cutlass, this DX2-66 is an exceptional amount of PC for the price. Overall test scores place this handsome minitower marginally ahead of the typical DX2-66.

The $1645 price buys a well-rounded VL bus configuration, starting with 8MB of RAM, 256K of secondary cache, and a hefty 540MB Enhanced-IDE hard drive. Though the 14-inch monitor makes for slightly cramped viewing, it comes with a handy power management utility to trim your power bills. You can set the monitor's sleep mode or change screen resolution without rebooting Windows. Axik adds a 1MB 64-bit Diamond Stealth 64 graphics card.

Axik

Expandability is also good. You can add five more 16-bit ISA cards; all but one slot accept full-length cards, and four drive bays are free.

System documentation is amply illustrated and a good place to turn for an overview of each component during upgrades, but novices may be daunted by technical jargon. Fortunately, Axik technicians are available 12 hours every day except Sunday. Sure, Axik's one-year warranty is comparatively short these days, but it includes free on-site service and a policy to repair and return your system in only two business days. All in all, the low price, healthy configuration, and respectable test scores make this minitower a worthy budget desktop Best Buy. While this system doesn't have all the multimedia trappings, there'll still be plenty of room in the PC—and likely in your budget—to add them later. *Axik Computer, 800/234-2945, 408/735-1234* **Reader service no. 654**

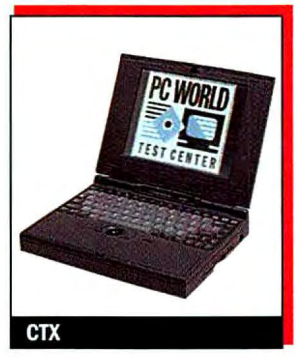
CTX EzBook

PC WORLD TOP 20 2 BUDGET MOBILE PC

PROS: Excellent price, great battery life
CONS: Nonstandard monitor connector, no weekend tech support

As in air travel, your options in a mobile computer range from first class to economy. CTX's EzBook, a monochrome DX2-50 notebook, fills the no-frills bill. This $1978 mobile may not have a lot of fancy extras, but it's got the essentials in an appealing package at a good price. You get a compact black case that weighs just 7.2 pounds yet feels solid. Equipped with 8MB of RAM and a generous (for a mobile) 340MB hard disk, the EzBook performs on a par with its DX-50 mobile peers. If you want to add peripherals, this notebook accepts one PCMCIA Type III card or two Type II devices. This rugged nomad chugged along for almost 4.5 hours in our battery-life tests. However, you can't plug a standard VGA monitor directly into it, as you can with most notebooks. Traveling presenters will need to pack the supplied special cable adapter.

We found the EzBook's keyboard comfortable to use, and the trackball, at the bottom center of the keyboard, is small but responsive. The 9.5-inch passive monochrome screen displays 64 gray shades, furnishing relatively crisp images for the technology.



CTX

CTX offers a two-year warranty on parts and labor but only one year on the screen and battery. Also, tech reps are available just 9 hours a day, weekdays only, and the company doesn't offer a money-back guarantee.

The upshot? Overall, the EzBook is a great little package for your budget dollar, sliding into the number two Best Buy slot. *CTX Int'l, 800/888-9052, 909/595-6146* **Reader service no. 655**

Dell Dimension XPS P90

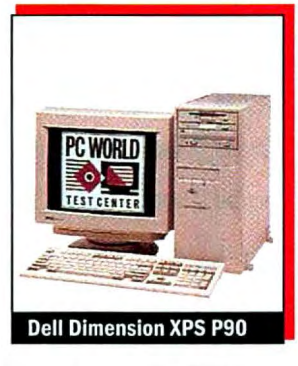
PC WORLD TOP 20 4 POWER DESKTOP

PROS: Super fast, giant hard disk, great support
CONS: One-year warranty, seven-day turnaround time on repairs

Déjà vu all over again? If this Dimension XPS P90 sounds strangely familiar, it's because it's a revamped version of the Dell Pentium-90 PC we reviewed last July that enjoyed a spectacular seven-month reign at the top of our Power Desktops Top 20.

Dell has taken a great product and made it even better. You get the same formidable features of the old PC—a colossal 1GB hard drive, 16MB of RAM, 256K of secondary cache, a CD-ROM drive, and a 15-inch monitor. However, Dell has replaced the double-speed CD-ROM drive with a triple-speed unit, installed Enhanced-IDE adapters for both the CD-ROM drive and the hard disk, and moved to a 128-bit graphics processor. The graphics card also remains high-end—it's a 32-bit PCI controller with 4MB of graphics RAM. Given all its top-of-the-line components, it's no surprise this PC conclusively outpaced the typical Pentium-90 computer.

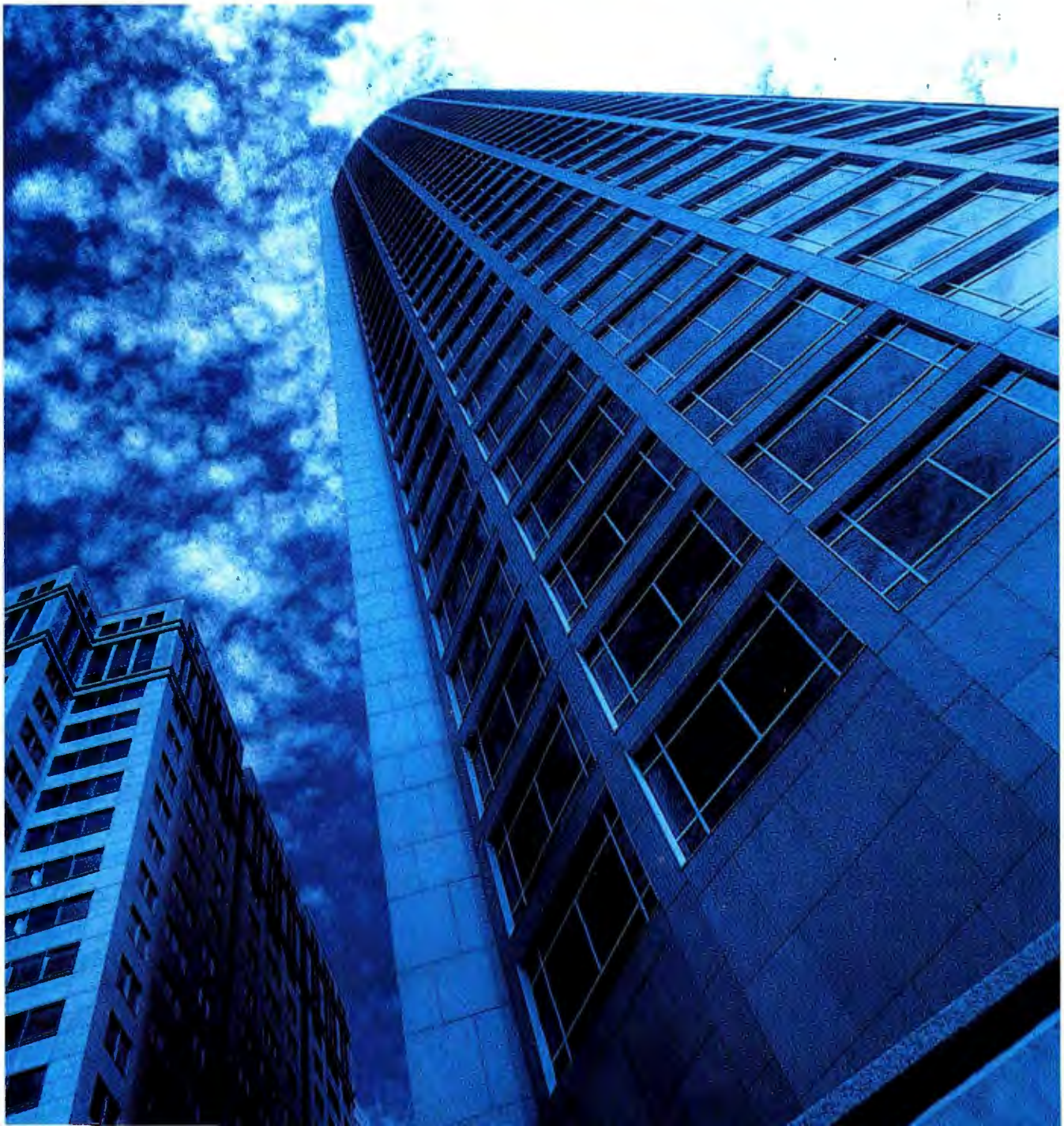
This minitower also provides plenty of room to grow. Three drive bays are at your disposal, as are one PCI and three 16-bit ISA connectors, plus one that you can use for either. The final piece of the puzzle—support—remains excellent. Tech support is available around the clock, and you also get free on-site service for the first year. The only drawbacks are the one-year warranty, which is considered marginal these days, and the seven-day turnaround time on factory repairs. Still, readers give Dell accolades in our reliability and service survey.



Dell Dimension XPS P90

Along with these enhancements, however, comes a higher price: This reincarnation sells for $600 more than its predecessor. Its $3687 price is a bit high, considering we have seen Pentium-90s with 1GB hard drives for under $3500. While no longer num- **continued on page 208**

Does the perfect office really exist?



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Jeff Newman for Marketing VP

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Formerly WordPerfect Office,™ it's our new integrated E-mail, calendaring and scheduling program.

Professional Edition
Includes all the products in PerfectOffice Standard plus Paradox® 5.0 database and AppWare™ 1.0 visual development tools.

PerfectOffice™

NOVELL.

THE PERFECT PLACE TO WORK™

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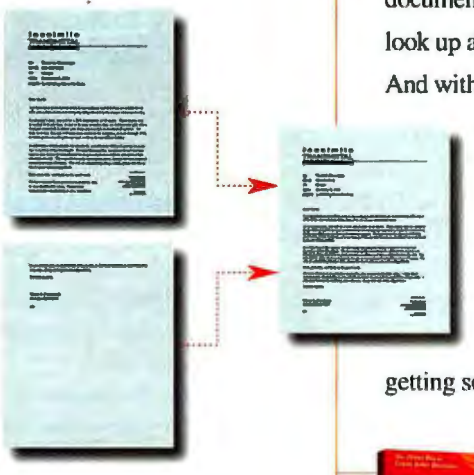
NEW WORDPERFECT 6.1 FOR WINDOWS

Introducing "Make It Fit." One of several new automation tools designed specifically to make your life easier.

NOW YOU CAN AUTOMATICALLY SHRINK (OR EXPAND) YOUR DOCUMENTS AT THE TOUCH OF A BUTTON. NEW WORDPERFECT 6.1 INSTANTLY ADJUSTS THE MARGINS, FONT SIZE AND LINE SPACING FOR YOU.



Have you ever wasted time fiddling with margins, font size and line spacing? Of course you have. But why?

Just to make your document fit a certain number of pages. Right?

We noticed. Hence our new "Make It Fit" feature. It automatically shrinks (or expands) a document to the number of pages you specify. You simply indicate the attributes you want adjusted. WordPerfect® does the rest. What else would you expect from the world's best-selling word processor?

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PerfectFit with PerfectOffice

WordPerfect is fully integrated with the other products in PerfectOffice.

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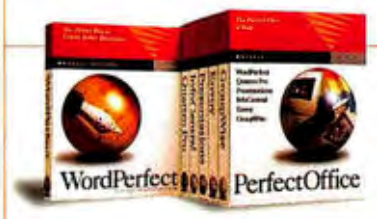
So stop asking "Why is it?" about your word processor. And start getting some answers. Pick up new WordPerfect at your local reseller. Or order directly by calling us at (800) 526-5198 today.



WordPerfect®

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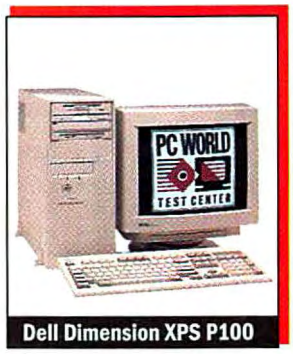
ber one, the new Dell Dimension XPS P90 is still a top-notch value, earning our Best Buy recommendation for a power desktop. *Dell Computer, 800/613-3355, 512/338-4400* **Reader service no. 656**

Dell Dimension XPS P100

PC WORLD TOP 20 — 7 POWER DESKTOP

PROS: Giant hard drive, good video
CONS: Expensive, subpar performance for a Pentium machine, one-year warranty

With the XPS P100, Dell is one of the first to hit the streets with a PC based on the mighty 100-MHz Pentium processor. Like many of its XPS-series forebears, the XPS P100 comes loaded with high-end features, among them 32MB of RAM, a 1GB hard disk, a 15-inch monitor, and a 64-bit PCI graphics controller with a whopping 4MB of VRAM. You also get a fine set of multimedia components including a sound card and a double-speed CD-ROM drive. The XPS P100 also has three free drive bays (two externally accessible) and five free slots, including one PCI, three ISA, and one shared slot.



Dell Dimension XPS P100

Support is another of Dell's strong suits. Dell has made an extremely good showing in our ongoing reader fax-back survey that rates companies' service and reliability. Policies are generally solid, with a 30-day money-back guarantee and nonstop toll-free tech support. But the one-year warranty is marginal nowadays, and we would have liked to see repair turnaround times shorter than a week.

This minitower offers impressive peripherals, huge amounts of memory and expansion, and lightning-fast graphics. But alas, it did not inherit the great speed or reasonable price of its 90-MHz kin. We expect the XPS P100 to do even better once Dell gets performance up to the expected level. *Dell Computer, 800/613-3355, 512/338-4400* **Reader service no. 657**

Diamond DT 486/100 VIP

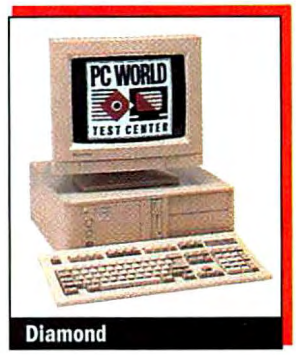
PC WORLD TOP 20 — 14 BUDGET DESKTOP

PROS: Low price, PCI and VL bus slots
CONS: Tech support not toll-free, 14-inch monitor

No doubt about it, the Diamond DT 486/100 VIP is a great deal. Although this desktop lacks some of the bells and whistles found on more expensive PCs, its 100-MHz DX4 processor puts serious power into your home or office. With expansion slots for ISA, VL, and PCI buses, this system helps protect your current investment in peripheral cards. And you'll like the price: At $1699 on the street, the Diamond DT 486/100 VIP is one of the least expensive DX4 systems you can buy.

System configuration is solid: 8MB of RAM and 256K of secondary cache are par for the course, while the 540MB Enhanced-IDE hard drive offers plenty of room for files and applications. Graphics receive a boost from the 2MB 64-bit ATI graphics board, but we were a bit disappointed with the small 14-inch monitor. In our tests, the DT 486/100 VIP lagged slightly behind a typical DX4-100 desktop.

The Diamond system boasts two free ISA slots, two free PCI slots, and a single shared space for either a PCI or a VL bus card, so users can keep one of their current VL peripherals if they wish. In addition, the DT 486/100 VIP has three free drive bays, all of which are externally accessible. On the downside, the system's I/O ports occupy one of the available expansion spaces, effectively blocking a bus slot, and we noticed moderate flex in the motherboard. Diamond's warranty covers parts and labor for three years. On-site service costs $75 per year, and technical support requires a toll call and is available only during weekday business hours. But many people will be willing to overlook these demerits to get at the impressive power that Diamond offers for such a low price. *Diamond Technologies, 800/989-7253, 714/533-9910* **Reader service no. 658**



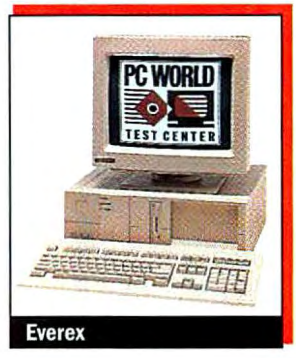
Diamond

Everex Step SP/100

PC WORLD TOP 20 — 3 POWER DESKTOP

PROS: Fast, large hard disk, good expandability
CONS: Tech support not toll-free, floppy drive could be blocked by keyboard

Cutting-edge power just keeps getting cheaper. The Everex Step SP/100 uses the hottest processor around—Intel's 100-MHz Pentium—to deliver some of the best performance we've seen in our applications tests, noticeably outpacing a typical Pentium-90 system. But the real surprise is the $3295 price, a far cry from the $4000 and upward that big-ticket computing used to demand.



Everex

The Step SP/100 comes with 16MB of RAM, 256K of secondary cache, and a cavernous 1.3GB hard drive. With an eye toward power users, the Step SP/100 includes a large 17-inch monitor and the 2MB PCI-based ATI Graphics Pro Turbo graphics accelerator—the fastest graphics board *PC World* has ever tested. What you won't get are multimedia peripherals such as a CD-ROM drive or sound board, but there's room to add them. Four externally accessible drive bays are free, as are three PCI and three 16-bit ISA slots. The system's easy-access motherboard has four free SIMM sockets.

Your investment is protected by a three-year warranty, including one year of free on-site service, though you'll pay the toll for calls to Everex's technical support—an annoyance if you don't live in the San Francisco area. But that's a minor concern when you consider the impressive Pentium-100 performance and reasonable street price—especially since you can add all the trimmings and turn this speedster into a multimedia powerhouse for less than $400. No wonder it found a home on our Power Desktops Top 20. *Everex Systems, 800/821-0806, 510/498-1111* **Reader service no. 659**

Color is color, unless you want performance *and* price.

New Phaser™140 Color Printer: $1,695.
At last there's a low-cost printer with world-class performance. It lets your business hit the ground running. Start with 360 dpi resolution on plain or glossy paper, transparency or back-print film. Pour on Pantone's certified color and Adobe™PostScript™ Level 2. Rip through image processing at RISC-speed—the fastest in its class. The Phaser 140 supports PCs, Macs, and networks simultaneously. And it's from Tektronix, a Fortune 500 leader, where value in workgroup color printers now starts at only $1,695, and doesn't stop until you finish first.

Tektronix

Free output sample, call 800-835-6100, Ext. 1073.

Circle 124 on reader service card

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THE PC WORLD TOP 20

BUDGET DESKTOPS

1 MIS Slimline 66
Solid, cheap DX2-66.

➤ New this month ◀ No change from last month ▲ Up from last month ▼ Down from last month

BEST BUYS		Last month	Months on chart	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus slots
1	◀ MIS Slimline 66	1	2	84	50	85/88	$1523	486DX2-66	8	420	ISA, VLB
2	➤ Micro Express MicroFlex-VL/80	–	1	83	57	69/71	$1549	Am486DX2-80	8	420	ISA, VLB
3	➤ Axik Ace Cache 466 VG2 Cutlass	–	1	81	47	85/65	$1645	486DX2-66	8	540	ISA, VLB
4	▼ Zeos Pantera DX2-66	2	4	81	55	71/76	$1845	486DX2-66	8	530	ISA, PCI
5	➤ Micro Express MicroFlex-VL/D6	–	1	81	47	69/71	$1349	486DX2-66	8	270	ISA, VLB
6	▲ VTech Platinum 486DX2/66 Dual	10	4	81	49	73/59	$1668	486DX2-66	16	500	ISA, VLB
7	▼ Zeos Pantera 60	3	4	81	66	71/76	$2145	Pentium-60	8	530	ISA, PCI
8	▼ Gateway P4D-66	7	10	80	46	73/72	$1884	486DX2-66	8	730	ISA, PCI
9	▼ Blackship 486DX2/66 Atlantis	4	2	80	45	71/69	$1695	486DX2-66	8	540	ISA, VLB
10	▼ Micron4100 PCI Magnum	5	6	80	62	71/83	$1999	DX4-100	8	420	ISA, VLB
11	▼ Polywell Poly 486-80VB	9	2	79	63	[2]	$1885	Am486DX2-80	8	540	ISA, VLB
12	▼ Quantex P-60	6	4	79	63	73/78	$2215	Pentium-60	16	540	ISA, PCI
13	▼ MIS M5P/60	8	2	79	52	85/86	$2223	Pentium-60	8	270	ISA, PCI
14	➤ Diamond DT 486/100 VIP	–	1	79	60	67/64	$1699	DX4-100	8	540	ISA, PCI [3]
15	▼ MIS M466T	14	4	79	36	85/86	$1540	486DX2-66	8	270	ISA, PCI
16	▲ Quantex Q486DX2/66MM-4	27	5	78	42	73/78	$1774	486DX2-66	8	540	ISA, VLB
17	▼ Gateway 2000 Family PC 4DX2-66	12	3	78	44	73/72	$1899	486DX2-66	8	731	ISA, PCI
18	▲ Vektron PCI Power Station/60	21	4	78	62	[2]	$1785	Pentium-60	8	425	ISA, PCI
19	▼ VTech Expo 486DX2-66	11	4	78	46	73/59	$1489	486DX2-66	8	540	ISA, VLB
20	➤ Netis N566 Best Buy	–	1	78	72	[2]	$2188	Pentium-66	8	730	ISA, PCI

[1] Call 800/434-4495 (for payment by Visa or MasterCard) or 900/903-2972 (for telephone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews ($4.95), a single capsule review plus features table and test report ($4.95), an entire month's review ($9.95), and a list of all systems tested by the PC World Test Center ($4.95). In addition, you can order next month's Top 20 charts and capsule reviews in advance (The Top 20 Flash Report, $9.95). Touch-tone phone required.

2 Micro Express VL/80
Fast AMD DX2-80.

3 Axik Ace Cache 466 VG2
Big drive on cheap DX2-66.

4 Zeos Pantera DX2-66
Fast four-time Best Buy.

5 Micro Express VL/D6
Rock-bottom price.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number [1]	Reader service no.	Comments
15"/.28	800/733-9188	Feb 95	3191	707	Low cost and decent performance. Scant reliability-and-service information, but what there is is good.
15"/.28	800/989-9900	current	3208	663	Fastest Best Buy also has a low price. Reliability and service scores are below average.
14"/.28	800/234-2945	current	3209	654	Solid desktop value with decent speed and a low price.
14"/.28	800/554-5220	Dec 94	3167	708	Fast for a DX2-66, member of the solid Pantera family.
14"/.28	800/989-9900	current	3210	664	Cheapest system on Top 20. Below-average reliability and service scores and a small hard drive.
15"/.28	800/815-0070	June 94	3102	709	Poor service scores, but you get a fast system with lots of RAM that can take a second processor to boost NT.
14"/.28	800/554-5220	Dec 94	3163	710	Top-rated budget Pentium, one of the fastest on the Budget Top 20.
15"/.28	800/846-2065	June 94	3096	711	Huge hard drive makes this solid desktop a good value.
15"/.28	800/531-7447	Feb 95	3192	712	Decent-value home PC with ordinary service and reliability.
14"/.28	800/223-6571	Aug 94	3125	713	Top-rated budget DX4-100 is fast and doesn't carry a big price.
14"/.28	800/999-1278	Feb 95	3194	714	AMD DX2-80 system is faster than many DX4-100s and it doesn't cost too much.
15"/.28	800/288-0566	Dec 94	3164	715	Low-cost Pentium with lots of RAM.
15"/.28	800/733-9188	Sep 94	3193	716	Cheap Pentium system needs a bigger hard drive.
14"/.28	800/989-7253	current	3211	658	Slow for a DX4-100 but very cheap.
14"/.29	800/733-9188	July 94	3195	717	Cheap desktop is also the slowest on the Top 20.
15"/.28	800/288-0566	June 94	3212	718	Full multimedia DX2-66 is loaded but slow. Big price cut catapults it onto Top 20.
14"/.39	800/846-2000	Jan 95	3180	719	Home version of no. 8 Gateway system. Costs a little more and runs a little slower, but you get sound.
15"/.28	800/725-0020	Dec 94	3213	720	Big price cut jumps basic Pentium onto chart.
15"/.28	800/815-0070	Dec 94	3165	721	Second-cheapest system on Top 20 is otherwise ordinary.
14"/.28	800/577-7526	current	3214	666	Fastest budget system has a skimpy configuration for its power processor.

[2] Insufficient customer responses to gauge service performance and reliability. For our overall evaluation, we use an average rating derived from all companies for which we've received fewer than 125 responses.
[3] Also includes VLB expansion slots.

For more information about all products in this table, circle reader service no. 907.

The ThinkPad works Including

Isn't it refreshing to talk to someone who actually listens? At IBM PC Direct™, we'll help you put together the ThinkPad® notebook that's exactly right for you. We call it CustomerFit: giving you the perfect combination of hardware, software, peripherals and accessories. And you can pay the way you prefer. Choose from most major credit cards, 36-month business leasing plans, or purchase orders for qualified customers. Of course, everything you buy is always covered by our 30-day moneyback guarantee.[1]

The ThinkPad is all the PC you really need. At the office, your ThinkPad easily slides into the optional Dock II docking station. You're ***instantly connected*** *to your printer, desktop-size monitor, keyboard or any other PC accessories.*

The ThinkPad 360CSE features the crisp, brilliant color of a 9.5" (measured diagonally) dual scan color display. With a full color palette of 256 SVGA colors, ***your work will look stunning.***

Every IBM ThinkPad from IBM PC Direct is backed by ***1-year International Warranty Service***[4] *and free technical support from the acclaimed IBM HelpCenter.®*

The ThinkPad 360CSE notebook features an Intel® 486DX2/50MHz processor with integrated math coprocessor. That's ***power to spare*** *for the toughest business applications whether you're on the road, in the office, or at home.*

You can change and swap ***hard drives in a snap.*** *Great for keeping presentations, client reports and data organized on the road.*

The Dock II is ***Plug and Play enabled*** *and conveniently allows you to dock and undock a powered-on or suspended ThinkPad.*

The Dock II even has an optional CD-ROM. A must for ***serious multimedia...*** *or even taking full advantage of many new software upgrades.*

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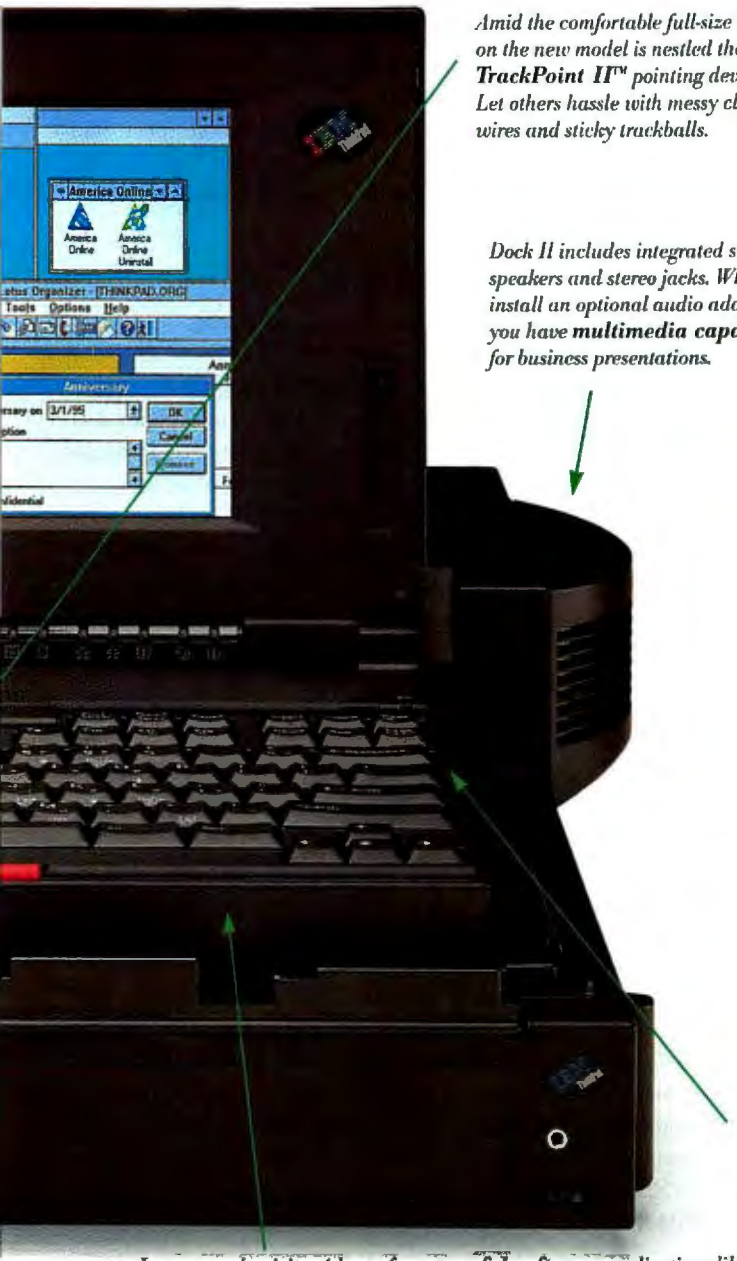

Amid the comfortable full-size keys on the new model is nestled the ***TrackPoint II™*** *pointing device. Let others hassle with messy clip-on wires and sticky trackballs.*

Dock II includes integrated stereo speakers and stereo jacks. When you install an optional audio adapter, you have ***multimedia capabilities*** *for business presentations.*

NEW!

THINKPAD 360CSE*	Dock II
Featuring dual scan color, desktop power including math coprocessor and the acclaimed IBM TrackPoint II.	**With a Dock II docking station, you can be connected to your network, printer, desktop-size monitor, keyboard or any other PC accessories. Just slide your ThinkPad in.**
For more performance	***More flexibility***
• Intel 486DX2/50MHz processor • Math coprocessor • 8KB internal cache • 4MB RAM (expandable to 20MB) • 340MB[3] HD (upgradable to 540MB)	• PCMCIA support for two Type I/II *or* one Type I/II and one Type III device • Two 5.25" storage bays for IDE or SCSI-2 devices • Two full-size 16-bit ISA slots • Includes ports for Enhanced Parallel, serial, SCSI-2, SVGA, keyboard, pointing and diskette devices
Convenient to operate	***Better communications***
• TrackPoint II pointing device • PCMCIA support for one Type III or two Type II or Type I devices • Advanced power management features • Weighs just 6.2 pounds • Battery life: 2.9-7 hours	• Integrated stereo speakers with volume control • Stereo in/out jacks • Headphone jacks • CD-ROM ready
Standard on every ThinkPad 360	***Convenient to use***
• Features a 9.5" (measured diagonally) screen • Local bus video with 1MB video memory • 1-year warranty with International Warranty Service[4] • ThinkPad EasyServ™ [5] and toll-free 24-hour HelpCenter with IBM Online Housecall during warranty • Personalized nameplate • Hundreds of dollars worth of preloaded business software • 3.5" 1.44MB removable diskette drive • Rechargeable NiMH battery and AC adapter	• Plug and Play ready to allow docking and undocking of a powered-on or suspended ThinkPad notebook • Fail-safe docking/undocking to prevent data loss • Emergency undocking capability in case of power failure • LCD System status indicators
$2999 **IBM Credit Lease $107/month[2]**	**Dock II .....$710** **Other ThinkPad options:** **CD-ROM for Dock II or Dock I .....$449** **Dock I .....$685** **Display shelf for Dock II .....$65** **IBM PCMCIA Ethernet Adapter.....$225**

Data/fax modems, network adapters and a host of other options are a snap with the PCMCIA capability of both the ThinkPad 360CSE and the Dock II. Plus PC Card Director ***makes PCMCIA support extraordinarily easy.***

Instant productivity. A host of ***very useful software*** *applications like Lotus® Organizer™ and SofNet FaxWorks™ come preloaded along with IBM DOS 6.3 and Windows™ 3.1. Access E-mail and remote faxes, support remote electronic printing, build presentations, conduct remote access PC-to-PC sessions, and more.*

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enter source code 4836.

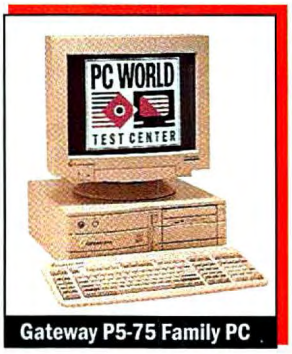
Gateway 2000 P5-75 Family PC

PC WORLD TOP 20 14 POWER DESKTOP

PROS: Home software bundle, ample hard drive

CONS: So-so reliability, no established turnaround time

Gateway clearly sees the lay of the land: Make the system perform like a business machine, but rig it up with the multimedia extras a home user craves. The newest P5 Family PC uses Intel's new Pentium-75 processor and offers good performance for a reasonable $2499 price. Its benchmark scores fall predictably between those of the average Pentium-66 and Pentium-90 PCs.



Gateway P5-75 Family PC

The hook in this desktop is in the details—a crisp 15-inch monitor is well paired with a 2MB STB PCI graphics card, and you get a CD-ROM drive, a sound card, and Altec speakers, plus a 14.4-kbps fax-modem and six CD-ROM titles. Under the hood, this P5-75 has the standard features of the Family PC line: 8MB of RAM, 256K of secondary cache, and a 730MB Enhanced-IDE hard drive. Gateway also throws in a full array of family-oriented software titles from Microsoft: Encarta 95, Cinemania 95, Golf, Money, Fine Artist, and Works. Two free externally accessible drive bays, two 16-bit slots, one PCI slot, and one shared PCI-and-ISA slot are available for upgrading and expansion.

The three-year warranty is backed by 18-hour-per-day toll-free tech support and Saturday hours as well. Gateway product reliability received average ratings in our ongoing reader fax-back survey. Happily, readers also report a high level of satisfaction with problem resolution, although 10-minute wait times for telephone support are not uncommon. Bottom line: The P5-75 is a powerful, affordable desktop suitable for home and office use. *Gateway 2000, 800/846-2065, 605/232-2000* **Reader service no. 662**

Gateway 2000 P5-90 Family PC

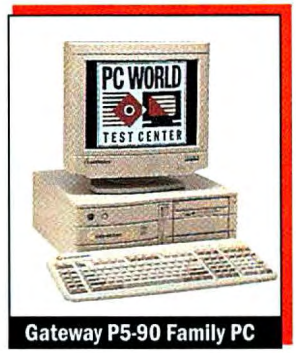
PC WORLD TOP 20 19 POWER DESKTOP

PROS: Inexpensive multimedia Pentium-90, fax-modem, three-year warranty

CONS: Slow for a Pentium-90 desktop, no established turnaround time for repairs, long hold times

Hunting for a powerful home office PC to entertain, educate, balance your books, and roam the Internet? Check out Gateway's P5-90 Family PC. Though the P5-90 lagged behind the typical Pentium-90 system in our tests, $2799 is an excellent price for a PC that's based on this fast processor and has an impressive multimedia configuration.

Gateway sweetens the pot with an assortment of Microsoft's family of CD-ROM titles, including Cinemania 95, Encarta 95, Golf, Money, and Works. You also get a double-speed CD-ROM drive and large 730MB hard drive. The system comes with 8MB of RAM and a 15-inch monitor. Along with a sound card, speakers, and a 2MB PCI graphics accelerator, Gateway provides a 14.4-kbps fax-modem. You may never feel the urge to splurge on additional peripherals, but if you do, you'll find room for four more cards (two ISA slots, one PCI, and one slot that can take either), and two drive bays are free.



Gateway P5-90 Family PC

The company's lengthy three-year warranty includes 18-hour toll-free tech support during the week and 5 hours on Saturdays. Gateway customers responding to our Reliability and Service Monitor fax-back survey say support hold times are long (about 10 minutes), but most callers were satisfied with the help they got. Quality support, low-cost Pentium speed, and robust multimedia edge Gateway's P5-90 Family PC onto our Top 20. *Gateway 2000, 800/846-2065, 605/232-2000* **Reader service no. 660**

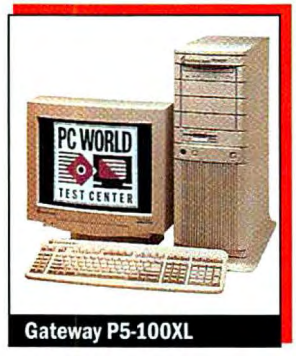
Gateway 2000 P5-100XL

PC WORLD TOP 20 12 POWER DESKTOP

PROS: Fast, 1GB hard drive, 17-inch monitor, quadruple-speed CD-ROM drive

CONS: Pricey, no established turnaround time for repairs

Gateway's P5-100XL makes multimedia systems look better than ever. One of the first units we've seen with a 100-MHz Pentium processor, the $4299 P5-100XL turned in better performance than the typical 90-MHz Pentium. The unit's 256K of secondary cache and 16MB of memory are nothing unusual, but its whopping 1GB hard drive and quadruple-speed CD-ROM drive are unexpected bonuses. You also get a sharp 17-inch monitor powered by a 2MB PCI graphics accelerator, which together furnish images at resolutions up to 1024 by 1280. A 16-bit sound card and high-quality speakers are included.



Gateway P5-100XL

The software that comes bundled with this Gateway computer is worth hundreds of dollars in its own right. The standard package includes Microsoft Office Professional (this contains Word, Excel, PowerPoint, and Access), Microsoft Bookshelf, and Microsoft Money, all on CD-ROM. You can also choose from four other bundles.

This sturdy tower system has six free drive bays, three of them externally accessible, and five free slots: One accepts a PCI card, three take ISA, and one takes either. In the 16MB configuration, all four SIMM sockets are occupied, so you will need to toss or trade in SIMMs if you want more memory.

Gateway offers a terrific three-year warranty and six-day toll-free tech support. On-site service is free, but the company has no established turnaround policy for factory repairs. Readers responding to our Reliability and Service Monitor give Gateway a slightly higher than average rating on factory repairs.

The P5-100XL's strong performance, enormous hard drive, fast CD-ROM drive, sizable software bundle, and three-year warranty propel it onto our Power Desktops honor roll. *Gateway 2000, 800/846-2065, 605/232-2000* **Reader service no. 661**

PC Magazine (UK), December 1994 Reprinted with kind permission of Ziff-Davis UK Limited.

Demand NexGen's Nx586™ Processor. Superior Performance. Unbeatable Price.

Now, you don't have to settle for a Pentium™ processor-based PC. Because there's a tough new kid on the block that delivers superior power and performance... for a *lot* less money.

It's the NexGen Nx586 processor. Manufactured by IBM Microelectronics.™* With patented RISC86™ microarchitecture that outperforms the Pentium processor, megahertz for megahertz. It's fully compatible with your DOS and Windows™ applications. And it's absolutely available right now.

So just call one of the PC suppliers listed below and ask for it by name. The Nx586 processor by NexGen. Don't buy a PC without it.

NexGen Chip Challenges Pentium Performance

PC WORLD, November 1994

System	CPU	RAM (MB)	Application test times (in minutes:seconds)
Nx586(VL) System	Nx586-P90	16	1:19 :37 1:08 1:03 1:27 1:19 1:16
Pentium System[1]	Pentium-90	16	1:15 :37 1:07 1:07 1:44 1:21 1:16

Shorter times are better.

0 1 2 3 4 5 6 7 8 9

Word 2.0 for Windows | Freelance 1.0 for Windows | 1-2-3 release 3.4
Excel 4.0 | WordPerfect 6.0 for DOS | Paradox 3.5
Paradox 1.0 for Windows

[1] Average score of six Pentium-90 systems.

Tests run on preproduction unit.
PC World Test Center application benchmarks.

Absolutely Available Right Now. Don't Buy a PC Without It!

Nx586 processor-based PCs are available from the following PC suppliers. Call the PC supplier of your choice and ask for NexGen's Nx586 processor by name.

A2 Industries
La Jolla, CA
619-452-5540

Aberdeen
Montebello, CA
800-952-6868

Add Tech Computer Inc.
Somerset, NJ
908-805-0900

AddNet Computer
Tucson, AZ
602-294-7200

Adisys Corporation
Santa Clara, CA
800-423-4797

Alaris
Fremont, CA
800-317-2348

Allied Manufacturing Group
Lodi, NJ
201-778-0707

Alpine Computer Center
Rockford, IL
815-229-0200

ASA Computers, Inc.
Santa Clara, CA
408-496-6933

Baillio's Inc.
Albuquerque, NM
505-883-7911

Blackship Computer
San Jose, CA
800-538-7447

C Point
Huntington Beach, CA
800-683-3323

City Computers
Rockville, MD
301-762-6890

Compu-Tek
Richardson, TX
800-994-0221

Computer Components
Middleton, WI
608-831-1165

Computer Discount Mart
Greenwood, IN
317-889-7220

Computer Parts Plus
San Marcos, CA
619-741-1700

Computer Resources
Englewood, CO
800-662-0034

Computer Zone
Beaverton, OR
503-626-3511

Data Storage Marketing
Boulder, CO
800-543-6098

Diamond Technologies, Inc.
Anaheim, CA
800-989-7253

Drake Systems
Tempe, AZ
800-244-7800

Duracom Computer
Irving, TX
800-351-9000

Eclektik PC's
Phoenix, AZ
602-265-4353

Fry's
Palo Alto, CA
415-496-6400

FYI Computer Source
Cincinnati, OH
513-753-1831

Gateway USA, Inc.
Westminster, CO
303-438-9500

Globe Computers
Scottsdale, AZ
800-467-0013

ICS Computer Systems Corp.
Richardson, TX
800-852-0644

Lucky Computers
Richardson, TX
214-437-3251

Luiski International
Melville, NY
516-454-8220

M.E.C.
Norcross, GA
404-447-1726

Manzil Corporation
Scottsdale, AZ
602-922-1435

Maximus
Monrovia, CA
800-394-6299

Megabyte International
Norcross, GA
404-449-8650

Micro Simplex
Mesa, AZ
800-477-6444

National Micro Computers
Salt Lake City, UT
800-424-2983

NCA Computer Products
Sunnyvale, CA
800-964-1200

Net Computers International
Dallas, TX
214-386-9300

Nexal Systems
Princeton, NJ
609-371-0003

Nictrix Corporation
Leonia, NJ
201-947-2220

Omni-Tec
Houston, TX
713-784-9791

Orientec Corp of America
El Monte, CA
818-442-1818

PC Concepts
Dallas, TX
214-328-2888

PC Express, Inc.
Richfield, MN
800-937-1100

PC Performance Centers
Englewood, CO
303-771-8030

Regals, Inc.
Tampa, FL
813-623-3302

Robotech, Inc.
Midvale, UT
801-565-0645

S.I.L Radio Shack
Truth or Consequences, NM
505-894-3442

Satara Computers
Reno, NV
702-825-9588

Systems Design Computers
San Diego, CA
619-537-3737

TAP
New Brunswick, NJ
908-247-6000

Tangent Computers
Burlingame, CA
800-800-5550

The Missing Byte Computers
Houston, TX
713-782-5557

Top Data
Sunnyvale, CA
800-888-3318

US Micro Express, Inc.
Bellevue, WA
800-874-9505

US Microtech
Milpitas, CA
408-433-9322

Victoria Computers
Quebec, Canada
1-800-VEC-3433

Vortex Computer Labs
Scottsdale, AZ
800-486-4586

West Hills LAN Systems
Chatsworth, CA
800-367-5267

MICROSOFT WINDOWS COMPATIBLE
yes it runs with NetWare
Ready! for OS/2
NEXGEN CERTIFIED

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NexGen

Micro Express MicroFlex-VL/80

PC WORLD TOP 20 2 BUDGET DESKTOP

PROS: Extremely fast for the money, good expandability

CONS: Manuals somewhat hard to read

Micro Express's MicroFlex-VL/80 is one of the first PCs we've tested that's based on AMD's new Am486DX2-80 processor, and it's a winner—this computer's performance equals that of typical Pentium-60 units. At $1549, it costs hundreds of dollars less than its similarly powered competitors. Add to these factors the system's above-average expandability, and you can see the reason this handsome minitower lands a spot as this month's second-place budget desktop Best Buy.

Micro Express VL/80

Micro Express cut remarkably few corners to keep the price low. The MicroFlex-VL/80 has 8MB of RAM, 256K of secondary cache, and a large 420MB hard disk. For graphics, a 2MB 32-bit graphics accelerator is paired with an energy-saving 15-inch flat-screen monitor. Our only complaint: Documentation can be daunting for the neophyte.

Expandability is good and includes one especially convenient feature: Four of the five free SIMM sockets hold 30-pin memory modules (the other is for 72-pin modules). That means you can recycle memory from your old PC. There's room for four more drives, and you can fit four ISA cards and two VL bus cards inside this tidy box.

Micro Express's two-year warranty provides free on-site service for one year and nonstop tech support. Calls are toll-free during business hours, but you pay the toll at other times and must wait for a callback.

You can hardly beat this combination of Pentium performance in a $1549 package from an established vendor. *Micro Express, 800/989-9900, 714/852-1400* **Reader service no. 663**

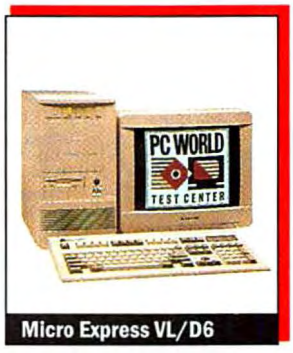
Micro Express MicroFlex-VL/D6

PC WORLD TOP 20 5 BUDGET DESKTOP

PROS: Great price, two-year warranty

CONS: Small hard drive and monitor

Shopping for a system with a rock-bottom price? Micro Express's $1349 MicroFlex-VL/D6 makes a great starter PC. With a 486DX2-66 processor, 8MB of RAM, and 256K of secondary cache, this MicroFlex completed our benchmarks slightly faster than the typical DX2-66 PC. The 270MB hard drive will serve only simple business needs, but the 1MB VLB caching controller is a nice extra. While Micro Express gives you a powerful 2MB VLB graphics card, you get only a 14-inch monitor. Four drive bays are free, and four ISA slots and one VLB slot are also available.



Micro Express VL/D6

Micro Express's two-year warranty is sure to please. Technical support is available 24 hours a day. It's toll-free during weekday business hours; at other times you call a toll number, leave a message, and wait for a call. Readers responding to our Reliability and Service Monitor give Micro Express an average rating.

The MicroFlex-VL/D6 should serve entry-level users well. With today's bulky applications, you may run out of storage space much sooner than you expect, but overall this is a good value. *Micro Express, 800/989-9900, 714/852-1400* **Reader service no. 664**

MidWest Micro Elite DX4-100

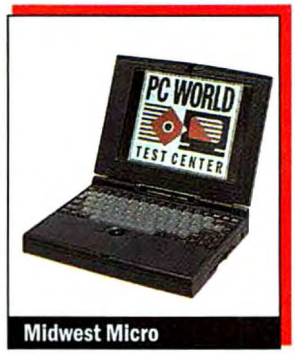
PC WORLD TOP 20 10 POWER MOBILE PC

PROS: Excellent performance, relatively low price

CONS: Heavy

The high-flying MidWest Micro Elite DX4-100 notebook is a sure ticket to fine performance—it's one of the fastest notebooks we've ever tested, and it comes with solid design and good expandability for only $2999.

Little MidWest Micro uses big-time components in this Elite notebook. A 100-MHz Intel DX4 processor is supported by an ample 12MB of RAM, while a 540MB hard drive is spacious even by desktop standards. A pair of PCMCIA slots offers excellent expandability and eliminates card shuffles; one slot accepts Type I and II cards, the other accepts Type III cards—all this on top of performance significantly better than that of the typical DX4-100 notebook.



Midwest Micro

We were pleased with the Elite's solid construction and design. The 10.3-inch dual-scan display features good contrast and color, though viewing is limited at indirect angles. The front-and-center trackball is easy to reach and offers good roll resistance, while the quiet keyboard is appropriate for public venues. There's even in-flight audio, with a built-in speaker and jacks for microphone and speakers.

Sure, there are trade-offs. At 8 pounds, the Elite is heavier than many competitors, and a tested battery life of just under 3 hours suggests the Elite is best suited for shorter hauls. MidWest Micro's one-year warranty and toll-free tech support (Saturdays included) are standard. If you need to get where you're going fast but don't want to pay full fare, the Elite DX4-100 is one of the better buys around. *MidWest Micro, 800/728-8582, 513/368-2309* **Reader service no. 665**

Netis N566 Best Buy

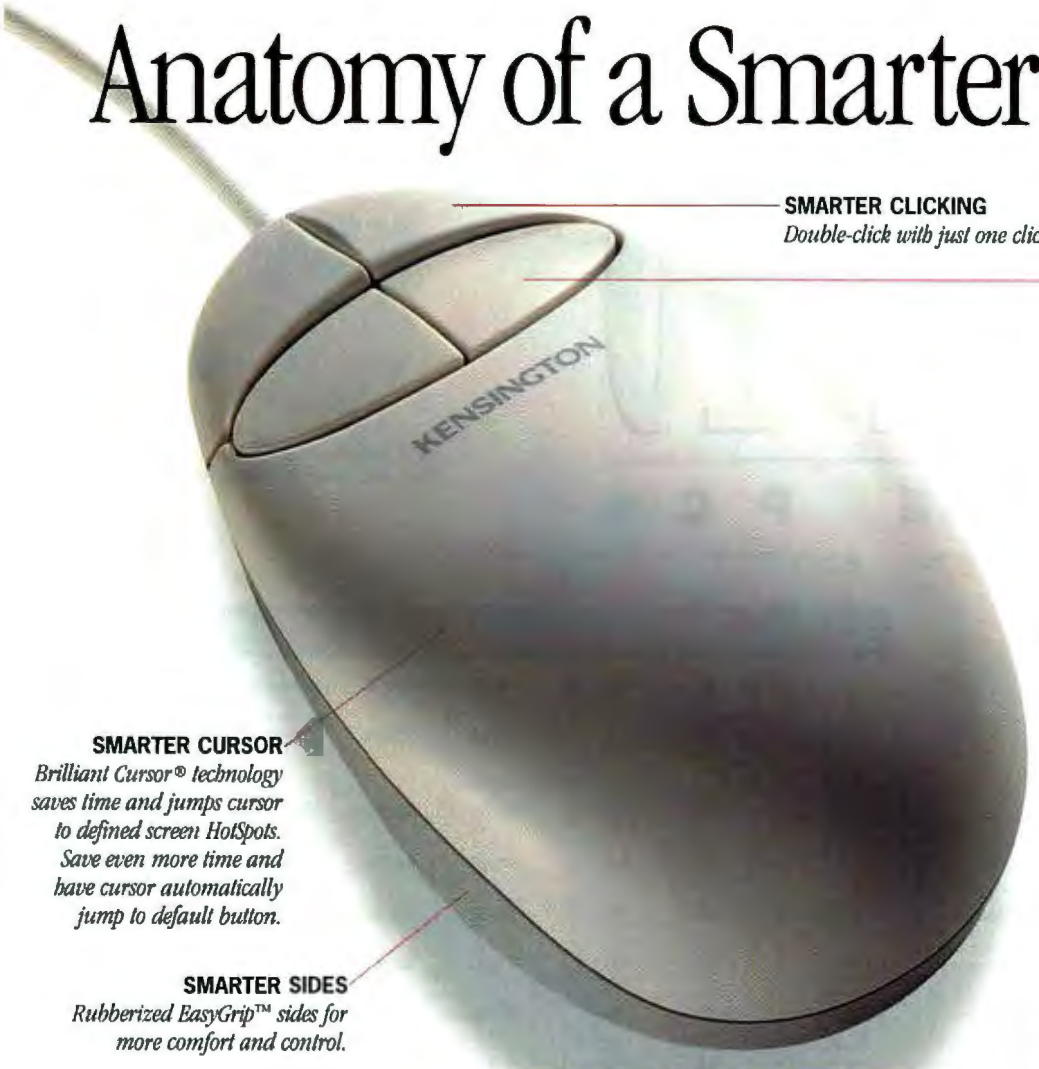
PC WORLD TOP 20 20 BUDGET DESKTOP

PROS: Inexpensive for a Pentium-66

CONS: One-year warranty

Not long ago Pentium-based systems were pie in the sky for the budget-minded PC buyer, but every month more of them land on the Budget Desktops Top 20. The Netis N566 Best Buy is another such winner, a Pentium-66 with 8MB of RAM and 256K of secondary cache. The $2188 Netis still performed a little better than the typical Pentium-66 desktop.

Anatomy of a Smarter Mouse.



SMARTER CLICKING
Double-click with just one click.

SMARTER BUTTONS
Program any mouse button to perform the following repetitive tasks:

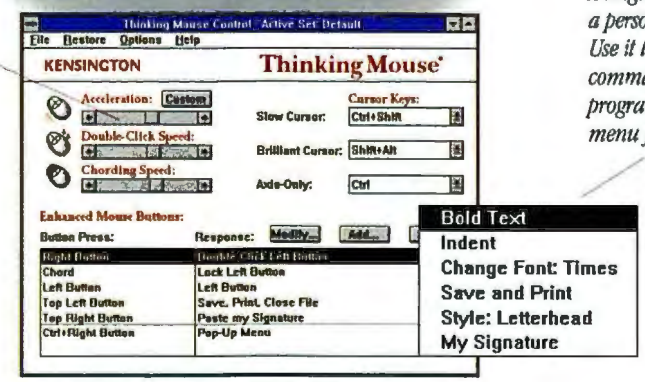
- LOCK BUTTON. *Just click once and you can drag, scroll, or highlight large blocks of text without having to hold the button down.*
- SEND KEYS. *Save time by executing multi-step commands with a single click. You can print a document, enter a block of text, log onto a network, download your e-mail, even send a fax from your fax/modem.*
- SHORTCUTS. *Work faster by automating frequently used Windows commands. You can open and close a file, copy, paste, switch to task list, and a lot more. Just click once to execute any command.*

SMARTER CURSOR
Brilliant Cursor® technology saves time and jumps cursor to defined screen HotSpots. Save even more time and have cursor automatically jump to default button.

SMARTER SIDES
Rubberized EasyGrip™ sides for more comfort and control.

SMARTER ACCELERATION
Change acceleration to match the way you work.

SMARTER WARRANTY
5-year warranty, toll-free technical support, no risk 90-Day Trial.



SMARTER MENUS
A single button click brings up a personalized pop-up menu. Use it to organize and execute commands within your favorite programs. Create a different menu for each program.

It has four programmable buttons. More than a dozen time-saving functions. You can even create a personalized pop-up menu for each of your favorite programs. And the hardware is as smart as the software—with rubberized EasyGrip™ sides for more comfort and control. Includes software for Windows, OS/2 and DOS. Available in Serial & PS/2 and Bus versions. 100% Microsoft compatible. For more information, call Kensington at 800-535-4242. Outside the US and Canada, 415-572-2700. For information by fax, call and request document 324.

Thinking Mouse
4-Button Programmable Mouse

KENSINGTON

EDITORS' HomeOffice COMPUTING PICK

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Circle 235 on reader service card

THE PC WORLD TOP 20 MOBILE PCs

1 Toshiba T4900CT
Fast, powerful Pentium-75.

➤ New this month ◀ No change from last month ▲ Up from last month ▼ Down from last month

		Last month	Months on chart	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
POWER SYSTEMS										
1	➤ Toshiba T4900CT	–	1	92	54	80/72	$7499	Pentium-75	8	810
2	▼ Compaq LTE Elite	1	6	91	37	83/80	$5429	DX4-75	8	340
3	➤ Toshiba T4850CT	–	1	90	41	80/72	$5299	DX4-75	8	504
4	◀ Austin DX4/100	4	4	89	54	72/67	$4548	DX4-100	16	500
5	▼ Austin Business Audio 4/1000	2	3	88	40	72/67	$3708	DX4-75	8	340
6	▼ Zeos Meridian 800C	3	2	87	45	67/71	$3285	DX4-100	8	340
7	◀ AST Ascentia 900N	7	6	86	35	66/65	$5098	DX4-75	8	510
8	▼ WinBook XP	5	4	86	34	[3]	$3999	DX4-75	8	520
9	▼ Dell Latitude 450C	6	4	86	30	69/74	$3297	486DX2-50	8	523
10	➤ MidWest Micro Elite DX4-100	–	1	85	50	[3]	$2999	DX4-100	12	540
BUDGET SYSTEMS										
1	◀ WinBook XP DX2/50	1	2	88	28	[3]	$2249	486DX2-50	6	255
2	➤ CTX EzBook	–	1	84	28	[3]	$1978	486DX2-50	8	340
3	▲ Austin Business Audio 4/75	4	2	83	36	72/67	$2689	DX4-75	8	250
4	▼ WinBook XP DX4/75	2	2	83	37	[3]	$2349	DX4-75	8	125
5	➤ Arm ArmNote TS30M	–	1	83	26	[3]	$1549	486DX2-50	8	200
6	▼ BSI EZBook 2000D	5	3	83	29	[3]	$2430	DX4-100	4	340
7	▼ ZDS Z-Star EX	3	2	83	29	67/74	$2248	486DX2-50	8	200
8	▼ AT&T Globalyst 200 (486SX-33)	6	4	82	26	74/75	$2570	486SX-33	8	170
9	➤ Acom Patriot 4000	–	1	82	35	[3]	$2560	486DX2-66	8	324
10	▼ CTX EzNote	7	4	81	28	[3]	$2130	486DX2-50	8	250

Best Buy

[1] CA = color active, CD = color dual-scan, CP = color passive, MD = mono dual-scan, MP = mono passive. [2] Call 800/434-4495 (for payment by Visa or MasterCard) or 900/903-2972 (for phone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews ($4.95), a single capsule review plus features table and test report ($4.95), an entire month's review ($9.95), and a list of all systems tested by the PC World Test Center ($4.95). You

2 Compaq LTE Elite
Six-time Best Buy.

1 WinBook XP DX2/50
Solid mono economy model.

2 CTX EzBook
Very cheap mono business notebook.

Weight (pounds)	Battery life (hours)	Screen type/size[1]	Vendor contact number	Issue reviewed	Fax reprint number [2]	Reader service no.	Comments
7.6	3:57	CA/10.4"	800/334-3445	current	3677	670	New no. 1 ties no. 4 for fastest note on Top 20. Huge hard drive, tons of features.
7.2	6:32	CA/9.5"	800/345-1518	Oct 94	3650	722	Fine notebook with good speed, battery life, portability, features.
8.4	4:22	CA/10.4"	800/334-3445	current	3678	669	Big screen, large hard drive, nice features, but a little heavy.
8.4	3:08	CA/9.4"	800/752-1577	Dec 94	3661	723	Ties no. 1 for fastest notebook on chart. Good audio; a great desktop replacement.
8.6	3:16	CA/9.5"	800/752-1577	Jan 95	3667	724	Good all-rounder with great sound and voice applications.
7.8	4:13	CD/10.3"	800/554-5220	Feb 95	3671	725	Cheap notebook with large screen but poor performance.
8.2	6:44	CA/10.4"	800/876-4278	Oct 94	3651	726	Big price cut helps beautifully equipped but slowish notebook hold its own.
7.4	4:26	CA/9.4"	800/468-1242	Dec 94	3660	727	Loaded, fine display, 14.4-kbps fax-modem.
7	3:13	CD/9.5"	800/613-3355	Jan 95	3668	728	Slowest power notebook has impressive features.
8	2:51	CD/10.3"	800/728-8582	current	3679	665	Cheapest power notebook gets decent performance and has a big screen.
6.8	6:46	MP/9.5"	800/468-2162	Feb 95	3673	729	Good basic mono notebook with great battery life, low price.
7.2	4:25	MP/9.5"	800/888-9052	current	3680	655	Decent standard mono notebook with a large hard drive and a low price.
8.2	3:57	CD/9.5"	800/752-1577	Feb 95	3676	730	Very fast budget notebook with good audio features.
7	5:39	CP/9.4"	800/468-2162	Feb 95	3674	731	Fastest budget notebook has good battery life but a small hard drive.
7.2	4:05	MD/9.5"	800/765-1767	current	3681	653	Cheapest budget notebook gets modest performance and decent battery life.
7.6	3:55	CD/9.5"	800/872-4547	Jan 95	3670	732	Surprisingly slow, but inexpensive for a DX4-100 notebook.
6.8	3:09	CP/9.5"	800/533-0331	Feb 95	3675	733	Modular notebook has solid design and an optional multimedia kit.
7	4:45	CD/9.4"	800/637-2600	Dec 94	3665	734	Nicely designed notebook could use a larger hard drive.
8.4	3:29	CP/10.3"	800/898-2665	current	3682	651	Big screen, good performance, and a large price.
6.8	5:12	CD/7.8"	909/595-6146	Dec 94	3664	735	Subnote with small screen, good battery life.

can also order next month's Top 20 charts and capsule reviews in advance (The Top 20 Flash Report, $9.95). Touch-tone phone required.
[3] Insufficient customer responses to gauge service performance and reliability. For our overall evaluation, we use an average rating derived from all companies for which we have received fewer than 125 responses.

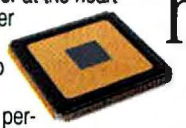
For more information about all products in this table, circle reader service no. 908.

Power Macintosh

Steve Archuleta
Director, Systems for Mass Markets Service Delivery
U S WEST, Phoenix

During the week, Steve manages the systems and processes that support 11 million customers in 14 western states. On weekends, he dotes on his granddaughter, rushes the net on the tennis court and, "when I'm feeling daring," scales the face at local rock climbing havens.

"There's leading edge. And bleeding edge. And you have to walk the line to stay competitive. That's why we use Power Macintosh. It's a RISC PC, so it's leading the way. But it's also a Mac that can run Windows and DOS, so it's compatible with everything we're doing now. That makes Power Macintosh a very safe choice. Which is good for a guy like me. I take my risks on the weekend."



The RISC-based PowerPC™ microprocessor at the heart of every Power Macintosh takes desktop computing to new levels of performance and compatibility. For the name of your nearest authorized Apple reseller, call 800-732-3131, ext. 750, today.

"In some cases, we used to have three different PCs on one desk–an absolute monument to systems failure. So that's where we put the Power Macintosh first. Now there's one PC per desk, the Power Macintosh. One happy user per desk, too."

Mac OS For Windows

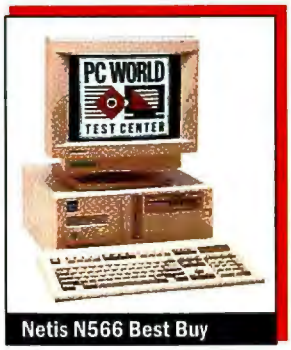
Power Macintosh™ fits right in at U S WEST, where people use many different types of PCs and 30 or so custom DOS and Windows programs. "Power Macintosh helps our people collaborate, no matter what kind of PC they use."

Power Macintosh. The business Macintosh. Apple

Adding SoftWindows™ from Insignia Solutions Inc. lets you run MS-DOS and Windows 3.1 on a Power Macintosh. © 1994 Apple Computer, Inc. All rights reserved. Apple, the Apple logo and Macintosh are registered trademarks of Apple Computer, Inc. Mac, the Mac OS logo and Power Macintosh are trademarks of Apple Computer, Inc. PowerPC and the PowerPC logo are trademarks of International Business Machines Corporation, used under license therefrom. MS-DOS is a registered trademark and Windows is a trademark of Microsoft Corporation; SoftWindows is a trademark used under license by Insignia from Microsoft Corporation.

Circle 16 on reader service card

Netis didn't skimp where it counts. A 730MB hard drive provides plenty of elbowroom, and the PC comes with a robust 2MB PCI video controller and a 14-inch monitor. Four free SIMM sockets allow up to 128MB of additional RAM. It's increasingly rare to see both 3½-inch and 5¼-inch floppy drives on a system, but this one has them. The compact case has decent expandability, with two free drive bays, three free ISA slots, and one shared slot for ISA or PCI.



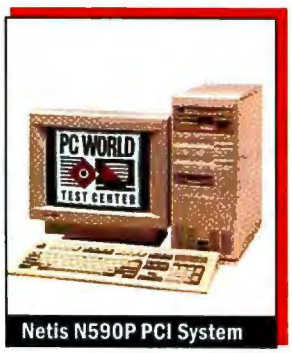
Netis N566 Best Buy

Netis's support package is typical, with Saturday hours and a fast two-day turnaround policy for repairs. Our single complaint—the meager one-year warranty, increasingly the exception as more vendors offer two- and three-year guarantees. Still, this system is an exceptional deal on a midrange Pentium machine. The Netis N566 Best Buy doesn't earn the topmost billing its name implies, but it does capture a spot on our Budget Desktops Top 20. *Netis Technology, 800/577-7526, 408/263-0368* **Reader service no. 666**

Netis N590P PCI System

PROS: True budget Pentium-90 PC, big hard drive, lots of expandability, fast graphics
CONS: One-year warranty

How inexpensive can a Pentium-90 system get? Netis is the latest company to push the limit on this, with its N590P PCI System. At $2249, this desktop is the least expensive Pentium-90 PC we've reviewed and the first one to squeak under our new, more stringent budget system price cap.



Netis N590P PCI System

The Netis N590P PCI System isn't just a stripped-down box with a motherboard. The system is nicely decked out with a 730MB Enhanced-IDE hard drive, a 15-inch monitor, and a Diamond Stealth 64 PCI graphics accelerator with a whopping 4MB of graphics memory. And although this system's 8MB of RAM is only half the usual amount for a Pentium-90 PC, performance was on a par with that of the typical Pentium-90 system. Netis leaves you plenty of room to expand. This desktop has six free expansion connectors—four ISA, one PCI, and one that can take either. The system also has four free drive bays.

Netis's service and support—a one-year warranty, a 30-day money-back guarantee, optional on-site service for $75, and 2-day turnaround policy for factory repairs—is unexceptional. Tech reps are by the phones 10 hours each weekday and on Saturdays as well.

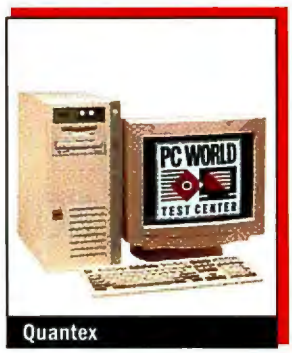
All things considered, the Netis N590P PCI System is a good deal and just missed our Budget Top 20. With its low cost and great expandability, there's probably room in both the PC and your budget to stock up on extra devices. *Netis Technology, 800/577-7526, 408/263-0368* **Reader service no. 667**

Quantex QP5/90W-3

PC WORLD TOP 20 2 POWER DESKTOP

PROS: 1GB hard drive, 17-inch monitor
CONS: One-year warranty

The Quantex QP5/90W-3 is a classic Power Desktops Top 20 system. The tower case houses a Pentium-90 CPU with 16MB of RAM and 256K of secondary cache. Not surprisingly, this PC posted scores right in line with the average Pentium-90 system. For the $2999 price, you also get a number of other prizes, including a huge 1GB Enhanced-IDE hard drive. And expandability is great: You get six free drive bays and five free expansion slots, including one for PCI, three ISA, and one shared slot.



Quantex

The system comes with a 14.4-kbps fax-modem and a CD-ROM drive. And it's impossible to dislike the 17-inch monitor, which is paired with a 64-bit 2MB PCI graphics controller. Bundled software includes Comit Lite and Delrina WinFax Lite, online service registration packages, and a CD-ROM packed with shareware.

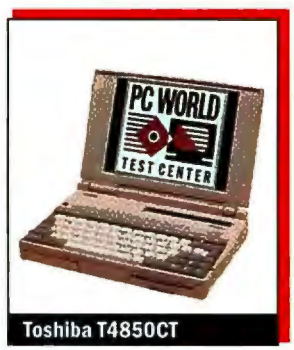
This system falls short only in support. Quantex provides just a one-year warranty, and the documentation is far from comprehensive and its information sometimes outdated. Still, you get an incredible amount of machine for the money—so much, in fact, that the Quantex QP5/90W-3 is our second-place power desktop Best Buy. *Quantex Microsystems, 800/288-0566, 908/563-4166* **Reader service no. 668**

Toshiba T4850CT

PC WORLD TOP 20 3 POWER MOBILE PC

PROS: Good performance, excellent display
CONS: Expensive, bulky

It's tough to give a good presentation on the road, but Toshiba's T4850CT tips the odds in your favor with desktop-level power, astounding graphics, and plenty of options in a well-designed notebook. The $5299 street price is steep, but the T4850CT is one of the fastest DX4-75 notebooks ever tested, posting numbers typical of a DX4-100 notebook, while the 4-hour, 22-minute battery life we found in our test is impressive.



Toshiba T4850CT

The T4850CT comes with 8MB of RAM, a 504MB hard drive, and local bus graphics. The large 10.4-inch active-matrix color display is great for presentations. Built-in audio and bundled Video for Windows software optimize the system for roadworthy presentations, while two PCMCIA slots (one Type II, one an oversized "Type IV" that can accept a Type II and a Type III device at the same time) expand your options. The T4850CT features an external side-mounted trackball that's clearly superior to integrated units, and the

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FEATURES COMPARISON: THIS MONTH'S CONTENDERS—DESKTOPS

1GB Hard Drives Become Common

● Yes
○ No
n/a = not applicable

	ALR Evolution X/75	Ajik Ace Cache 466 VG2 Cutlass (BEST BUY)	Dell Dimension XPS P90 (BEST BUY)	Dell Dimension XPS P100	Diamond DT 486/100 VIP	Everex Step SP/100 (BEST BUY)	Gateway 2000 P5-75 Family PC	Gateway 2000 P5-90 Family PC	Gateway 2000 P5-100TL
Standard features									
Street price as of 12/1/94[1]	$3188	$1645	$3687	$3899	$1699	$3295	$2499	$2799	$4299
CPU	Pentium-75	486DX2-66	Pentium-90	Pentium-100	DX4-100	Pentium-100	Pentium-75	Pentium-90	Pentium-100
CPU or upgrade socket	ZIF	ZIF	ZIF	ZIF	ZIF	ZIF	ZIF	ZIF	ZIF
BIOS	Phoenix 11/11/94	Award BIOS 4.50G	AMI 11/11/92	AMI 11/1/92	Award 8/26/94	Award 9/22/94	AMI 10/18/94	AMI 8/31/94	AMI 10/18/94
Installed/maximum RAM (MB)	16/264	8/64	16/128	32/128	8/128	16/192	8/128	8/128	16/128
30-pin or 72-pin SIMMs	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin
SIMM sockets/number free	4/2	4/3	4/2	4/2	4/3	6/4	4/2	4/2	4/0
Secondary RAM cache installed/ maximum (K)	256/256	256/1024	256/256	256/256	256/512	256/256	256/256	256/256	256/256
Case style	compact	minitower	minitower	minitower	desktop	desktop	compact	desktop	tower
Free externally accessible 3½-inch/ 5¼-inch drive bays	0/3	1/3	1/1	1/1	0/3	1/3	0/2	0/2	0/3
Free internal 3½/5¼-inch drive bays	1/0	0/0	1/0	1/0	0/0	0/0	2/0	0/0	3/0
Free 32-bit EISA/16-bit ISA/8-bit ISA expansion slots[2]	0/5/0[3]	0/5/0	0/4/0[3]	0/4/0[3]	0/2/0[3]	0/3/0	0/3/0[3]	0/3/0[3]	0/4/0[3]
PCI or VL bus slots/number free[2]	3 PCI/2[3]	2 VLB/0	3 PCI/2[3]	3 PCI/2[3]	4 PCI/3, 1 VLB/1[3]	4 PCI/3	3 PCI/2[3]	3 PCI/2[3]	3 PCI/2[3]
Hard disk	IBM	WD Caviar 2540	WD Caviar 31000	WD AC31000H	Maxtor MXT540A	Conner CFA1275A	WD Caviar AC2700	WD Caviar 2700	WD WDAC31000H
Size (MB)	1088	540	1080	1083	540	1275	730	730	1063
Adapter	integrated	Promise EIDE 2300 Plus VLB	integrated	integrated	integrated	integrated	integrated	integrated	integrated
Floppy drives (MB)	1.44	1.44	1.44	combo	1.44	1.44	1.44	1.44	1.44
Graphics adapter	ATI Mach64 PCI	Diamond Stealth 64 VLB	Number 9 Imagine 128 PCI	Number 9 Imagine PCI	ATI Mach 64 PCI	ATI Graphics Pro Turbo	STB 864 PCI	STB 864 PCI	ATI Mach 64 PCI
Installed VRAM/DRAM (MB)	2/0	1/0	4/0	4/0	0/2	2/0	0/2	0/2	2/0
Monitor	ALR Clear-View 15	MicroScan 5514GP	Dell UltraScan 15ES	Dell UltraScan 15TE	Sceptre E 447AU	ExView	Gateway CPD-F1513	Gateway CPD-F1513	Gateway Vivitron 1776
Screen diagonal (inches)/ dot pitch (mm)	15/.28	14/.28	15/.28	15/.28	14/.28	17/.28	15/.25	15/.25	17/.26
Modem speed for fax/data (kbps)	n/a	n/a	n/a	n/a	n/a	n/a	14.4/14.4	14.4/14.4	n/a
Sound board	○	○	○	SoundBlaster 16	○	○	SoundBlaster 16	OEM SoundBlaster	Ensoniq Wavetable
CD-ROM drive	○	○	Dell CDR-510	NEC CDR 260R	○	○	NEC CDR 260	NEC CDR 260	Mitsumi FX400
Data transfer rate (K/sec)	n/a	n/a	450	300	n/a	n/a	300	300	600
Parallel/serial/mouse/SCSI ports	1/2/1/0	1/2/0/0	1/2/1/1	1/2/1/0	1/2/0/0	1/2/0/0	1/2/1/0	1/2/1/0	1/2/1/0
Service and support									
Warranty (years)	5[4]	1	1[5]	1[5]	3	3	3	3	3
30-day money-back guarantee	●	●	●	●	●	●	●	●	●
On-site service first-year price	$9.95	free	free	free	$75	free	free	free	free
Repair turnaround policy (days)	3	2	7[5]	7[5]	2	2	○	○	○
Daily toll-free phone support (hours)	12	12	24	24	9[6]	9[6]	18	18	18
Weekend support	●[8]	●[8]	●	●	○	○	●[8]	●[8]	●[8]
BBS	●	●	●	●	●	●	●	●	●
Fax	●	●	●	●	○	●	●	●	●

[1] All systems priced as configured with DOS 6.0 or later version, Windows 3.1, VGA and color monitor, keyboard, and mouse or other pointing device. Selling price is direct or based on vendor estimate.

[2] VL bus slots also accept 8- and 16-bit ISA cards.

[3] One less 16-bit or VL-bus slot available when all PCI slots are filled; one less PCI slot available when all 16-bit or VL-bus slots are filled.

[4] Three years on peripheral components.

[5] Optional $199 three-year warranty with one-day repair turnaround.

	BEST BUY Micro Express MicroFlex-XL/80	BEST BUY Micro Express MicroFlex-XL/06	Neits N566 Best Buy	Neits N590P PCI System	BEST BUY Quantex QPS/90W-3
	$1549	$1349	$2188	$2249	$2999
	Am486DX2-80	486DX2-66	Pentium-66	Pentium-90	Pentium-90
	ZIF	ZIF	ZIF	ZIF	ZIF
	Award 7/25/94	Award 7/25/94	Award 7/7/94	AMI 8/23/94	AMI 8/23/94
	8/128	8/128	8/192	8/128	16/128
	30- and 72-pin	30- and 72-pin	72-pin	72-pin	72-pin
	6/5	6/5	6/4	4/2	4/2
	256/512	256/512	256/512	256/256	256/256
	minitower	minitower	compact	tower	tower
	1/3	1/3	0/2	1/2	0/3
	0/0	0/0	0/0	1/0	3/0
	0/3/1	0/4/0	0/4/0[3]	0/5/0[3]	0/4/0[3]
	3 VLB/2	3 VLB/1	3 PCI/1[3]	3 PCI/2[3]	3 PCI/2[3]
	WD Caviar 2420	WD Caviar 1270	Quantum Lightning 730A	Quantum Lightning 730A	WD AC3100DH
	420	270	730	730	1083
	Promise DC 4030 1MB VLB	Promise DC 4030 1MB VLB	OEM PCI	Integrated	Integrated
	1.44	1.44	1.2, 1.44	1.2, 1.44	1.44
	Hercules VLB	Cardex ET400/W32p VLB	Diamond Stealth 64 PCI	Diamond Stealth 64 PCI	Cirrus Logic/ ALG543X PCI
	2/0	2/0	2/0	4/0	0/2
	Micro Express FM590	Micro Express	OEM	View Magic CA 1565 CPG	Mag DX17F
	15/.28	14/.28	14/.28	15/.28	17/.26
	n/a	n/a	n/a	n/a	14.4/14.4
	○	○	○	○	○
	○	○	○	○	Sony CDU55E
	n/a	n/a	n/a	n/a	300
	2/2/0/0	2/2/0/0	1/2/0/0	1/2/0/0	1/2/0/0
	2	2	1	1	1
	●	●	●	●	●
	free	free	$75	$75	free
	2	2	2	2	1
	24[7]	24[7]	10	10	11
	●	●	●[6]	●[8]	○
	○	○	●	●	○
	●	●	●	●	●

[6] Not toll-free.
[7] Toll-free weekdays only.
[8] Saturdays only.

solid chassis and comfortable keyboard simplify life on the road. Drawbacks include the heavier-than-average 8.4-pound traveling weight. The three-year warranty is generous, and 24-hour toll-free tech support is available seven days a week. You'll pay dearly for the privilege, but the Toshiba T4850CT, our third most highly recommended power mobile this month, lets you bring the advantages of your desktop machine with you on the road. *Toshiba America Information Systems, 800/334-3445, 714/583-3000* **Reader service no. 669**

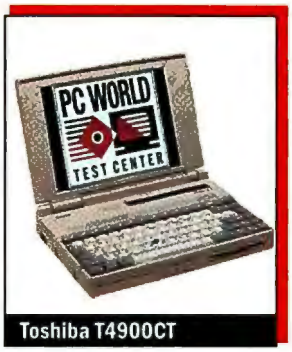
Toshiba T4900CT

PC WORLD TOP 20 1 POWER MOBILE PC

PROS: Great performance, large color-rich screen, giant hard disk, excellent support
CONS: Steep price

Heads up, power notebook seekers: Toshiba's latest, the T4900CT, redefines the high end of portable computing as our new number one power Best Buy. Let's start with performance. The T4900CT is the first notebook we've reviewed to sport Intel's new 75-MHz Pentium processor, and the test results are impressive. Equipped with 8MB of RAM, this note matched the speed of the fastest DX4-100 notes we've tested. Only MidWest Micro's Pentium-90 notebook, also reviewed this month, is faster.

This 7.6-pound computer is packed with welcome features, including a vivid and comfortably large 10.4-inch active-matrix color screen that displays more than 65,000 colors at once, an enormous 810MB hard drive, a couple of PCMCIA slots (one Type II slot and one Type III), and thoughtful ergonomics. Toshiba's notebooks are known for their comfortable, quiet keyboards, and the company's T4900CT unit is no exception. The pointing device, an eraserlike minijoystick, is very easy to get used to. The pointing-device buttons, which are conveniently mounted on the notebook's front panel, have crisp action yet are not too stiff. Our only complaint with the system's design is the nonstandard placement of the <Ctrl>, <Caps Lock>, and <Alt> keys—this reviewer kept pressing <Caps Lock> when what he really wanted was <Alt>.



Toshiba T4900CT

The notebook's battery life is very impressive. The system's Pentium-75 processor uses energy-efficient 3.3-volt technology, a factor that helped this decked-out portable powerhouse manage nearly 4 hours of computing off the battery.

We can even rave about the system's service and support. Toshiba's policies excel in all respects, including a three-year warranty and around-the-clock toll-free tech support, and the company fares very well among Toshiba owners who have responded to our Reliability and Service Monitor fax-back survey.

In short, Toshiba has fielded another first-class notebook computer. The sticker-shock $7499 price is our only major gripe. The T4900CT had no problem capturing the top spot in our Top 20 Mobile PCs power section. *Toshiba America Information Systems, 800/334-3445, 714/583-3000* **Reader service no. 670**

System Snapshots

These systems present unique and valuable solutions to end-user needs, but they rate lower as business PCs than the preceding group.

AMS SoundPro

PROS: Very fast, three-year warranty
CONS: Slightly heavy

No doubt about it, the $3554 AMS SoundPro is a tough contender among power mobiles. An above-average performer even for a DX4-100 notebook, and feature rich, this elegant black-on-black portable gives the front ranks a run for the money.

Along with 8MB of RAM and 128K of secondary cache, you get a crisp 9.5-inch active-matrix color screen, a 1MB graphics controller, and a removable 340MB hard drive. As its name suggests, the 8.2-pound SoundPro comes with fine audio capabilities, including stereo sound, a mike, and a speaker. Its 3.5-hour battery life is more than acceptable, and both the keyboard and trackball are comfortable to use. AMS backs its product well, including a three-year warranty and Saturday tech support hours. The final call? Although a tad portly, the AMS SoundPro nearly has what it takes to make our Top 20 chart. *AMS, 800/980-8889, 818/814-8851* **Reader service no. 671**

AST Ascentia 810N

PROS: Three-year warranty
CONS: Short battery life

AST has a reputation for producing powerful portables at palatable prices, and this Ascentia is no exception. Equipped with a Cyrix 486DX2V-66 CPU and 8MB of RAM, this $2956 notebook slightly outpaced the typical DX2-66 mobile. With a trim profile and sleek black casing, the 7-pound Ascentia 810N offers a crisp, 10.4-inch passive color display, a 340MB hard drive, and a PCMCIA Type III slot that can hold two Type II cards at once. Both typing and screen pointing are smooth operations; the keys and trackball have solid travel. The big disappointment is the 810N's short 2.5-hour battery life. AST offers an outstanding three-year warranty, the promise of a two-day turnaround on repairs, and 24-hour tech help from capable support representatives. Had battery life been longer, the Ascentia 810N might have made it into our Top 20. *AST Research, 800/876-4278, 714/727-4141* **Reader service no. 672**

Dell Dimension XPS P75

PROS: Inexpensive
CONS: One-year warranty

Dell is one of the first companies to offer a Pentium-75 system. While this minitower's benchmark scores are lower than expected—below those of the typical Pentium-66 PC—the price is only $2250, and that buys you a 540MB hard drive, a CD-ROM drive, a sound card, a 1MB PCI graphics accelerator, and a 15-inch monitor. The XPS P75 has six free expansion slots and two free drive bays (one externally accessible).

The standard one-year warranty on this system includes free on-site service and around-the-clock tech support. Unfortunately, turnaround time for factory repairs is seven days. Dell has received excellent ratings from the *PC World* readers who responded to our Reliability and Service Monitor fax-back survey. In the final analysis, the Dimension XPS P75 has much going for it. Slightly more pep for the price could have pushed it into the Top 20. *Dell Computer, 800/613-3355, 512/338-4400* **Reader service no. 673**

DFI MediaBook 5110T

PROS: Fast, voice-equipped fax-modem
CONS: Pricey, short battery life, extremely short five-day money-back guarantee

Looking for real speed in a mobile? The MediaBook 5110T easily bested the typical DX4-100 notebook in our tests, thanks in part to its hearty 16MB of RAM and 128K of secondary cache. You also get a 340MB hard drive and a 14.4-kbps fax-modem with voice capabilities and fax and communication software. A built-in speaker and microphone and 16-bit sound round out this somewhat expensive $4570 package. The DFI MediaBook's 9.5-inch active-matrix screen is great to look at, and the keyboard and trackball are comfortable to use. Battery life, however, is a very poor 1.5 hours. Support is acceptable, including a two-year warranty, but we were surprised by the limited five-day money-back guarantee.

The MediaBook has a lot to recommend it, but several drawbacks, including high price and short battery life, keep it well off our Top 20 list. *DFI, 800/275-3342, 916/568-1234* **Reader service no. 674**

Diamond DualPower

PROS: Fast, 703MB hard drive, dual-processor support, three-year warranty
CONS: Short tech-support hours

The competitively priced $2795 Diamond DualPower is one of the few PCs we've seen that supports two CPUs running at the same time, and this Pentium-90 PC is one of the few systems nowadays with EISA slots. The single-CPU version of the DualPower that we tested kept up easily with a typical Pentium-90—not surprising, given its 16MB of RAM and 730MB hard drive with a 1MB PCI caching controller. The video subsystem pairs a 15-inch monitor with a 2MB 64-bit PCI graphics accelerator.

The competitively priced $2795 Diamond DualPower is one of the few PCs we've seen that supports two CPUs running at the same time.

Diamond's three-year warranty includes one year of free on-site service. However, tech support is available just 9 hours a day, weekdays only. While the DualPower may be attractive to some Windows NT users, its price/performance ratio isn't strong enough to land it on our Power Desktops Top 20. *Diamond Technologies, 800/989-7253, 714/533-9910* **Reader service no. 675**

DTK Feat-39M

PROS: Above-average ratings on Reliability and Service Monitor, low price for a DX4-100
CONS: Short tech-support hours

DTK's latest tower doesn't scream bargain, but it's a good value. This DX4-100 PC comes with a 430MB hard drive, a 15-inch

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FEATURES COMPARISON: THIS MONTH'S CONTENDERS–MOBILE PCs

Fast Pentium Chips Hit the Road

● Yes
○ No
n/a = not applicable

	Acorn Patriot 4000	Arm ArmNote TS30M (BEST BUY)	CTX EzBook	MidWest Micro Elite DX4-100	Toshiba T4850CT (BEST BUY)	Toshiba T4900CT
Standard features						
Street price as of 12/12/94 [1]	$2560	$1549	$1978	$2999	$5299	$7499
CPU	486DX2-66	486DX2-50	486DX2-50	DX4-100	DX4-75	Pentium-75
Traveling weight (pounds) [2]	8.4	7.2	7.2	8	8.4	7.6
Width x depth x height (inches)	11.4 x 9 x 2.1	11 x 5.6 x 1.8	11.3 x 8.5 x 1.8	11 x 8.6 x 2.1	11.5 x 8 x 2	11.6 x 8.3 x 2.3
Installed/maximum RAM (MB)	8/32	8/20	8/32	12/20	8/24	8/40
Secondary RAM cache installed/maximum (K)	0/0	0/0	0/0	0/0	0/0	0/0
Installed/maximum hard disk (MB)	324/520	200/810	340/520	540/540	504/772	810/810
Removable hard disk	○	○	●	○	○	○
Display type	color passive	mono dual-scan	mono passive	color dual-scan	color active	color active
Screen diagonal (inches)	10.3	9.5	9.5	10.3	10.4	10.4
Maximum colors or gray shades of LCD	256	65,536	64	256	256	65,536
Simultaneous LCD and external monitor	○	●	●	●	●	●
Highest resolution of external monitor	1024 x 768	1280 x 1024	1024 x 768	1280 x 1024	1024 x 768	1024 x 768
Mouse/keyboard ports	1/0	1/0[3]	1/0[3]	1/0[3]	1/1	1/1
Cursor keys in inverted T	●	●	●	●	●	●
Dedicated page-control keys	●	●	●	●	●	●
All 12 function keys dedicated	●	●	○	●	●	●
Standard <Ctrl> and <Alt> layout	○	○	●	○	○	○
Built-in pointing device	●	●	●	●	●	●
Modem speed for fax/data (kilobits per second)	n/a	n/a	n/a	n/a	n/a	n/a
Docking station available	●	●	●	●	●	●
PCMCIA slot Type II/III	0/1[4]	0/1[4]	0/1[4]	1/1[4]	1/1[5]	1/1
Power management						
Supports APM	●	●	●	●	●	●
Type of battery	NiMH	NiMH	NiMH	NiMH	NiMH	NiMH
Suspend button	●	●	●	●	○	●
Suspends when case closed	●	●	●	●	○	○
Service and support						
Warranty (years)	1	1/3[6]	2[7]	1	3	3
30-day money-back guarantee	●	●	○	●	○	○
On-site/replacement service first-year price	free	○	○	○	$50	$50
Repair turnaround policy (days)	2	1	3	○	2	2
Daily toll-free phone support (hours)	11	11	9	11	24	24
Weekend support	○	●	○	●[8]	●	●
BBS	●	○	●	●	●	●
Fax	●	●	●	●	○	○

[1] All notebooks priced as configured with DOS 6.0 or later version, Windows 3.1, VGA monochrome or better display, and mouse or other pointing device. Price is direct or based on vendor estimate.
[2] Includes computer, adapter, power cord, and external floppy drive if notebook has one.
[3] Mouse port doubles as keyboard port.
[4] Type III slot alternatively holds two Type II devices.
[5] Larger "Type IV" slot holds a Type II and a Type III device simultaneously.
[6] One year parts, three years labor.
[7] One year for screen and battery.
[8] Saturdays only.

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programmable monitor, and a 2MB VL bus graphics controller, and it costs just $2200—markedly less than its typical peer. Not bad for a PC that performs almost as well as a typical Pentium-60 and has room to grow.

True, we weren't wowed by the support policies. Tech reps are available only 9 hours a day, weekdays only. And while DTK will replace your PC within the first month, it doesn't offer a money-back guarantee. Still, the two-year warranty is more generous than most, and the company does well in reliability and service, according to our continually updated reader fax-back survey. In short, while the Feat-39M doesn't offer enough outstanding features to land a spot on our Top 20, it's a capable, well-supported system at a fair price. *DTK Computer, 800/289-2385, 818/810-0098* **Reader service no. 676**

Everex Tempo Station

PROS: Bargain price

CONS: Poor graphics subsystem, lacks expandability

Buyers looking for an entry-level system should take note of the Everex Tempo. Based on AMD's 486DX2-66 processor, the Tempo Station features performance superior to that of the typical Intel DX2-66 desktop, along with a bargain-basement $1349 price. The Tempo Station performed significantly better than a typical PC based on Intel's 486DX2-66 processor, and its no-nonsense configuration includes 8MB of RAM, 256K of secondary cache, and a 420MB IDE hard drive. The 14-inch monitor is bare-bones, as is the 1MB local bus graphics adapter. Five slots and a pair of drive bays are free.

You get a one-year warranty, and tech support is available only during weekday business hours and requires a toll call. The verdict? The Tempo Station isn't built for heavy-duty computing, but it's a capable entry-level computer. *Everex Systems, 800/821-0806, 510/498-1111* **Reader service no. 677**

Hertz P90e

PROS: 2GB hard drive, PCI and VL bus slots

CONS: Subpar support

Hertz's entry this month offers luxury performance and multimedia in a midsize desktop case. Most remarkable is the enormous 2GB hard drive; other major attractions include a Pentium-90 CPU and 16MB of RAM. You also get a 15-inch monitor with a 2MB PCI graphics controller, a CD-ROM drive, and internal speakers. Performance is average for systems of this CPU class. The P90e offers a rare plus for upgraders: VL bus *and* PCI slots among the four free slots. Two drive bays are also at your disposal. But Hertz stumbles on its service and support policies. Apart from a fast one-day turnaround on repairs, those policies are minimal; the company doesn't offer onsite service, and it charges for tech support calls. The Hertz P90e isn't Top 20 material, but its premium configuration is impressive even for the somewhat high $3695 price. *Hertz Computer, 800/232-8737, 212/684-4141* **Reader service no. 678**

> MidWest Micro's latest is by far the fastest note we've tested. The $5049 price is hefty, but this mobile has features to tempt many a power user.

Insight PCI P60 DT

PROS: Low price, strong performance, 14.4-kbps fax-modem, 24-hour tech support

CONS: Poor showing on Reliability and Service Monitor

Insight's PCI P60 DT is a lot of system for $1958. It delivers strong performance for a Pentium-60 PC, and it's stocked with a 420MB hard drive, a 15-inch monitor, a 2MB 64-bit PCI graphics accelerator, and a 14.4-kbps fax-modem complete with fax and datacomm software. This compact also offers decent expandability: Four drive bays and six slots are free.

Where Insight falls short is in the area of support and reliability. The 24-hour technical support is great, and you get a three-year warranty on parts plus one year on labor. But there's no on-site service, and Insight systems received some of the lowest reliability ratings we've seen in our monthly reader fax-back survey. The PCI P60 DT's excellent price/performance ratio should appeal to many, but the company's poor showing on our Reliability and Service Monitor prevents this system from achieving Top 20 recognition. *Insight Direct, 800/998-8011, 602/902-1176* **Reader service no. 679**

MidWest Micro Elite Pentium SoundBook Plus

PROS: First Pentium-90 mobile, color active display, infrared data-transfer capability

CONS: Pricey, short battery life

Welcome to the first Pentium-90 notebook! MidWest Micro's latest is by far the fastest note we've tested. The $5049 price is hefty, but this mobile has features to tempt many a power user: 8MB of RAM, 256K of secondary cache, a 540MB hard drive, and a 10.4-inch active-matrix screen. There's a stereo sound system as well as an infrared port for transferring data between similarly equipped devices. However, users are beginning to expect more than the mere 2.75 hours of battery life this unit can muster.

The SoundBook Plus offers a minimal one-year warranty, although support is available on Saturdays, and there's no established turnaround time on repairs. While the Elite Pentium SoundBook Plus missed our Top 20, it should be your first stop if you're looking predominantly for speed in a notebook. *MidWest Micro, 800/728-8582, 513/368-2309* **Reader service no. 680**

NEC Versa M/75TC

PROS: Fast, exceptionally color-rich display, floppy drive bay accepts different devices

CONS: Pricey, heavy, short battery life

NEC's latest Versa, the M/75TC, has many special features, from its 9.5-inch active-matrix screen, which displays 16.8 million colors—a real bonus for on-the-road presentations—to its Versa Bay slot, which can hold a floppy drive, a second battery, a PCMCIA Type III slot, or a VideoPak—a device that lets users view TV broadcasts and VCR input on the Versa's screen.

Excellent for a DX4-75–based notebook equipped with 8MB of RAM, this Versa roared through our benchmarks, posting DX4-100 level scores. The Versa comes with a 325MB removable hard disk, 16-bit sound, and a built-in speaker and micro-

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phone. NEC's support policies are mixed: There's a one-year warranty on parts and labor, but there's also a three-year return policy, a year of responsive 24-hour toll-free technical support, and one-day turnaround on repairs. The Versa has plenty going for it, but the short 2.75-hour battery life, heavy 9-pound weight, and high $4599 price keep it off our Top 20 charts. *NEC Technologies, 800/632-4636* **Reader service no. 681**

Packard Bell Multimedia Pentium PC

PROS: Multimedia ready, 14.4-kbps fax-modem, lots of software and CD-ROM titles
CONS: Slow for its class, limited expandability

Packard Bell's Multimedia Pentium PC delivers a multimedia full house. This Pentium-90 system comes with an impressive host of peripherals and software for the surprisingly inexpensive price of $2900. You get 8MB of RAM, 256K of secondary cache, a 780MB Enhanced-IDE hard drive, a fast 14.4-kbps fax-modem, a double-speed CD-ROM drive, a sound board, and a 15-inch monitor, in addition to Global Village's easy-to-use FaxWorks software plus a generous stack of CD-ROM titles.

But alas, this system lacks some zip for its processor class, recording scores that are slower than those of a typical Pentium-66. The slimline case saves desktop space, but you pay a price in expandability: Only one drive bay and three expansion slots are unoccupied. The one-year warranty is minimal, but toll-free support is available round the clock. Even so, Packard Bell service rates poorly in our fax-back survey—one reason we couldn't rank this system higher. *Packard Bell, 800/733-5858* **Reader service no. 682**

The Poly 5100P5, Polywell's Pentium-100 entry, is the speediest desktop we've tested. It easily beat out the other three Pentium-100 PCs we looked at.

PDS Netstation 90

PROS: Lightning speed, quadruple-speed CD-ROM drive, three-year warranty
CONS: Pricey, 14-inch monitor

PDS's Netstation 90 is *fast*. Supported by 16MB of RAM, 256K of secondary cache, and 64-bit PCI video, this screamer finished near the top in all our tests. Top speed plus multimedia add up to one impressive PC.

This Pentium-90 PC has a 730MB Enhanced-IDE hard disk and a combo floppy drive. Four drive bays are free, as are six expansion slots, two of them PCI. The sound card, speakers, and quad-speed SCSI CD-ROM drive make this well-constructed desktop a formidable multimedia system.

A three-year parts-and-labor warranty and two-day turnaround on repairs highlight an otherwise ordinary support plan. The $3843 Netstation 90 is one of the fastest PCs we've tested, and it's impressively equipped. The bottom line, though, is that you have your choice of several similarly configured systems for considerably less money. *Paragon Development Systems, 800/966-6090, 414/567-7770* **Reader service no. 683**

Polywell Poly 5100P5

PROS: Fastest unit tested to date, 1GB hard drive
CONS: Expensive, 14-inch monitor

The Poly 5100P5, Polywell's Pentium-100 entry, holds the speed record among all the desktops we've tested. Using 16MB of RAM and 512K of secondary cache, it easily beat out the other three Pentium-100 PCs we looked at. The $42907 Poly 5100P5 comes with a huge 1GB hard drive, a 4MB PCI caching controller, and a CD-ROM drive. However, its 14-inch monitor is unexpectedly small. This full tower unit has room to grow, with four free drive bays and four free slots.

Polywell's excellent warranty covers parts for two years and labor for five, and tech reps are available six days a week. If you want the fastest system money can buy, the Poly 5100P5 is the computer for you; otherwise, consult our Top 20 charts. *Polywell Computers, 800/999-1278, 415/583-7222* **Reader service no. 684**

Zeos Meridian 400C

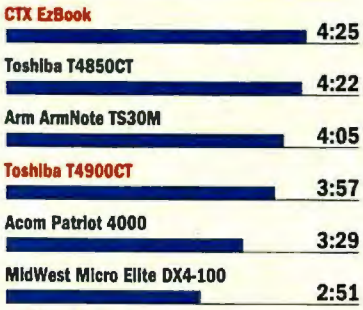
PROS: Zippy, upgradable to DX4-100
CONS: Small screen, short battery life

Zeos's Meridian 400C is a speedy 486DX2-50 subnote that tested out as fast as most DX4-75 mobiles. We were also pleased by the system's 340MB hard disk and its 1MB local bus graphics controller. You get all this for a low $2795 price.

However, a subnotebook often involves compromises in quality of components, and this Meridian is no exception in this regard, with its small 7.8-inch dual-scan color screen and external floppy drive. But the system's most serious handicap is the short 2.75-hour battery life. Zeos's support package is for the most part good. While you get only a one-year warranty, you can always reach a technician. Readers who responded to *PC World*'s ongoing Reliability and Service Monitor rate Zeos above average. Were it not for its short battery life, the Meridian 400C, an otherwise hot contender, might very well have placed on our Mobile PCs Top 20 chart. *Zeos Int'l, 800/554-5220, 612/362-1234* **Reader service no. 685**

BATTERY LIFE TEST REPORT

No Marathon Battery Life This Month



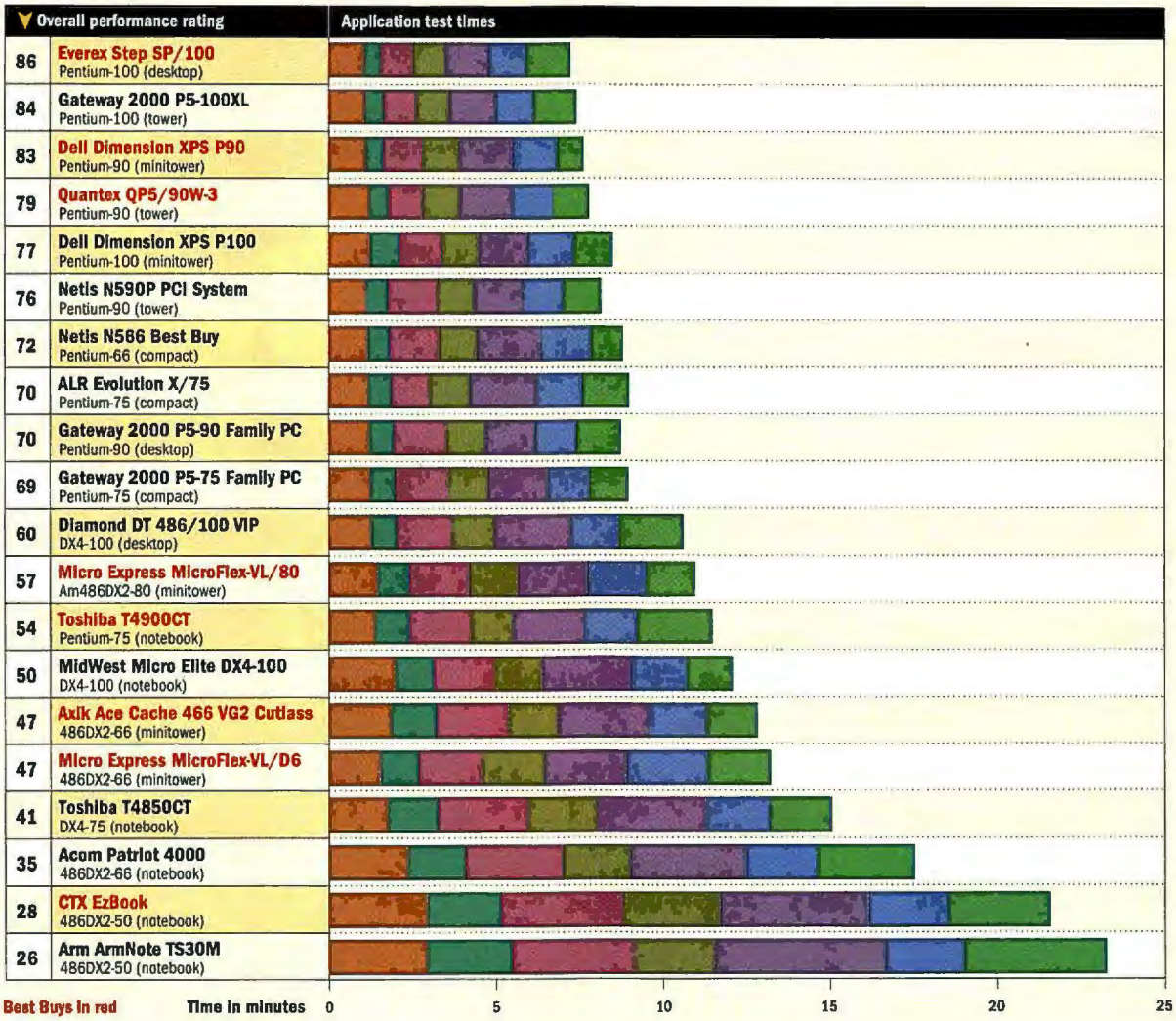
Best buys in red

Time in hours:minutes.

Methodology
We drain and fully recharge the battery and set power-saving options to match a consistent profile where possible. Office workers type at regular intervals in Word for Windows, saving periodically. Notebooks are rotated among workers to even the workloads. We report the time elapsed until the notebook shuts itself off.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

Pentium-100s Make a Smashing Debut



Systems are arranged in order of overall performance from best to worst, based on the normalized, weighted scores from seven tests. A system may have a better overall performance rating than another system that took less time to complete our test suite.

Methodology

We tested each system as supplied by the manufacturer, using the version of DOS supplied. If we installed Windows, we used the default installation. We configured Windows with an HP LaserJet III as the default printer, disabled Print Manager, and attached a null printer to LPT1. We set video resolution to 800 by 600 pixels in 256 colors using the supplied video driver where possible. We loaded the test applications and files and test automation software and scripts.

Word 2.0 for Windows

We worked with 1-, 9-, and 28-page business documents. Operations included creating, saving, opening, scrolling, editing, checking spelling, formatting, previewing, and printing.

Excel 4.0

We opened a file and performed several data extracts, entered new data, altered calculations, formatted, scrolled, moved blocks, previewed, printed, and saved.

Paradox 1.0 for Windows

We used a custom form to add a moderate number of records to an existing table, performed several queries, and generated a report.

Freelance 1.0 for Windows

We built a six-page presentation using a standard template, clip art, text, and charts; applied several views to the presentation; and previewed and saved it.

WordPerfect 6.0 for DOS

We performed a variety of editing, formatting, previewing, and printing tasks on documents ranging from a single-page memo to a long report. Due to memory requirements, the amount of free memory for DOS in the first 640K dramatically affects this test.

1-2-3 release 3.4 for DOS

Using the graphical Wysiwyg add-in and working in three different files, we created and altered formulas, built graphs, saved, and printed.

Paradox 3.5 for DOS

We tested Paradox 3.5 running under Windows in a DOS window. We entered data, searched records, updated, and generated reports from a simple customer list.

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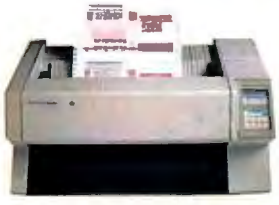

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*Source: 1994 J.D. Power and Associates Desktop PC Customer Satisfaction Study.℠ Study conducted among business users and based on 1,528 user respondents.
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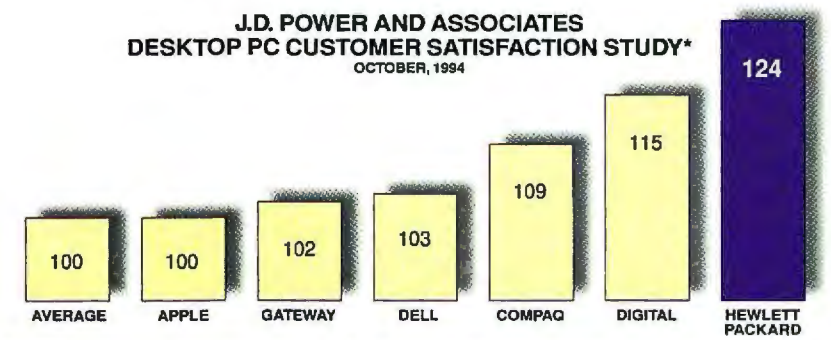

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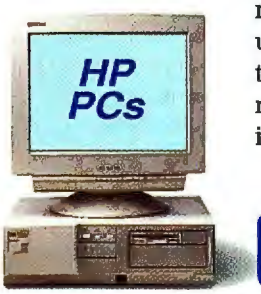

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Have you ever contacted your PC maker for service and support? Or has your PC been trouble-free? Tell us about it! Fill out and fax in the questionnaire below—even if you have no problems to report, and even if you have responded to this survey before—and we'll enter you in a drawing to win a Quantex QP5/90W-3, a Best Buy Pentium-90 PC.

HOW TO ENTER: Fax your completed questionnaire to *PC World* at 415/974-7367. Do NOT fax a cover page. If you don't have a fax machine, you can mail your survey to Fax Survey, Box 3-SS, *PC World*, 501 Second St. #600, San Francisco, CA 94107-1496. Surveys must be received by March 31.

PRIZE: One entry per person. IDG employees and their families are not eligible. One prize will be awarded through a random drawing. *PC World* will make reasonable efforts to contact prize winners at the telephone and fax numbers they provide. If *PC World* is unable to do so within 30 days of the drawing, a substitute winner will be selected. No purchase necessary. Void where prohibited by law.

HOW TO FILL OUT THE FORM: Clearly print your name (use block capital letters) and your fax number at right; fill the appropriate circle for each digit of your daytime phone number. Then fill out the rest of the questionnaire. WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES!

LAST, FIRST NAME

FAX NUMBER — —

ZIP CODE

Please fill in your daytime phone number below.

1	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○
9	○	○	○	○	○	○	○	○	○	○
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How did you get this copy of *PC World*?

○ By subscription ○ On the newsstand ○ From someone else

ABOUT YOUR PC

Who is the manufacturer of the PC you use most frequently?

○ Acer	○ Compudyne	○ Future Tech	○ Mitac	○ Tangent
○ Acma	○ Comtrade	○ Gateway 2000	○ NEC	○ Texas Instruments
○ ALR	○ Comell	○ Hewlett-Packard	○ Netis	○ Toshiba
○ Apple	○ CTX	○ Hyundai	○ Packard Bell	○ Tri-Star
○ AST	○ Dell	○ IBM	○ Panasonic	○ Twinhead
○ AT&T (NCR)	○ Diamond	○ Insight	○ Pionex	○ USA Flex
○ Austin	○ Digital (DEC)	○ Intelesys	○ Polywell	○ VTech (Expotech, Laser)
○ Axik	○ DTK	○ Leading Edge	○ Quantex	○ Winbook
○ Blackship	○ Eltech	○ Micro Express	○ Samsung	○ Zenith (ZDS)
○ Canon	○ EPS	○ Micron	○ Sharp	○ Zenon
○ Compaq	○ Epson	○ Midwest Micro	○ Swan	○ Zeos
○ CompuAdd	○ Everex	○ MIS	○ Tandy	○ Other

What size is this PC?

○ Desktop
○ Notebook/laptop
○ Hand-held

What is the CPU?

○ PowerPC
○ Pentium
○ 80486
○ 80386
○ Other

Where did you buy this PC?

○ Local dealer
○ Mail/phone order
○ Direct from field sales force
○ Membership discount store
○ Computer superstore
○ Home electronics store
○ Retail store
○ VAR
○ Other

After ordering, how long did it take to get your PC?

○ Less than 1 week
○ 1–2 weeks
○ 3–4 weeks
○ More than 4 weeks

Who set up your PC?

○ Dealer/retailer/VAR
○ Staff computer technician
○ Self or co-worker

WHEN YOU FIRST GOT YOUR PC

When did you buy this PC? (Specify month and year.)

○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 90 ○ 91 ○ 92 ○ 93 ○ 94 ○ 95

When you first set up your PC, were any components "dead on arrival" (DOA)?

○ Yes ○ No ○ Don't know

If so, which component was it? (Mark all that apply.)

○ Battery	○ Graphics/video board	○ Modem/fax board	○ Power supply
○ CD-ROM	○ Hard drive	○ Monitor/screen	○ Sound board
○ CPU	○ Keyboard	○ Motherboard	○ Other
○ Floppy drive	○ Memory	○ Mouse	

Did your problem occur only after you added your own hardware or software?

○ Yes ○ No ○ Don't know

Would you buy this brand of PC again?

○ Yes ○ No ○ Not sure

How many times have you had a problem with this PC?

○ No problem ever ○ One ○ Two ○ Three ○ Four ○ More than four

If you have had a problem that you have not reported in a previous survey, please fill out the right column. If you are reporting a DOA for the first time, skip to the service section.

NEW PROBLEM REPORT

Please answer for the most recent problem—*other than DOA*—not reported in a previous survey.

When did this problem occur? (Specify month and year.)

○ Jan ○ Feb ○ Mar ○ Apr ○ May ○ June ○ July ○ Aug ○ Sept ○ Oct ○ Nov ○ Dec
○ 90 ○ 91 ○ 92 ○ 93 ○ 94 ○ 95

How long was this after you purchased your PC?

○ Less than 1 month ○ 1–3 months ○ 4–6 months ○ 7–12 months ○ More than 12 months ○ Not sure

Did the problem occur as a result of adding new hardware or software?

○ Yes ○ No ○ Don't know

Did the problem occur under warranty?

○ Yes ○ No ○ Don't know

What was the problem finally identified as? (Mark all that apply.)

○ Faulty component ○ Wrong configuration ○ Device conflicts ○ Other
○ Incorrectly installed software ○ Faulty peripheral ○ OS problem ○ Don't know

If a component failed, which one was it? (Mark all that apply.)

○ Battery	○ Graphics/video board	○ Modem/fax board	○ Power supply
○ CD-ROM	○ Hard drive	○ Monitor/screen	○ Sound board
○ CPU	○ Keyboard	○ Motherboard	○ Other
○ Floppy drive	○ Memory	○ Mouse	

SERVICE

Please use this section to describe the service and support you received for the problem reported above or the DOA reported at left.

Who fixed your PC?

○ Manufacturer
○ Dealer/store where purchased
○ Manufacturer's authorized repair technician
○ Self ○ Other

What types of service and support did you receive? (Mark all that apply.)

○ Phone ○ On site ○ In store ○ System swap ○ Component swap ○ Factory return

If you received phone service, how long were you on hold?

○ Not at all ○ Less than 1 minute ○ 1–2 minutes ○ 3–5 minutes ○ 6–10 minutes ○ 11–20 minutes ○ More than 20 minutes

How long did it take before you talked to the person who finally helped you?

○ Less than 15 minutes ○ 15 minutes–1 hour ○ 2–5 hours ○ 6–10 hours ○ 11–24 hours ○ 1 1/2–2 days ○ 3–5 days ○ 1 week or more

How long did it take to resolve the problem completely?

○ 1–2 days ○ 3–7 days ○ 1 1/2–4 weeks ○ More than 1 month ○ Never resolved ○ Awaiting resolution

Was the problem resolved to your satisfaction?

○ Yes ○ No

How would you rate the person(s) who helped you?

	Poor		Good		Excellent
Courtesy	○	○	○	○	○
Knowledge	○	○	○	○	○
Follow-through	○	○	○	○	○

Based on the service and support you received, would you buy this brand of PC again?

○ Yes ○ No

On the whole, how satisfied are you with the service and support you received?

○ Not at all ○ ○ ○ Satisfied ○ ○ Extremely satisfied

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DELL LATITUDE XP 100MHz SYSTEM

Dell's featured computer artist is Jonathan Herbert of NY, NY.

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BUSINESS LEASE: $122/Mo.

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Notebook

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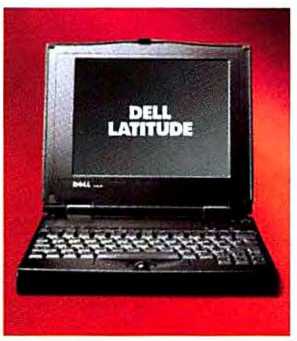
Call today to order the Dell Latitude XP. Because if you're the type to put your notebook through hell, you should get one that's already been there.



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DELL LATITUDE INTELDX4 75MHz SYSTEM

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- 9.5" DUAL SCAN COLOR
- 4MB RAM (20MB MAX RAM)
- 524MB UPGRADEABLE HARD DRIVE
- $99 MORE FOR 2ND NiMH BATTERY (Slides into floppy drive to achieve extended battery life)
- 32-BIT LOCAL BUS VIDEO, 1MB VIDEO RAM
- 2 TYPE II/1 TYPE III PCMCIA EXPANSION SLOTS
- 6 POUNDS
- 1-YEAR WARRANTY
- 30-DAY MONEY-BACK GUARANTEE

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intel inside

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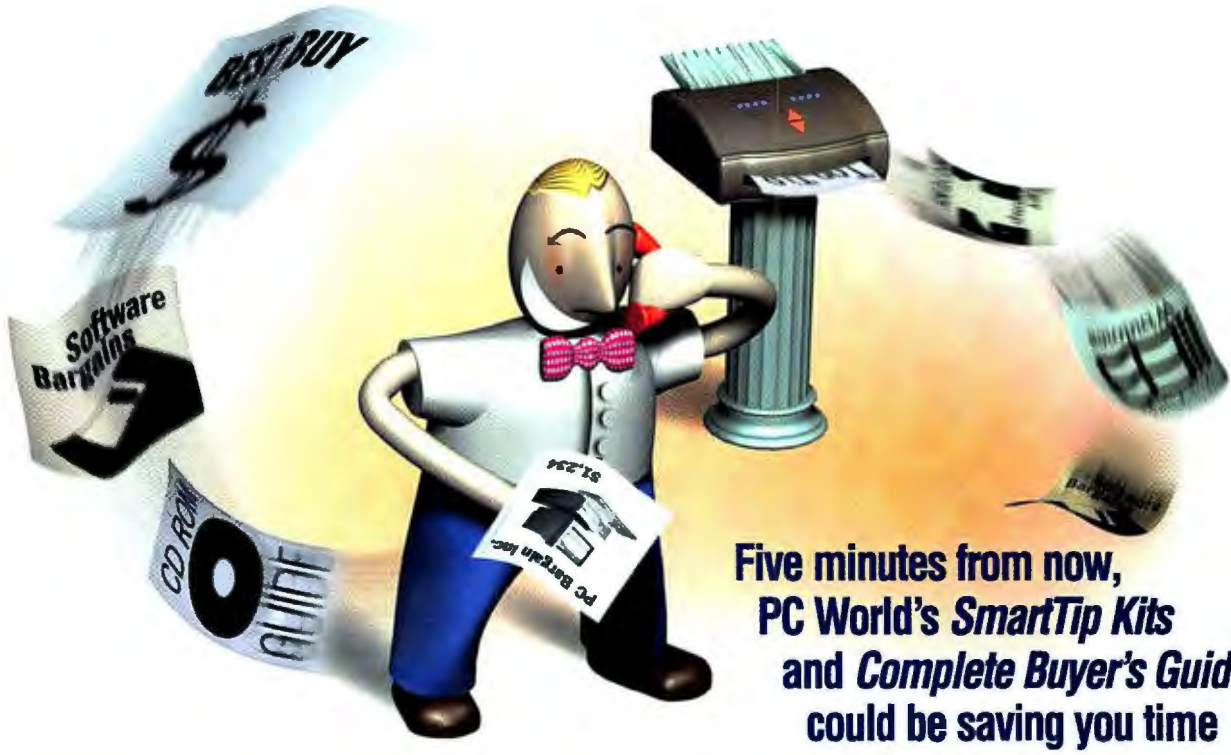
Tips by Fax!



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Top 10 Windows Accelerators: Stingray Makes Its Move

Most 64-bit graphics boards come with 2MB of RAM, since 1MB doesn't provide enough lanes into memory to take advantage of wide 64-bit and 32-bit interleaved graphics chips. The performance payoff is significant: On average, 64-bit boards boast a nine-point performance lead over 32-bit boards in the *PC World* Windows Integrated Test Suite (WITS). We still test bargain-priced 1MB boards, but only the Boca Voyager, with its cached memory design and WITS score of 69.4, comes close to Top 10 competition in value. And 2MB boards support higher resolutions and greater color depths.

64-bit boards boast a nine-point WITS performance lead over 32-bit models.

This month's contenders prove the point. All three products we tested—the Hercules Stingray 64, the Paradise Barbados 64, and the VL and PCI versions of the Matrox Impression Light—use 2MB of RAM and a 64-bit design. The PCI- and DRAM-based Stingray 64 costs $179 on the street and uses the new Ark2000PV chip from ArkLogic to earn an overall WITS score of 75 and a number five ranking on the Top 10 with an overall value score of 92. It includes Hercules' new graphics software suite, competing with products such as the ATI Graphics Xpression and the Diamond Stealth line for ease of use and features.

The Barbados 64 is powered by S3's Vision964 chip and 2MB of pricey VRAM to achieve an impressive 77.3 performance score in our WITS benchmark. Unfortunately, the relatively high $329 street price and no-frills software keep it off the Top 10. Still, it's a good buy if you work with programs that use high-resolution, 24-bit color—it offers top-notch performance at a reasonable price. The other VRAM contender this month is the $315 Matrox Impression Light, a nonupgradable model of the 2MB Impression Plus reviewed in January. The PCI version scored a solid 76.7 in our WITS benchmark—half a point behind its Impression Plus cousin—while the VL version trailed with a score of 71.1. Both boards use the same strong utilities found on the Impression Plus and come with a CD-ROM featuring three-dimensional game software that takes advantage of the boards' 3-D acceleration capabilities.

WITS was developed by Jon Peddie Associates, a PC graphics consulting firm. Jon Peddie and Fred Dunn are the firm's principal officers.

TOP 10 ACCELERATORS

➤ New this month
▲ Up from last month
◀ No change from last month
▼ Down from last month

		Overall value	Estimated street price	Windows Integrated Test Suite scores: Word 2.0 for Windows	Excel 4.0	CorelDraw 3.0	PhotoStyler 1.1	QuarkXPress 3.11	Graphics 2.01 Freelance	Overall WITS score	RAM (MB/type)[1] Bus type	Chip Driver date	Reader service number
1	◀ **STB Powergraph 64** 800/234-4334	99	$180	13.6	16.5	13.7	11.7	16.7	6.1	78.2	2 / D PCI	Trio64 7/11/94	617
2	◀ **ATI Graphics Xpression** 905/882-2600	94	$225	13.4	16.6	13.2	11.6	15.6	4.8	75.1	2 / D PCI	88800CX 4/11/94	618
3	◀ **PraeoTek FastMax P20** 800/752-8033	94	$189	13.1	16.2	13.4	11.5	15.3	6.6	76.1	2 / D PCI	Vision864 6/1/94	619
4	◀ **STB Powergraph Pro** 800/234-4334	93	$219	12.8	15.6	12.2	11.7	14.6	6.6	73.4	2 / D PCI	Vision864 5/9/94	617
5	➤ **Hercules Stingray 64** 800/532-0600	92	$179	13.8	16.0	13.7	11.8	16.0	3.8	75	2 / D PCI	Ark2000PV 10/27/94	620
6	▼ **STB LightSpeed** 800/234-4334	92	$199	12.5	14.5	12.6	11.4	14.7	5.9	71.5	2 / D VL	ET4000/W32p 4/10/94	617
7	▼ **Paradise Bahamas 64** 800/568-9272	92	$199	13.7	16.4	13.3	11.3	16.6	6.3	77.4	2 / D PCI	Vision864 7/11/94	621
8	▼ **Hercules Dynamite Power PCI** 800/532-0600	91	$199	13.2	15.2	13.3	12.8	15.3	5.7	75.5	2 / D PCI	ET4000/W32p 5/11/94	620
9	▼ **Genoa Phantom 64** 800/934-3662	90	$230	14.0	16.9	13.4	11.5	16.9	6.3	79	2 / D PCI	Vision864 8/2/94	622
10	▼ **Diamond Stealth 64 VRAM** 800/380-0030	90	$315	13.5	17.9	13.1	11.2	12.9	8.5	77.1	2 / V VL	Vision964 4/1/94	623

Methodology Boards were tested at 1024 by 768 resolution at 256 colors and a minimum 70-Hz refresh rate on a 486DX2-66 with 16MB of RAM and 256K of secondary cache. Application scores are the factor by which a board exceeds our baseline system, an unaccelerated ET4000-based VGA adapter on a 386DX-25 with 16MB of RAM. The overall value score balances performance, estimated street price, and features. The overall WITS score is the aggregate of the application scores. For all scores, higher is better.

[1] D = DRAM, V = VRAM.
[2] Comparable value offered by other bus versions tested.
For more information about all products in this table, circle reader service no. 903.

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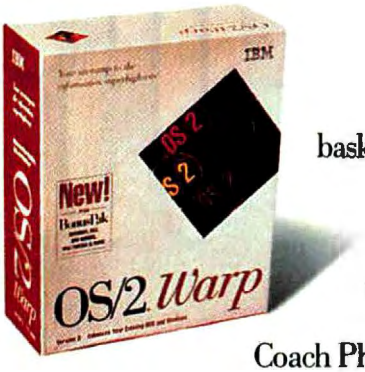
SINCE THE START
OF THE SEASON.



Before any basketball coach tries to emulate the winning ways of Coach Phil Jackson, they may want to take a peek inside his computer.

If they did, they'd see that Phil can do some pretty neat things. Like use his computer to review video of last night's game against New York. At the exact same time that he's e-mailing a respectful appeal to the League. Of course, being a game day, he's also, at the same time, using a Windows™ graphics program to jot down plays.

They might also note that Phil never has to worry about totally losing it (his programs, that is) if an application ever goes down. And that Phil can get on the Internet and other on-line services incredibly fast and easy, so he can get up-to-the-minute stats and injury reports.

In short, they'd see that Phil has OS/2 Warp, a new multitasking operating system that gives DOS and Windows* programs amazing versatility. (And anyone who's ever seen Phil coach, knows he likes versatility.)

THE WORD "TECHNICAL" DOESN'T FAZE HIM.

Now, just so there's no confusion, Phil's not letting anyone take a peek inside his computer.

OS/2 Warp is available for under $90. (Or for just slightly more than the cost of a court-side seat.) To get warped, stop by your local software dealer, or call 1 800 3 IBM-OS2. Ask for a free demo disk.

The new 32-bit, multitasking, multimedia, Internet-accessed, crash-protected, Windows-friendly, totally cool way to run your computer. **OS/2® WARP**

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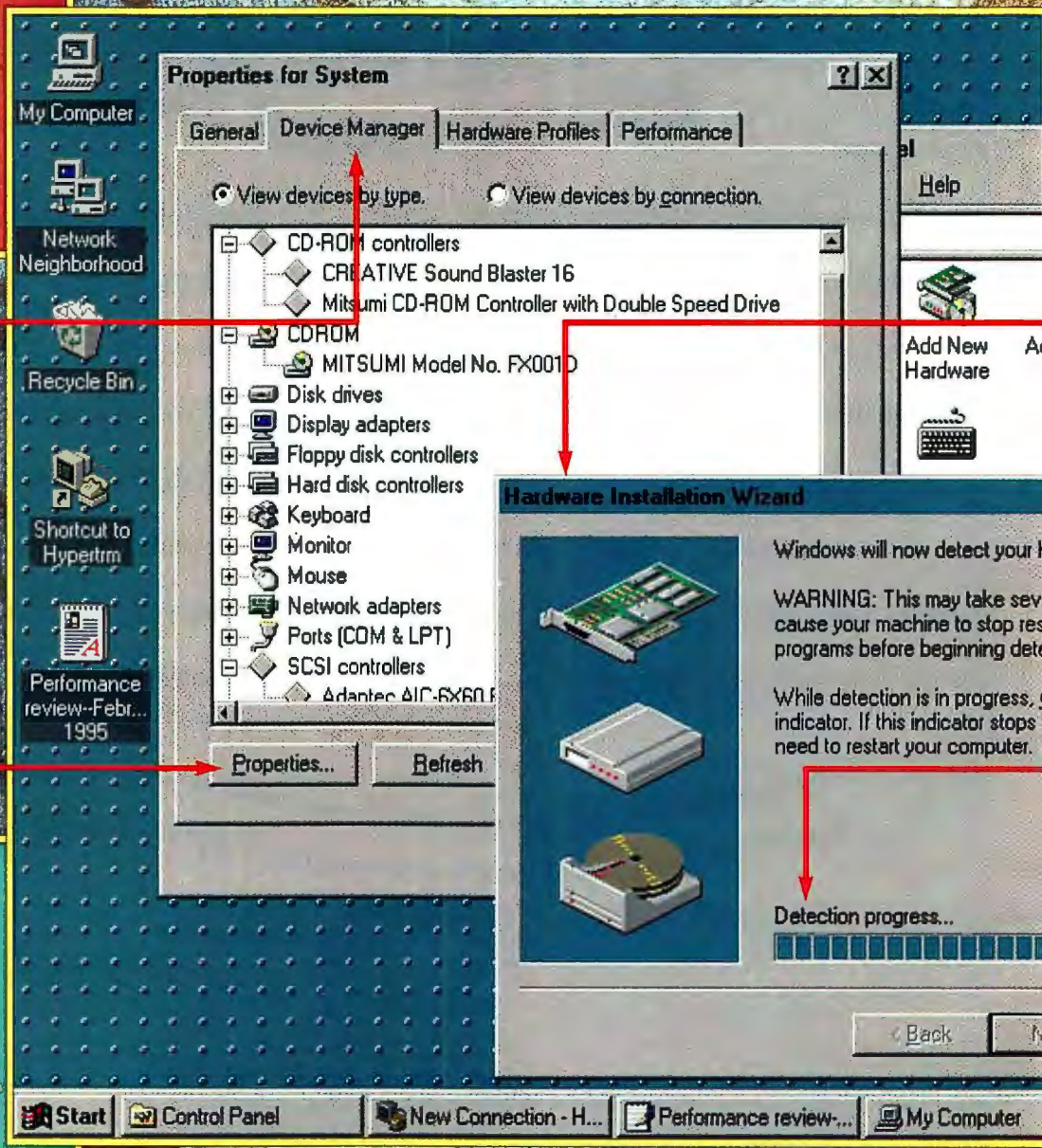
PREVIEW

Windows 95:

WILL THE PLUG AND PLAY SPECIFICATION CURE ALL YOUR HARDWARE WOES,



WINDOWS 95'S DEVICE MANAGER gives you a graphical look at all the devices installed in and attached to your computer.

NEED MORE INFORMATION ABOUT YOUR HARDWARE? Click the Properties button for details on configurations, settings, conflicts, and so on.

BACKGROUND PHOTOS: PIERRE-YVES GOAVEC; INSET PHOTOS: JOHN GREENLEIGH

Plug and Play

OR IS MICROSOFT JUST BLOWING SMOKE?

WINDOWS 95'S HARDWARE INSTALLATION WIZARD steps you through the installation of new hardware—whether it's Plug and Play or not.

AUTOMATIC HARDWARE DETECTION isn't foolproof, but it is Windows 95's best shot at identifying non–Plug and Play devices.

By Eric Knorr

Plug and Play threatens to put me out of business. I write the *Hardware* column for *PC World,* and every month I get dozens of letters and E-mail messages asking about hardware conflicts and configuration hassles: Why are CD-ROM drives such a drag to install? How should the jumpers be set on my sound card? Why won't this big, expensive monitor stop flickering? If Plug and Play lives up to its name—just plug in an expansion board, printer, mouse, or monitor, and get to work—the questions could dry up and I could spend the rest of my days playing gin rummy with the Maytag mechanic.

To see whether my services would still be required, *PC World* ordered me to the lab. I got a prerelease copy of Windows 95, a Micron Pentium-90 system with a Plug and

Play BIOS, a TI TravelMate 4000M notebook PC, and a workbench full of brand-new PnP cards, drives, printers, and monitors. After days of plugging, playing, clicking, and dragging my way through board after cable after menu after dialog box, I had installed 23 devices and experimented with countless combinations (see "A Plugger's Journal").

The results were surprisingly positive. No, PnP will not live up to Microsoft's stated goal of "PC configuration with no intervention by the user"—at least not this year, nor probably the next. Nonetheless, it quickly became clear that setting up, configuring, and upgrading PCs is about to become easier.

Exactly how much easier depends on whether you have the three ingredients of a full PnP system: a PnP BIOS, a PnP operating system (Windows 95), and PnP peripherals. In other words, there are several levels of PnP support, each with its own benefits and limitations. The level you get depends on how many of these three pieces you have in place. To help you sort through all the possible permutations, I've answered some of the most common questions about PnP. This discussion should give you a sense of what to expect, while providing guidelines for the hardware you'll need if you want to be ready for Windows 95 when it ships.

Will Plug and Play be as easy as Microsoft says?

Yes—and no. If you have Windows 95, if all your devices are PnP, and if your PC has a PnP BIOS, hardware configuration should be a no-brainer. If you don't have all those elements in place (a likely scenario for the next year or so), don't expect miracles.

Let's start with the ideal situation—a 100 percent PnP system. You've plugged in a new PnP expansion and restarted your PC. A message appears on screen to tell you Windows 95 is 'autodetecting' the new board and reconfiguring your system—that is, it's reshuffling IRQs, I/O addresses, and DMA channels (see "Inside Plug and Play") to accommodate the new device. When Windows is done, everything—unbelievably—works.

How likely is this scenario? Pretty likely, if you really have an all-PnP system (although you may have to insert one or two Windows 95 disks in the process). True, every new hardware standard—EISA, VL, PCI, you name it—has had problems in the early stages of implementation (even Carl Stork, Microsoft's director of Windows hardware programs, admits that some hardware companies "will undoubtedly mess up" initial implementations). However, the devices we tested worked remarkably well, considering we were dealing with prerelease software and, in some cases, prerelease hardware.

In addition, the commitment among hardware manufacturers to get PnP right the first time is very strong. Why? Well, consider that last year, CompUSA reported that one in four multimedia upgrade kits sold by the superstore were returned by frustrated customers. Nothing lights a fire under a hardware company like lost revenues.

Can I use my old expansion cards in a Windows 95 PnP system?

You bet. Early on, Microsoft recognized that accommodating non-PnP devices (also known as *legacy* devices) was essential for PnP to flourish. Unfortunately, the more legacy devices you install, the greater the opportunity for conflict. Neither a PnP BIOS nor Windows 95 can reconfigure legacy devices. Legacy device settings stay fixed, while the remaining resources are shared among PnP devices. If, say, one legacy device is using IRQ 3 and another is using IRQ 5, and a PnP device can use only one of those two IRQs, then you'll need to change one of the legacy card's IRQs—a manual process that generally requires setting jumpers on the card. If two legacy devices conflict, one of them won't work—or your system will lock up, just like the bad old days.

Installing a legacy device in your system is only slightly more complicated than installing a PnP device. Whatever you do when you install a legacy device, do *not* run the automatic installation program that comes with it. If you do, Windows 95 may not be aware of the card, and you'll be cruising for a conflict.

Instead, start the Hardware Installation Wizard, a utility in the Windows 95 Control Panel, *before* you plug in the legacy device. You'll get a choice of having Windows detect legacy hardware or of installing specific hardware. Choose the latter, and a long list appears, from which you choose the make and model of your device. At this point, you may also be advised to change settings on the card so it will work properly in your system.

Another approach: Install the legacy device first and ask questions later. Windows 95 won't notice the new hardware when your system boots. But if you then run the Hardware Installation Wizard's detection routine.

What You Plug Is What You Get

If you have...	HELPS YOU CONFIGURE NON-PNP HARDWARE MANUALLY	CONFIGURES PNP DEVICES AUTOMATICALLY	LOADS AND MANAGES DRIVERS AUTOMATICALLY
PnP BIOS only	No	n/a	No
Windows 95 only	Yes	n/a	Yes
Windows 95 and PnP devices only	Yes	Yes[1]	Yes
Windows 95, PnP BIOS, and PnP devices	Yes	Yes	Yes
Intel Plug and Play software only	Yes	n/a	No
Intel Plug and Play software and PnP devices only	Yes	Yes[1]	No
Intel Plug and Play software, PnP BIOS, and PnP devices	Yes	Yes	No

[1] Cannot configure PnP devices, such as the boot drive's interface card, that must start up before operating system loads.

Inside Plug and Play

Plug and Play has one objective: to help you correctly install and configure hardware—particularly expansion boards that fit in ISA slots. To understand how PnP works, you need to grasp how ISA devices use—and sometimes squabble over—the limited hardware resources in every PC.

Limited Resources

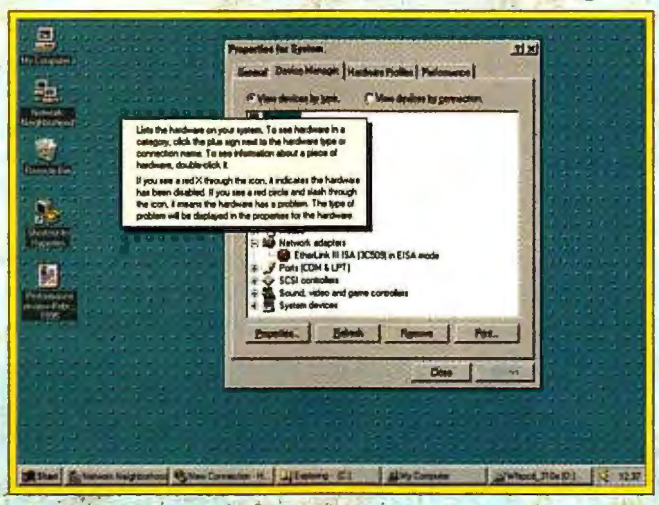
The resources that Plug and Play manages aren't the conventional system resources you deal with daily, such as disk space for applications. They're resources that allow devices (mostly expansion boards) to communicate with your PC. They fall into four categories.

Interrupt request (IRQ) lines. IRQ lines are pathways that PC devices use to signal the CPU that they need attention. Almost every device requires its own IRQ line, and a PC has only 16—half of which are often unavailable for new devices. Not only are IRQs scant, but many expansion boards let you choose from only a couple of IRQ assignments (IRQ 3, IRQ 5, and so on) during installation. If two devices try to grab the same IRQ, your system will probably lock up.

I/O port addresses. These are memory locations to which the CPU sends instructions for controlling a device. Each device should have a unique I/O port address; if two devices have the same address, your PC won't necessarily lock up immediately, but it may crash intermittently. I/O port conflicts most often occur between similar devices—two hard disk interfaces, two graphics controllers, and so on. Most devices offer a choice of at least two I/O port addresses.

DMA channels. The most efficient way for a device to exchange large blocks of data with your PC is to bypass the CPU and send data directly to, or receive data from, system memory. To do this, a device needs its own DMA (direct memory access) channel; today's PCs have eight, and five are usually free. Only certain devices want to use DMA channels—sound boards, hard disk interfaces, network cards, and scanner interface boards—and you can almost always reassign DMA channels (or disable DMA access entirely, although this slows things down). DMA conflicts won't crash your system, but they will impair performance and cause noise or dropouts with sound cards.

ROM starting addresses. Some expansion boards come with ROM (read-only memory), the contents of which are assigned locations in system memory, beginning with a starting address. If the ROMs from two devices try to use the same location, your system locks up. Sometimes you can change a device's ROM starting address; sometimes you can't.



FIND OUT HOW WINDOWS 95 IS DIVVYING UP SYSTEM RESOURCES with the help of the Device Manager configuration utility.

Today, when you add a new device, you often have to change IRQs, DMA channels, I/O port addresses, and ROM starting addresses on the device you're installing in order to avoid conflict. You may even need to reconfigure devices already installed in order to accommodate the new one. With ordinary ISA cards, you usually change settings by moving a jumper or flipping a switch on the board, though you can sometimes use a software utility to help make these changes. You need to keep a record of all the resources used by each device in your system—and to hang on to the devices' documentation in order to figure out how to set or reset jumpers and switches.

No More Switches

With PnP devices, Windows 95 and/or the PnP BIOS steps in and performs the juggling act for you. Instead of hardware switches and jumpers, PnP boards use logical switches controlled by the system. Your system also maintains a complete database of all hardware resources, so if you add a new PnP device, Windows 95 and/or the PnP BIOS reshuffles resources to accommodate it when your system boots up. If for some reason your system *can't* accommodate the new PnP device, it shuts the new device down.

The more non-PnP (or *legacy*) devices you have, the fewer resources will be available for PnP's juggling act, and the more likely some kind of conflict will occur. In a PnP system, the legacy devices call the shots, because the system has no leeway with their settings. Windows 95 (or Intel's Plug and Play software) may help you diagnose conflicts, but resolving them means that you'll have to whip out your screwdriver, remove the legacy device, and change the settings the old-fashioned way.

Living With a Legacy

Nevertheless, Windows 95 should still be helpful when you install legacy devices. Today, nearly every device requires a *device driver* (a small program that enables hardware to talk to software) to work with Windows 3.1. Many of these devices—sound boards, SCSI adapters, fax-modems, PCMCIA cards, and CD-ROM drives, for example—require a line in your CONFIG.SYS file to work with DOS.

In Windows 95, driver handling is automatic—usually, you just pick your device from a list and let the operating system copy the driver from a floppy disk—and there's no CONFIG.SYS file to mess with (except in rare cases, when a non-PnP device *demands* that CONFIG.SYS be present). Intel's PnP software automatically deals out hardware resources among PnP devices, but it does little to help you with device drivers.

Windows will probably spot the new device, as long as it's in the driver database. Install the driver and reboot your system, and your legacy device should work.

What if Windows 95 doesn't have a driver for my legacy device?

Don't sweat it. You probably don't want Microsoft's driver anyway. For best performance—whether for a legacy device or a new PnP peripheral—try to get a Windows 95 driver from the manufacturer. If the product didn't come with a driver, you can generally download one from the manufacturer's BBS or product support forum on CompuServe, America Online, or other online services. Alternatively, you can call the manufacturer and have the driver mailed to you.

If that's not an option, Windows 95 will very likely have some kind of driver for you. Glenn Thompson, Microsoft's director of hardware technical evangelism, estimates the floppy version of Windows 95 will support 80 percent of all devices on the market. The CD-ROM version will support even more, and additional drivers will be available through Microsoft Network (an online service you will be able to access directly from Windows 95).

Okay, what happens if neither the manufacturer nor Microsoft has a driver for your device? You may be able to use one of Windows 95's "compatible" drivers—one that's workable but not specifically written for the device. The Hardware Installation Wizard helps you determine which compatible driver to try. (In our tests, it correctly identified the S3 graphics controller on a legacy graphics card and suggested an S3 driver, which

A Plugger's Journal

I started with the easy stuff. Windows 95 installed smoothly on the Micron Pentium system and then identified the hard disk, floppy drive, and internal Mitsumi CD-ROM drive. So far so good. I added a Logitech mouse with similar success. Next, I plugged in a Hewlett-Packard LaserJet 4MV printer and rebooted. Windows 95 identified the printer *almost* correctly as an HP LaserJet 4V (same printer, minus PostScript), and told me it was improperly configured and that I should click 'OK' to start the Hardware Installation Wizard. There, I selected the 4MV from a list of drivers, swapped in a few Windows 95 disks as prompted, and rebooted. Again, everything worked. I was plugging, playing, and ready for more.

Grappling With Graphics

It was time for a real test. I swapped the Micron's Diamond Stealth 64 card for Number Nine's #9GXE64 PCI graphics card and hooked up NEC's PnP-compatible MultiSync XP17 monitor. Again Windows 95 led me to the Wizard, but the #9GXE64 wasn't on the list of supported graphics boards. I asked the Wizard to detect the hardware in my system. After a few long minutes, the Wizard correctly guessed my card had an S3 controller and offered to install a generic S3 driver. I accepted this suggestion, swapped in a few Windows 95 disks, and rebooted.

The system worked, with a hitch: At resolutions higher than 640 by 480, the monitor flickered badly due to a low refresh rate (the graphics card produced too few screens per second). Then I remembered: While the NEC monitor was fully PnP, the Number Nine graphics card wasn't. For a graphics card to qualify as PnP, it must *automatically* snap to the maximum refresh rate the monitor allows for a given resolution.

Fortunately, I had a real PnP graphics card (a prototype from Cirrus Logic) waiting in the wings. I swapped it in and ran the detection routine, which correctly detected the graphics controller and the PnP monitor (although not the make or model). Too bad the monitor still flickered! A Microsoft techie admitted Windows 95 was "a little behind" in providing support for PnP monitors but said this will be corrected by the time the operating system ships.

Just for yuks, I threw in a Video 7 VRAM II Ergo graphics card. Windows 95 correctly identified this legacy (circa 1990) device, even had a driver for it, and it worked like a charm.

Dickering With Drives

Next task: drive interface cards. I began by installing an Adaptec AHA 2490 SCSI adapter and connecting a Quantum SCSI drive into it. Windows 95 recognized the new hard disk as drive E: as soon as I booted the system. Then, expecting the system to unravel before my eyes, I added a second SCSI adapter—a Future Domain PnP 1630. But when I rebooted, Win-

ARE YOU A PLUGGER OR A PLAYER? Contributing Editor Eric Knorr finds that it depends on what you're trying to plug into your system and whether Windows 95 has the right driver.

INSET PHOTO: GERRY GROPP; BACKGROUND PHOTO: PIERRE-YVES GOAVEC

worked.) Failing that, Windows 95 lets you use the device's Windows 3.1 driver, though it won't perform as well as up-to-date software.

How do I upgrade to the latest driver using Windows 95?

When you install new hardware, Windows 95 does its damnedest to load its own driver for that device. To replace the automatically installed driver with the manufacturer's more up-to-date version, you'll need to use the Device Manager, a configuration utility hidden two layers deep in Control Panel. The Device Manager lists all the hardware on your system; a series of clicks takes you to the Change Driver button. Click it, and the utility asks you to insert the driver disk. This solution is none too elegant, but Microsoft considers the Device Manager to be a tool only for advanced users.

Will I still need to mess with AUTOEXEC.BAT and CONFIG.SYS?

Although a few legacy devices will still need to load drivers in AUTOEXEC.BAT or CONFIG.SYS, Windows 95 otherwise doesn't need these two files. Instead, Windows 95 organizes drivers and hardware settings in a database that ordinary mortals would do well to avoid (Microsoft does provide a database editing utility, REGEDIT, for advanced users).

THE CAST OF PLAYERS

3Com EtherLink III 3C509B *(network adapter)*
Adaptec AHA 1530 *(ISA-to-SCSI adapter)*
Adaptec AHA 2940 *(PCI-to-SCSI adapter)*
Adaptec SlimSCSI PCMCIA *(PCMCIA card, SCSI adapter)*
Cirrus Logic Plug and Play *(graphics board, demonstration unit)*
Creative Labs Sound Blaster 16 Plug and Play *(sound board)*
Future Domain PNP 1630 *(SCSI adapter)*
Hewlett-Packard LaserJet 4MV *(printer)*
Iomega Tape510 *(tape backup)*
Logitech MouseMan *(mouse)*
Maxtor Mobile Max Hard Drive *(PCMCIA card, hard drive)*
Megahertz XJ2144 *(PCMCIA card, modem)*
Mitsumi FX001DE *(CD-ROM drive)*
NEC MultiSync XP17 *(monitor)*
Number Nine #9GXE64 *(PCI graphics board)*
Socket EA+ Credit Card Ethernet Adapter *(PCMCIA card, network adapter)*
STB Systems Powergraph Pro PCI *(graphics board)*
Video 7 VRAM II Ergo *(graphics board)*
Xircom Credit Card Ethernet/Modem II *(PCMCIA card, network adapter/modem)*

dows 95 correctly recognized the drive I'd attached to the Future Domain card. I was impressed.

I had less luck with other types of drives. The system didn't recognize the Iomega Tape510 tape drive I hooked up to the parallel port, because my prerelease version of Windows 95 doesn't support tape drives. Then, when I installed a Mitsumi FX001DE CD-ROM drive, the system locked up and stayed locked until I removed the drive. Turns out the Micron's built-in CD-ROM drive used a proprietary interface, while the Mitsumi attached to an IDE card. Neither card was PnP, both of them were competing for the same resources, and Windows 95 was not able to resolve the conflict.

Navigating Networks

Normally I prefer to let the professionals handle networks, but this time I had a job to do. I plugged in a 3Com EtherLink III model 3C509B network card and rebooted. Windows 95 got the make and model of the card right, opened the Network utility in Control Panel, and informed me the network software had already been installed. This is several million times easier than setting up a network node the old-fashioned way.

Then I pulled the 3Com card, and things got ugly. Each time the system booted, I got a message saying something was wrong with my network connection. And I was unable to uninstall the network software through the Network utility. Turns out, I should have uninstalled the network software before yanking the card—not exactly intuitive. I had to use the Device Manager configuration utility to clean up the mess.

Hot-Pluggin' Notebooks

I saved the best for last. Windows 95 claims it can sense PCMCIA devices the instant they're plugged in, so I slapped Windows 95 on a TI TravelMate 4000M notebook and got to work.

Since I'd just upgraded from Windows 3.1, Windows 95's PCMCIA Wizard offered to help me remove existing PCMCIA drivers to avoid conflicts. It displayed my old SYSTEM.INI file, with the old drivers selected, and told me to make the necessary changes. Since I had no way of identifying the obscure abbreviations in the SYSTEM.INI file, I bypassed this screen and simply clicked Finish.

Hoping for the best, I inserted a Megahertz XJ2144 fax-modem. Windows 95 recognized it immediately and already had a driver for the device. A message appeared saying my system was being reconfigured—and that was it. This seamless setup repeated itself with an Adaptec SlimSCSI card and a Maxtor Mobile Max PCMCIA hard disk.

Networks once again proved to be the fly in the ointment. When I plugged in a Socket Communications EA+ Credit Card Ethernet Adapter, I was told the network software had been installed automatically. But when I removed the card, Windows 95 didn't notice. And when I rebooted the system, I got a series of ugly text messages saying important files were missing. I realized—horror of horrors—that these files were network drivers that had been listed in my old SYSTEM.INI, and that Windows 95 had deleted them.

I got Windows 95 running well enough to start Control Panel and uninstall both the network software and the Ethernet card. I then tried the whole process again with a Xircom Credit Card Ethernet/Modem II, with the same frustrating results.

But that's prerelease software for you. In the end, my surprise wasn't that Windows 95 had trouble with networks, but that everything else worked so well. Configuring hardware is about to become much, much easier.

What if something goes wrong? Once again, you'll have to resort to the Device Manager. As described, Device Manager tracks all the resources in your system, even those used by such obscure motherboard devices as the DMA controller and the programmable interrupt controller. Device Manager cleverly flags misconfigured devices and lets you to change resource assignments manually. Thanks to the monkey wrench of legacy hardware, my guess is that you may have to resort to this intimidating utility more often than Microsoft would like to admit (good news for my job security).

How do I know if my BIOS is PnP?

Most systems shipped in the last six months from major manufacturers should have one. To see for yourself, check the BIOS identification message that appears on screen as soon as you turn on your system. If you see 'Plug and Play' in the ID, you have a PnP BIOS. If you don't see a PnP message, there's a slim possibility you may still have one. PnP BIOSes aren't required to identify themselves as such, so the only way to make sure is to call your system vendor.

If I don't have a PnP BIOS and I upgrade to Windows 95, can I use PnP devices?

Yes, but your PnP experience is less likely to be painless. In a system without a PnP BIOS, Windows 95 has to configure all PnP devices. That means none of these devices will function until the system boots from the drive containing Windows 95—which is why, in a system lacking a PnP BIOS, the boot drive can't be a PnP device.

By the same token, any other devices that must power on before the system boots—the graphics controller, floppy controller, any motherboard-based serial or parallel ports—must, in a system with a non-PnP BIOS, be legacy devices. When Windows 95 has less leeway to allocate resources, Plug and Play begins to resemble the old "Plug and Pray."

A Plug and Play Buyers' Guide

Windows 95 won't arrive until August (at least), but that doesn't mean you should wait until then to buy PnP hardware. For one thing, if you've got the hardware, you'll be prepared should you upgrade to Windows 95. Besides, PnP hardware shouldn't cost any more than the non-PnP variety, and it will be fully compatible with Intel's PnP software, an interim remedy that runs today under DOS and Windows 3.1.

We considered compiling a list of vendors who are selling (or will soon sell) PnP devices. The problem was, the list changes every day. Every major BIOS company—Phoenix, AMI, Award, and Quadtel—is already on board, and most of the major peripherals manufacturers are either shipping PnP products or are prepared to do so soon. The big exception: Microsoft predicts that few PnP IDE interface cards will be ready by Windows 95's ship date.

Your problem as a buyer is that the term *plug and play* has been used loosely for some time now. Sometimes it means the product is easy to install under ideal circumstances; other times it means the device has been certified as compatible with the Microsoft/Intel Plug and Play specification. You want the latter. If this isn't clear from the box, call the manufacturer and persist until you get a straight answer. And because Plug and Play is a new specification, you should also look for a 30-day money-back guarantee, with no restocking fee.

If you're in the market for a new system, ask for a PnP BIOS. The best PnP BIOSes will support Extended System Configuration Data (ESCD); if it's a toss-up between two systems with PnP BIOSes, go for the one with ESCD. (Verifying this capability may require some close questioning of a sales rep, who will probably have to get back to you.) It's also a good idea to buy a system that has a *flash BIOS*—one that can be upgraded using a utility from the system manufacturer. If there are any kinks in PnP technology, an upgradable BIOS may give you added opportunity to fix your problems or work around them.

Do all PnP BIOSes provide the same features?

Some offer more than others. At the very least, a system with a PnP BIOS will support a PnP boot drive and allocate resources to the video and keyboard controller before boot time. Other PnP BIOSes configure all PnP devices before Windows 95 takes over. PnP BIOSes that maintain Extended System Configuration Data (ESCD) do the most work of all, creating and storing the PC's entire hardware configuration in nonvolatile RAM (a handy backup if the drive containing Windows 95 goes down and takes with it vital info on legacy device settings). Your vendor can tell you if your BIOS supports ESCD.

Can I upgrade the BIOS in my old system to a PnP BIOS?

Yes, you can, if your system has a *flash BIOS*—that is, a BIOS that can be upgraded. Your system vendor will have to supply the upgrade. If you don't have a flash BIOS, and your system uses ordinary BIOS chips, you're probably out of luck. The only way to find out for sure, though, is to call your system vendor. With an upgraded PnP BIOS, you get the ability to install PnP boot devices, to track legacy devices, and to configure PnP devices dynamically before boot time, all of which should ensure a more stable PnP platform. However, an upgraded BIOS probably won't maintain a full ESCD profile of your system configuration.

Do I need Windows 95 in order to use PnP devices?

No, you don't. Intel currently offers its own PnP software, unavailable for purchase separately but bundled with a number of systems and PnP devices, which automatically configures PnP devices on systems running DOS and Windows 3.1. Like Windows 95, Intel PnP will configure PnP devices whether or not you have a PnP BIOS.

The main drawback to Intel's PnP retrofit: You still have to deal with DOS. You need CONFIG.SYS and AUTOEXEC.BAT for memory management, DOS settings, and the like, and if a legacy device demands a device driver, you'll have to load it through a line in your CONFIG.SYS. Moreover, unlike Win-

ACMA P90-"The Fastest System we've ever tested"

-PC World Magazine

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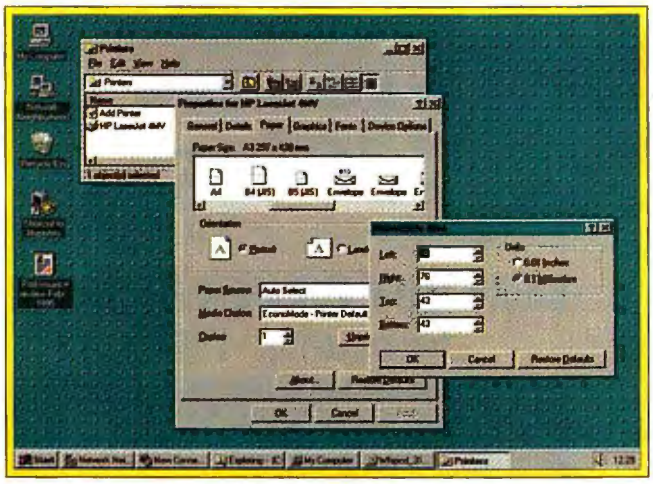

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dows 95, Intel PnP has no routine for detecting legacy devices. Instead you use a Windows 3.1 program called the ISA Configuration Utility (ICU).

Unfortunately, the ICU's database of legacy devices is nowhere near as exhaustive as Windows 95's. If your device isn't on the list, you must use the ICU like an ordinary diagnostic utility—it tells you which resources are free, and you configure the device to match. Finally, you must run the disk-based driver installation routine that comes with the device. Then everything should work—provided, of course, the driver installation hasn't messed up CONFIG.SYS or AUTOEXEC.BAT.

While Intel's scheme is far from perfect, it does have one advantage over Windows 95's: If you purchase the right systems or devices, it's available now.

Will PnP make installing a hard disk easier?

PnP will certainly make configuring hard drive adapters easier. In addition to making it easier to install new cards, PnP lets you plug two or more hard disk adapters into one machine, a task that's next to impossible without PnP devices. At this writing, several PnP SCSI cards were available; few PnP IDE cards are likely to be ready when Windows 95 finally ships.

Unfortunately, while PnP helps with the adapters, it won't help much with the drives themselves. Neither Windows 95 nor Intel PnP will help your system recognize and exploit your hard disk's maximum capacity or configure IDE drives as master and slave. Independent of PnP, Windows 95 will provide an automated installation routine for partitioning and formatting a hard disk (similar to the one DOS currently offers).

SCSI users can expect even more relief in the near future from a developing standard called SCAM (for SCSI Configuration Auto Magic, if you can believe it). This new scheme isn't part of the PnP spec, but it takes a similar approach: You don't need to set unique SCSI identification numbers for each SCAM device with jumpers or switches. Instead, the numbers will be assigned automatically (non-SCAM hardware will stay fixed, just like legacy devices on an ISA bus). SCAM devices should be widely available by the time you read this.

Isn't PCI already PnP? If so, why do I need Windows 95?

Ever since PCI revision 2.0 was finalized over a year ago (we're up to 2.1 now), PCI has been as PnP as it gets. PCI systems can dynamically configure PCI cards, and PCI devices can share IRQs, further reducing the possibility of conflict.

But whether it has PCI slots or not, every desktop PC sold today still has ISA slots as well. So you need some way to accommodate ISA devices. That's what Windows 95's PnP is really all about: It's a stopgap measure for handling ISA devices until ISA is replaced entirely by PCI. (PCI-exclusive desktop PCs should begin to appear on the market in the next couple of years).

What about VESA local bus cards?

VESA local bus cards are basically ISA cards (all VL cards occupy an ISA slot plus a VL slot extension). So, not surprisingly, both Windows 95 and Intel PnP treat VL bus cards just like they treat ISA cards: If they're PnP devices, they get dynamically configured; if they're legacy devices, you'll probably have to set them up manually. You're not likely to see many PnP VL bus devices, however, since the VL bus is rapidly fading into history.

Will I need special PnP hardware for notebooks?

Not at all. As with PCI, PCMCIA cards and sockets are already Plug and Play. However, incompatibilities between PCMCIA devices and sockets are common (though the newest PCMCIA cards are considerably more reliable).

In the early days, PCMCIA notebooks worked only with certain PCMCIA devices. Often, even skilled users would fail to get PCMCIA cards to work, no matter how heroically they tweaked drivers or reconfigured memory. The current situation is better, although you must have a driver loaded on your system for every card you want to use. Often, notebook system vendors bundle a whole mess of drivers—all of which must be loaded by the system—to accommodate the full range of cards. Should you install multiple cards, you'll also have to load a utility called Card and Socket Services to allocate IRQs, I/O addresses, and other system resources. As you might imagine, all this software can cause memory conflicts, especially if you use memory managers or other TSRs.

Something similar to Card and Socket Services will come bundled with Windows 95, as will a raft of PCMCIA device drivers. As long as your notebook and devices comply with Card and Socket Services, Windows 95 should be pretty bulletproof. If, on the other hand, you have first-generation PCMCIA hardware, you're on your own.

Is this really going to work?

There are no guarantees. I can't improve on the surprisingly realistic prognosis provided by Microsoft's Carl Stork: "It won't be a Garden of Eden even with all PnP hardware. But it will be better."

Eric Knorr is a contributing editor for PC World *and editor and principal author of* The PC Bible *(Peachpit Press, Berkeley, California, 1995).*

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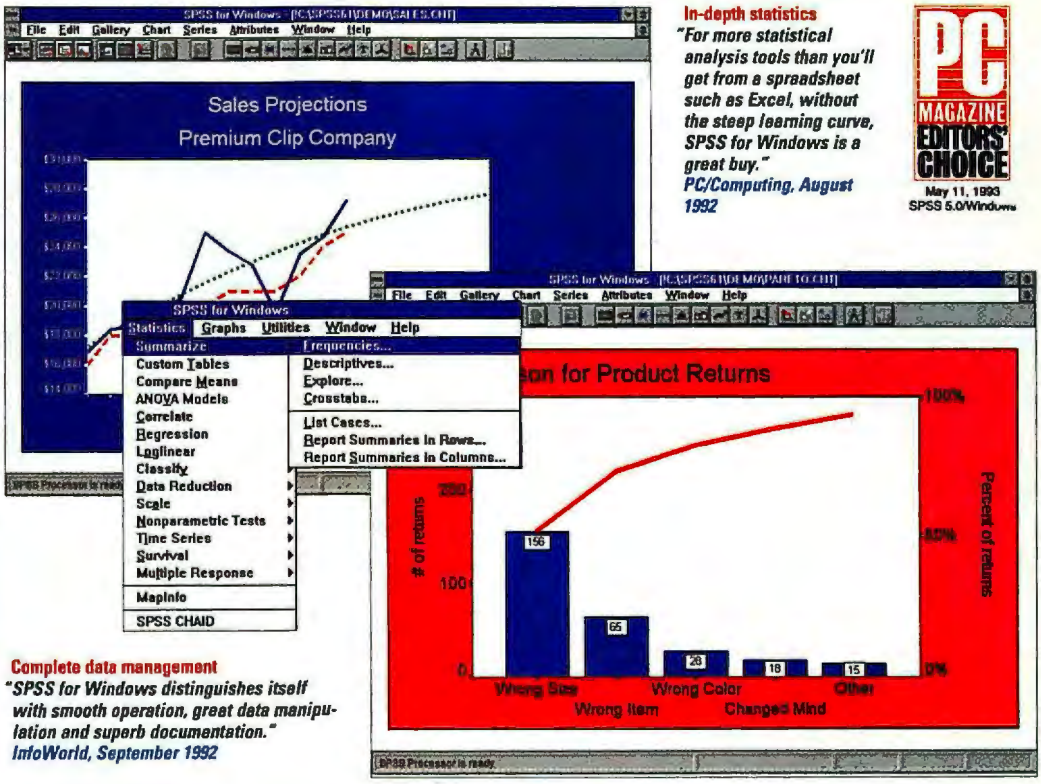

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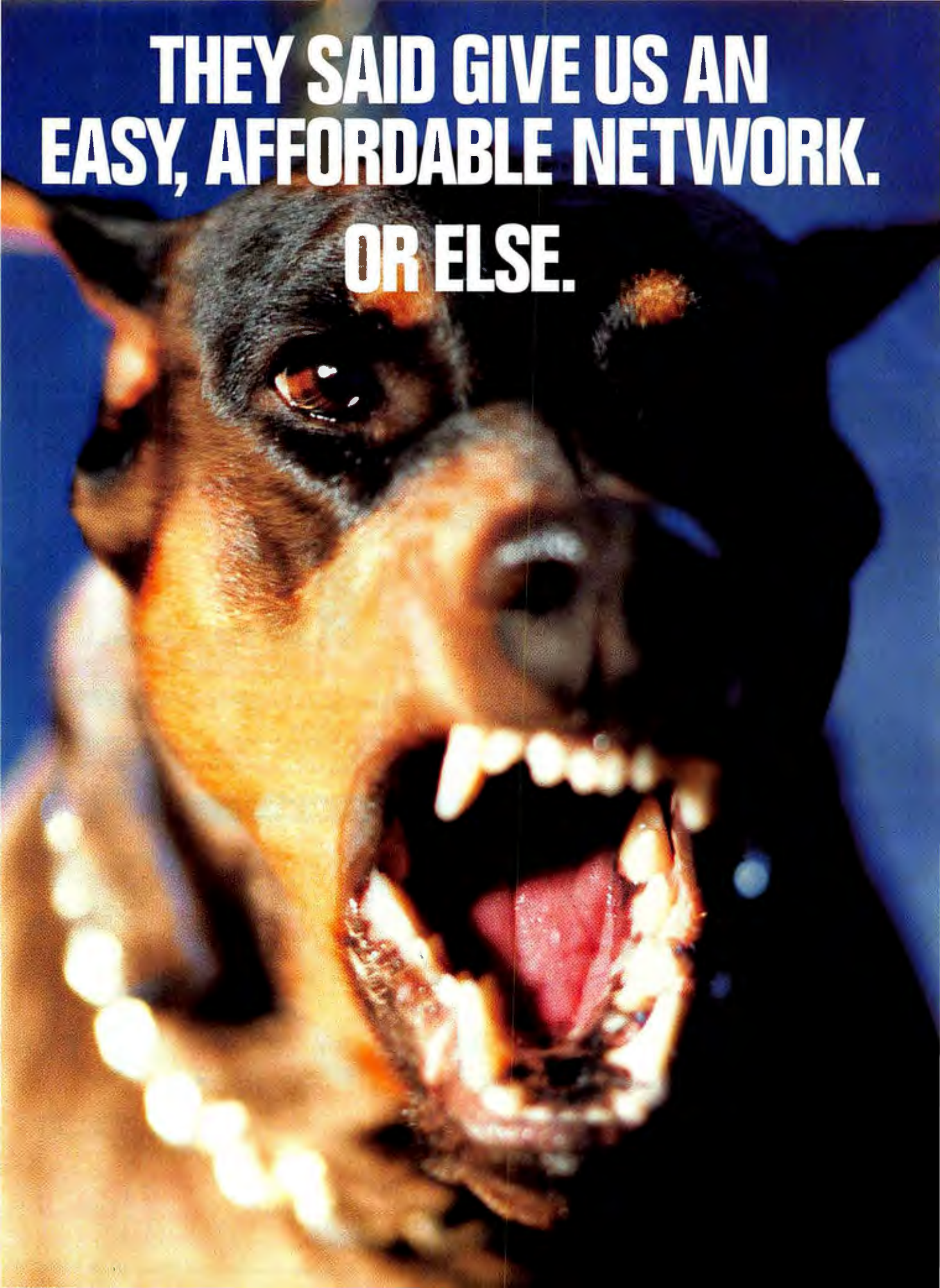
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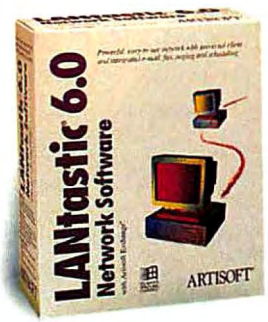

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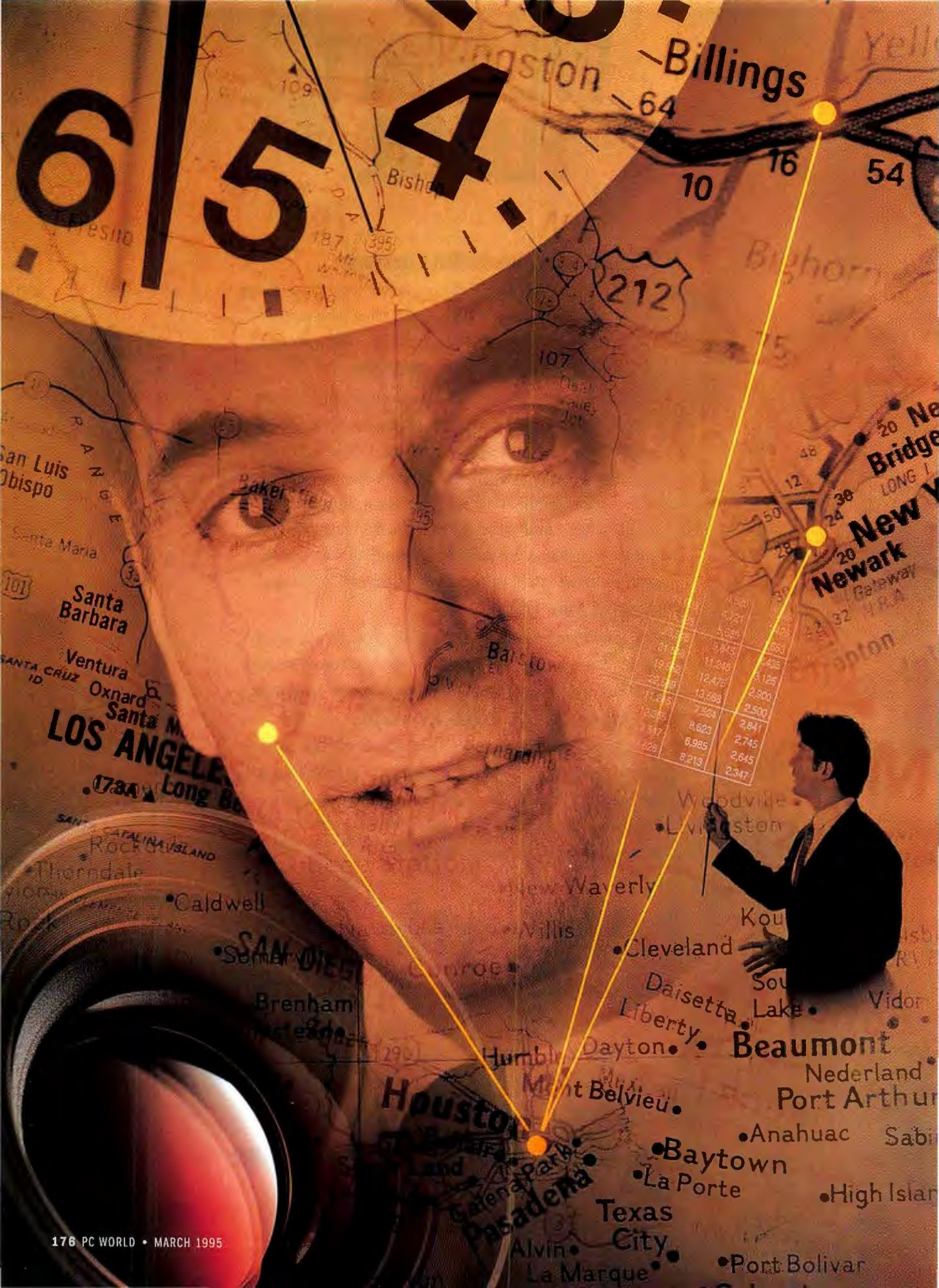
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VIDEO Conferencing

Desktop video conferencing is able to span distances, save big money, and even increase productivity. But is it really ready for prime time?

IT'S AN OLD STORY. A BRIGHT NEW TECHNOLOGY COMES ALONG AND FOREVER CHANGES THE WAY we do business. First it was the fax machine, then it was E-mail. Now PC-based video conferencing promises to revolutionize the workplace. And the way we work may never be the same again.

In fact, desktop video conferencing is one of the most electrifying applications to emerge from multimedia technology, combining the instant connectivity of your phone with the visual impact of real-time video. Powerful tools such as application-sharing and whiteboard software take advantage of the PC's strengths, letting coworkers in different locations collaborate on spreadsheets and reports even as they build personal relationships. Better yet, desktop video conferencing can save money—potentially a *lot* of money—since an overnight cross-country trip can run $1000 to $1500 in airfare, lodging, and other expenses. Add the cost of time lost dashing through airports and waiting in taxi lines, and it's easy to see the strong appeal of video conferencing. Finally, this technology can help motivate remote employees, increasing their visibility, improving their morale, and cementing professional alliances.

COAST TO COAST AND FACE TO FACE

By Michael Desmond

WILL CROCKER

Moving Pictures

If video conferencing is so compelling, why isn't the capability built into every PC? For one thing, the technology is still in its infancy. Vendors such as Intel, Creative Labs, and PictureTel have only recently come to market, and all employ standards, preliminary standards, and proprietary systems that render compatibility a distant hope. More important, some of the products require a high-speed digital phone connection, a service not yet universally available. Known as Integrated Services Digital Network, the service provides data throughput that is more than 4 times faster than that of existing modems—suitable for the heavy demands of full-motion video.

That said, video conferencing has been around in non-PC form for years. Boston-based PictureTel and San Jose, California–based Compression Labs, for example, sell video conferencing systems for large meeting rooms. But these products cost upwards of $50,000 and require leased digital phone lines costing hundreds more every month to operate. Now the technology used in these room-based systems has been adapted for desktop PCs.

But setting up a PC for video conferencing is a complex proposition. These products require you to install at least two add-in cards, a video camera, and some sort of microphone or speakerphone system—not to mention several megabytes of software that change key configuration files. That's a lot of tinkering for folks who don't care to pop the top on their PC. Worse, ISDN products often force you to coordinate between the product vendor, the local phone company, and the long-distance provider to get the system working. To avoid needless confusion, be sure you know which conferencing system you plan on buying when you configure your ISDN lines.

Shrink to Fit

At the heart of these products is compression technology that lets them send huge streams of video data over the phone line. They shrink video by sending only changes that occur between frames—thus small movements, such as someone moving in the background, will degrade video quality and reduce frame rates. It's best, therefore, to set up an undisturbed background for your conferences. These systems also shrink video by selectively discarding unneeded or hard-to-perceive image data, though at the expense of image quality.

Even with compression, ISDN-based video won't maintain frame rates much higher than 10 or 15 frames per second (fps)—significantly lower than the 30 fps rate of television. Systems that work with standard analog phone lines—affectionately known as POTS (Plain Old Telephone System)—fare worse. Frame rates range from about 5 fps to less than 1.

Unfortunately, these products use different systems to handle video and data, so most won't be able to talk to systems from other manufacturers. The closest thing to a standard is the H.320 model used in room-based systems. PictureTel and AT&T support H.320 in their desktop products (albeit at lower data rates than those of dedicated systems), so they can connect to both room-based systems and to each other. Intel plans to add support for H.320 in the future.

But H.320 has no provision for sharing applications or data, though proposed standards aim to address this issue. For now, H.320 systems from different vendors can't share applications, even if they share video. And systems using proprietary schemes—Intel ProShare, Creative Labs ShareVision, and ASL MegaConference—can't talk to each other at all.

Regardless of the compression scheme used, all conferencing systems exhibit a slight transmission lag. As a result, coworkers won't see or hear what you do for about half a second—an annoyance that takes getting used to. This lag also make group meetings difficult, as participants attempt to interrupt each other.

Recommendations

No doubt about it, PC-based video conferencing is fascinating. But there are enough problems—not least of which is the limited coverage of high-speed ISDN phone lines—that we cannot award a definitive Best Buy. That said, Intel's ProShare Video System 200 offers the most reliable path to video conferencing. It edged out the PictureTel Live PCS 100 in ease of use and installation, and was just a step behind in video quality. But the kicker is Intel's promotional deal, which lets you buy a complete ProShare system and an ISDN line installation for $999 to $2499, depending on the deal offered by your regional Bell company. Creative Labs' ShareVision, meanwhile, is the only choice for use on standard analog phone lines, and its strong suite of app-sharing and whiteboarding software makes it an effective conferencing tool. Just don't expect much from the video.

INTEL'S PROSHARE delivers good video at a bargain price, but the PictureTel Live PCS 100 has the most sophisticated setup.

PHOTOS: ROBERT HOLMGREN

The Virtual Meeting

Can even the highest-quality desktop video conferencing system really replace face-to-face meetings? Or do the limitations of the technology and the simple absence of physical contact mean that businesspeople will still have to board planes and hail taxis to get real work done?

To find out, we subjected the busy senior staff of *PC World* to a test. We took our weekly senior managers' meeting—an hour-long, face-to-face meeting of eight people—and split it into two groups. Placed in separate rooms, members conducted the meeting over the PictureTel Live PCS 100 desktop conferencing system, which had the best video quality of the systems we evaluated. Because the meeting involved individual presentations followed by a general response and discussion session, the participants were forced to address both local and remote colleagues—a worst-case scenario for conferencing systems.

A Pleasant Surprise

The result? Virtually every participant felt the video conferencing system helped structure the meeting, eliciting presentations that were concise and to the point. In fact, it was the shortest managers' meeting in memory. While most saw this as a *good* thing, the reduction of personal interplay might hamper open-ended brainstorming, where creative thought and exchange are key. Private cross talk was limited to members in the same room, but much less of it took place than usual.

While most members were comfortable with the video quality, several complained that the video window was too small—a reality of trying to fit six people into the camera's field of view. No one had a problem identifying who was speaking, but it was difficult to pick up facial nuances. Perhaps more important, the speakerphone system delivered clear audio that even picked up semiprivate conversation between local participants.

One interesting note: Participants tended to address presentations to their remote coworkers, speaking directly into the PC's monitor to the exclusion of equally involved local members. Those in the room with the presenter also tended to focus on the screen and not on the person speaking. While this phenomenon might help keep meetings mercifully short, it can also dampen dynamic exchange and creative discussion.

—Michael Desmond

On to the Show

To find out whether desktop video conferencing is worth an investment, we reviewed five systems that work with ISA-based PCs under Windows. Three of the products use ISDN lines, which yield superior video quality but limit geographic availability and invite installation headaches (see "The Long and Winding Road"). Two of the systems use universally available POTS lines but lack the video quality and data rates of the digital products. So buyers face a trade-off. A sixth system—C-Phone from Target Technologies in Wilmington, North Carolina—provides both ISDN- and LAN-based conferencing for about $2400, but shipped too late for this review.

To test these products, we took a pair of regular meetings—one conducted face-to-face, the other held coast-to-coast via phone and E-mail—and moved them to video conferencing systems. The products were installed on Micron 90-MHz Pentium PCs with 16MB of RAM and a fast PCI graphics accelerator. (All products except the PictureTel Live PCS 100 rely on the PC's processor to handle video data, so a slower machine results in worse performance.) Testers were observed throughout the 45-minute meetings as they conducted tasks related to application sharing, document sharing, and object identification. Testers also filled out questionnaires concerning video quality, ease of use, and other elements. Ease of installation, documentation quality, and overall stability were assessed.

Before you spend cash on video conferencing, consider your needs. To reduce travel expenses with a system that lets users feel like they are in the same room, an ISDN setup is a must. But hold onto your frequent-flier card: Even the top-rated video of the PictureTel Live PCS 100 lacks detail. Still, our testers felt that ISDN-based systems offer passable video quality and accurate audio/video synching that improve communications with coworkers. Just keep in mind that one-on-one meetings work best. Group meetings are hampered by lack of video detail when the camera encompasses a wide field of view, so it can be difficult to identify who is speaking.

All the packages except the ASL MegaConference provide tools for jointly running Windows applications. While ISDN packages enjoy faster response times than does the POTS-based ShareVision, the ShareVision's strong suite of tools makes it an excellent alternative for those unable or unwilling to use ISDN lines. Unfortunately,

PC Conferencing Pays Off

No video conferencing system can eliminate business trips entirely, but it can help whittle your travel budget. Consider this: Installing a pair of video conferencing systems can cost less than four coast-to-coast overnight trips. And our comparison doesn't take into account the benefit of time savings and improved communications between local and remote staff.

San Francisco to New York round-trip travel

Air travel	$1451
Food and lodging	$220
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TOTAL	$1756

Intel ProShare setup

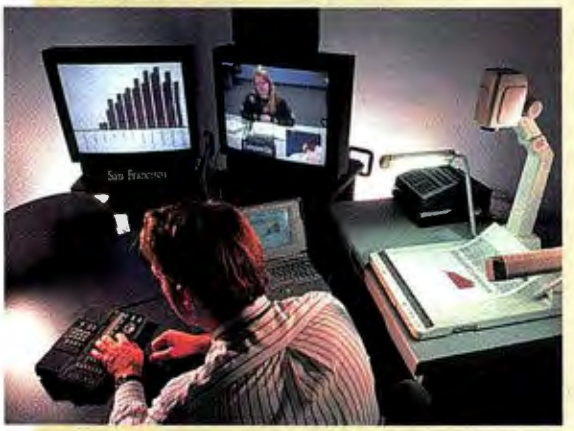
2 ProShare systems	$4998
2 NT-1 adapters	$700
2 ISDN installations	$440
TOTAL	$6138

WILL CROCKER

From Copies to Conferencing

Kinko's Copy Shops Offer Video

Video conferencing seems like neat technology, but not everyone is willing to face the considerable expense and hassle of setting up their own system. Fortunately, you may have to look no further than the nearest copy shop. Kinko's, one of the country's largest copy center chains, has teamed up with Sprint to offer room-based video conferencing for $150 per hour per site for a two-way meeting. More than 125 of Kinko's 700 branches are equipped with video conferencing equipment. Can video conferencing could be as easy as running off a few copies? We ambled down to our local Kinko's to find out.



PROFESSIONAL SURROUNDINGS and a high-end video conferencing system enhance remote meetings.

If conducting business meetings at your local copy shop seems akin to taking a client to McDonald's for lunch, think again. We were impressed with Kinko's private rooms—set up with a conference table for five to eight people—and the powerful room-based video conferencing system from PictureTel. The unit we saw includes a remote-controlled camera that can pan and zoom, a large 27-inch Sony TV with full-screen images, and a VCR for taping our meeting. A separate document camera sends images of printed material to the other site. The system uses dedicated phone lines that transmit data three times faster than ISDN lines, yielding much better image quality and higher frame rates than the desktop systems we reviewed.

To set up a video conference, call your local Kinko's store to find branches to handle each side of the call. Then reserve a time slot by calling Sprint's toll-free number. A Kinko's representative walks you through the use of the system and places the call to the other site. If there's a problem, help is just a few feet away, either from the Kinko's employee or directly from Sprint. The service costs $150 per hour per site, or $300 per hour total for a two-way meeting. If you want to conference with more than one other location, it costs $210 per hour per site, or at least $630 per hour total.

Kinko's; 800/743-2679. **Reader service no. 759**

Sprint; 800/669-1235. **Reader service no. 760**

—Anita Hamilton

we suffered frequent application crashes on all these systems, a problem that we suspect is as much the fault of Windows as of the products we tested. Testers also had to play a shell game with video windows, control boxes, and application windows on screen, since our 15-inch monitors often lacked viewable area to conveniently display all the elements. Finally, users must learn to share a mouse pointer when working together, since all but the PictureTel Live PCS 100 let either user take control of the cursor by moving the mouse.

All in all, video conferencing technology is still under construction. Someday, these products may well change the way we work. But for now, video conferencing is not quite ready for general acceptance.

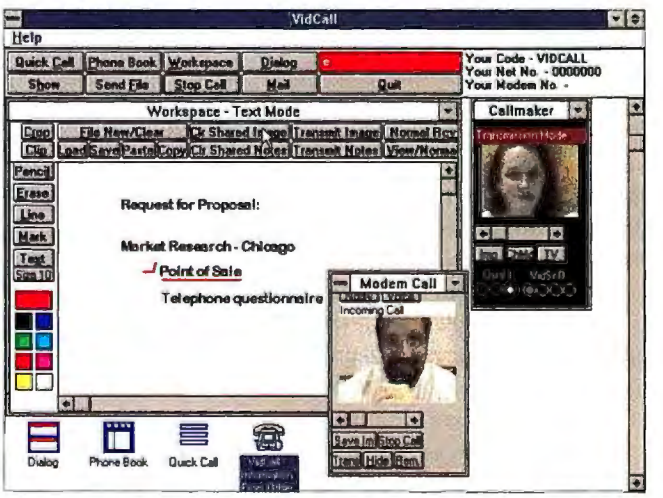
Alpha Systems Lab MegaConference

PROS: Low cost, works on standard phone lines

CONS: Poor video, no application sharing, difficult interface

At first glance, the ASL MegaConference looks like a bargain, with a low $1100 price. But look again. The MegaConference is the only system that uses a separate analog phone connection to handle audio—requiring two phone lines and prohibiting synchronization of audio and video. This setup may free bandwidth for video and data transfers on the 28.8-kbps modem connection, but you couldn't tell from the video. The MegaConference was by far the worst product we tested, falling well behind the Creative Labs ShareVision in every respect and drawing comments of disdain from our testers.

Video frame rates were so low that one tester likened ASL's video to a grainy slide show, while another suggested that it would be better to fax still photos to colleagues. Indeed, the video lagged several seconds behind audio over the separate phone line, and we often had to wait for the modem's connection to resynch due to line noise or



THE ASL MEGACONFERENCE lacks the full application sharing of other packages, though it offers a shared whiteboard and file transfers.

PHOTO: ROBERT HOLMGREN

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2 PCI + 4 ISA + 1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
Built-in PCI IDE & I/O

Quin-02/33
Pentium 60/66Mhz Processor
8MB RAM, Up to 192MB
256K/512K Cache
PCI/ISA Architecture
3 PCI + 3 ISA +1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
Built-in PCI IDE

Value For the Buck
SIS Chipset

Quin-34
Pentium 60/66Mhz Processor
8MB RAM, Up to 128MB
256K/512K/1MB Cache
PCI/ISA Architecture
3 PCI + 3 ISA + 1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
Built-in 2 Enhanced PCI IDE Interface

Quin-35
Pentium 75/90/100Mhz Processor
8MB RAM, Up to 128MB
256K/512K/1MB Cache
PCI/ISA Architecture
3 PCI + 3 ISA + 1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
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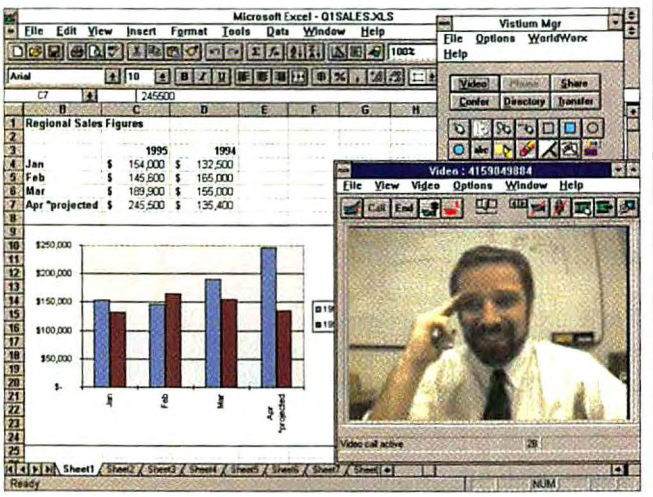
other problems. Eventually, we dropped to a lower data rate to complete our calls. Installation was difficult as well. ASL's sparse documentation left us guessing at critical moments, while the three ISA boards demand too much expansion space. Worse, sizing video windows is difficult, since the scroll bar that changes the window size moves along with the video window box. Testers complained about clicking the wrong buttons as controls shifted around.

The MegaConference was the only product in the review without application sharing. However, we did work with the program's whiteboard and were able to interactively mark up and view a shared image. But that's small comfort in a product that fails utterly to deliver useful video conferencing. If you need a system to make remote face-to-face meetings a reality, look elsewhere. *Alpha Systems Lab, 800/576-4275* **Reader service no. 761**



ABOVE-AVERAGE VIDEO quality, snappy application sharing, and a sensible interface help offset the Vistium 1200's difficult installation.

AT&T Vistium 1200

PROS: Good video, easy-to-use interface

CONS: Difficult installation, frequent crashes during application sharing

If you want a video conferencing package that lets you share applications and files during meetings, the AT&T Vistium 1200 system may be the best in the group. And at $2400, the Vistium 1200 makes a solid claim to being the strongest buy of the crowd. Our user panel rated the Vistium's video quality just behind the top-rated PictureTel Live PCS 100—not surprising considering that both products use the same H.320 standard for compressing video data. The difference is probably the Vistium's unsophisticated camera, which lacks manual controls beyond a simple focus setting.

But the Vistium 1200 excels with its application-sharing software and interface. The Vistium Manager software is the most space-conscious interface in the review, featuring a compact control panel for initiating video calls, sharing applications, and launching the whiteboard. The user can select from three video window sizes for remote and local video—938 by 768 pixels, 192 by 144 pixels, and icon size—and adjust brightness and contrast with software controls. To share Windows applications, you select files from a list in the Share application, which puts them into Share's main window. Double-clicking the appropriate icon in the Share window launches a shared session. This system requires you to first define which applications are to be shared, making it more cumbersome than the Intel or PictureTel products. Shared applications ran smoothly and quickly in our tests, although users must practice strict mouse etiquette to avoid preempting each other's control of the shared cursor.

The system includes a full-length video board, a half-length ISDN communications board with an attached add-on card, a compact camera that rests atop the PC monitor, and a blocky speaker/microphone unit that sits on the desktop. The two ISA boards are connected by a ribbon cable. The Vistium 1200's only downside was the installation, which forced us to place several calls to AT&T's tech support. But for users working jointly on files, the AT&T Vistium 1200 is without peer. (Those who don't have a high-powered Pentium or 486 system might look into the $4995 AT&T Vistium 1300, which uses its own processor to handle video without burdening the PC.) *AT&T Global Information Solutions, 800/843-3646* **Reader service no. 762**

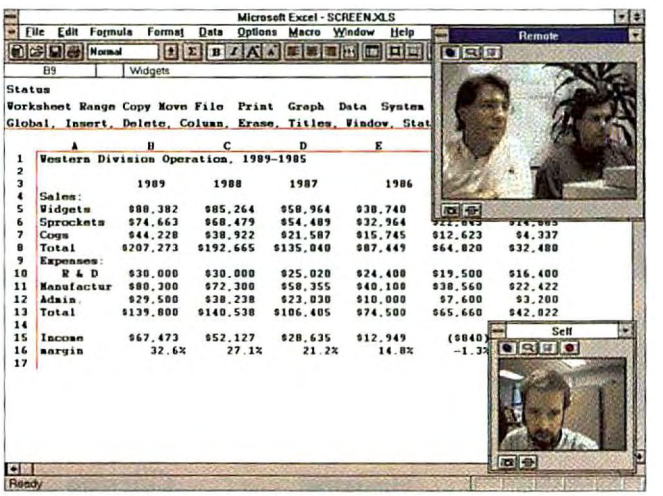
Creative Labs ShareVision PC3000

PROS: Works with analog phone lines, simple installation

CONS: Low video frame rates, applications crashed during shared sessions

At $1599, the Creative Labs ShareVision PC3000 boasts a relatively low price, simple installation, and decent application sharing. But even with a 28.8-kbps modem, this POTS-based system is no match for ISDN products that push up to 128 kbps of data. What the ShareVision does is let you conduct video conferences over existing phone lines—an impressive feat that eliminates thorny ISDN issues. Just keep in mind that unlike ISDN connections, analog phone links are subject to line noise and other interference that can pull data rates down to 9600 bps or less—a fact we discovered during our tests.

As expected, video quality fell behind that of the ISDN competition, with slower screen updates and grainier image quality. We also experienced lost connections and frequent interruptions in the video—often, we suspect, due to line noise. Video windows are sizable to 96 by 80, 128 by 96, and 160 by 120 pixels. The ShareVision uses a dial-pad interface that can integrate video windows to save



STRONG APPLICATION SHARING tools are nice, but testers complained about the ShareVision PC3000's poor video and frequent crashes.

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space. It also includes a small but cryptic icon pad for accessing features and utilities. To share a program, you click the Share icon while the desired application is open, then select the app from a list of active programs. But testers experienced crashes and slow response, and video windows often froze—hardly an effective medium for meetings. However, the snapshot feature sends high-resolution images, which is nice for demonstrations where detail is important.

The ShareVision consists of a three-quarter–length Video Blaster RT300 video board, a half-length compression board, and an external 28.8-kbps modem. The integrated earpiece and microphone free up desk space—at the expense of comfort and mobility—but the monitor-top camera lacks controls. Creative Labs' documentation is slick, complete, and a bit long-winded, forcing users to leaf through a variety of manuals to find information. But installation was smooth and quick. If ISDN access is a problem and you aren't too concerned with video quality, the ShareVision PC3000 is worth considering.
Creative Labs, 800/998-1000 **Reader service no. 763**

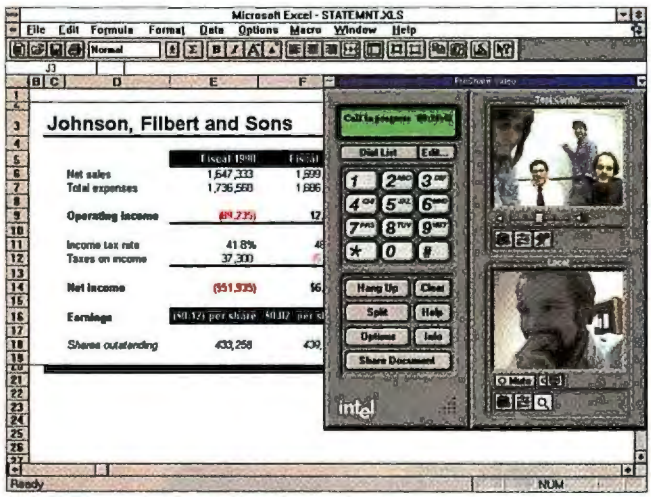
Intel ProShare Video System 200

PROS: Good video quality, intuitive interface, simple installation
CONS: Problems selecting cells in shared spreadsheets

Intel's ProShare Video System 200 stands out as the easiest product to install and use, thanks to well-designed documentation and a sensible interface that features balloon help to identify cryptic controls and icons. And you can't beat the price. Intel seems intent on single-handedly launching the ISDN market, offering a ProShare system and ISDN line installation for as little as $999, depending on your Bell carrier. Even at its $2400 list price, ProShare is a relative bargain.

Our testers rated the ProShare's video quality lower than that of both the AT&T Vistium and the PictureTel Live PCS 100, citing grainier video, lack of smooth motion, and fish-eye distortion from the camera lens. A recent upgrade improved video quality, particularly the image and motion, but we noticed excessive ghosting as people moved around. The fish-eye distortion, of course, remained. Despite these criticisms, testers commended the ProShare as the most natural for conversations: Unlike the AT&T and PictureTel systems, the ProShare's integrated earpiece and microphone—identical to the one in Creative Labs' ShareVision—eliminates the delays and cutouts of speakerphone systems. But the earpiece limits movement, and testers complained of discomfort during extended use.

The ProShare boasts an excellent interface built around an on-screen dial pad resembling a cellular phone. Users make calls, keep phone lists, and access application-sharing functions from this panel. Video windows can be set to three sizes—320 by 240, 160 by 120, and icon size—and can be divided or integrated with the dial pad. Appli-



INTEL'S WELL-ROUNDED PROSHARE didn't get top marks in video, but its easy installation, intelligent interface, and low price can't be beat.

The Long and Winding Road

As a Boston-based *PC World* editor, I was asked to set up a video conferencing system so that I could participate in meetings with editors in San Francisco. When I ordered an ISDN line to work with the Intel ProShare Video System 200, I had to endure two weeks of hair pulling, buck passing, and finger pointing before the ProShare and ISDN line were up and running. What follows is a chronology of events. Am I a kvetcher or a user with a legitimate beef? You be the judge.

Sept. 20—The Odyssey Begins:
ProShare requires an ISDN line "provisioned" for Intel Blue and a device called an NT-1 (not included with the ProShare). I'm not familiar with either ISDN provisioning or NT-1 devices. The whole process sounds ominous, so I do the smart thing—nothing—and hope they'll forget about the video conferencing project in the San Francisco office.

Sept. 23—No Such Luck:
I'm told to have the line installed immediately. I call NYNEX, my local telephone service provider. The sales rep has never heard of Intel Blue, but says she'll check into it. She tells me to choose a long-distance carrier for my ISDN line. She also says she doesn't sell NT-1s. Now I have two additional calls to make.

I call a recommended supplier of communications hardware located in the Boston area and request an NT-1.

First knucklehead: "What's an NT-1?" I get transferred.

Second knucklehead: "An MP-1?" Transferred again. I leave a message.

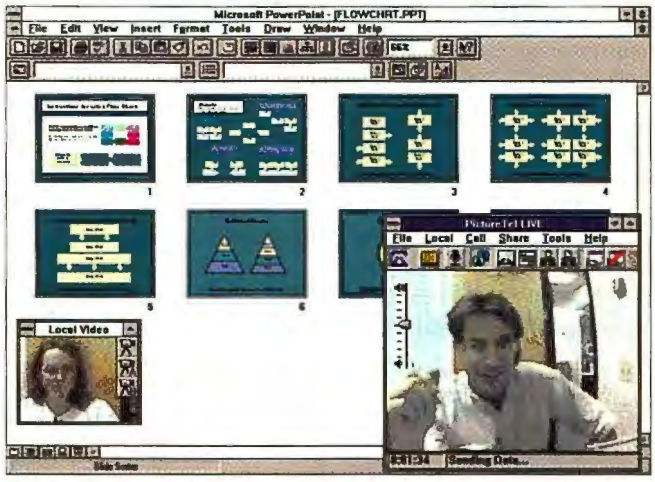
I call another supplier, Tone Commander. My luck has improved. The sales rep offers to overnight the device, its power supply, and cable for $308.

I call MCI and order long-distance service.

Sept. 30—Installation:
A NYNEX technician installs the line in about an hour. I install the ProShare and dial the ISDN number of our San Francisco office. My PC generates an error message. Additional attempts yield the same message; the ProShare manual is no help.

cations are shared by selecting the desired app from a list—the simplest method we've seen. Unfortunately, remote testers complained that they couldn't see the highlighting of selected text or spreadsheet cells, though the host user could. Remote testers also had to be extremely careful not to input data into the wrong spreadsheet cells. As with the Vistium 1200, users must negotiate mouse control. Finally, the video often halted during file transfers and app launches, speeding these operations but breaking the flow of the video call.

The full-length ISDN communications card and three-quarter–length video card demand plenty of room, but since no card-to-card feature connector is used, the two boards do not have to sit in adjacent slots—a real advantage over the PictureTel system. Like the ShareVision, the ProShare's integrated earpiece and microphone conserve desk space, but the camera lacks controls. Finally, ProShare also supports LAN conferencing, making it the most versatile product we reviewed. *Intel Corp., 800/538-3373* **Reader service no. 764**



EXCELLENT COMPONENTS and top-notch video quality boost the Live PCS 100, but its sluggish application sharing drew some complaints.

PictureTel Live PCS 100

PROS: Top-rated video, excellent camera and speakerphone, can run on a 386 PC
CONS: Very expensive, will not work with installed graphics card

If you're serious about video conferencing but don't have a Pentium PC, the $4995 PictureTel Live PCS 100 is a great buy. Its hardware-based video compression takes the load off the PC's CPU, yielding superior video quality and letting even a 386SX become a video conferencing station. The PCS 100 uses the same H.320 video conferencing standard employed by the AT&T Vistium 1200, yet it turned in slightly better video quality thanks to its excellent camera and unmatched controls. For example, the PCS 100 excelled in handling variable lighting conditions, and it was the only system able to effectively minimize background glare from an office window. The PCS 100 also boasts the best audio system, with a full-fledged speakerphone that includes a handset for private video conferences.

PictureTel complements its impressive hardware with powerful software, silky-smooth installation, and exhaustive documentation. The system's app-sharing and whiteboarding functions are accessed from drop-down menus arrayed along the top of the main video window—a relief from the incomprehensible icons offered by other products, and a nifty way to reduce on-screen windows. Sharing applications is simple: You click on an icon and then click in the program window to be shared. While PCS 100 provided the most stable application sharing in the group—traumatic crashes were delightfully rare—performance was sluggish. PictureTel is alone in addressing the issue of sharing the cursor, transferring control only after a mouse click. Video windows are freely sizable up to 938 by 768 pixels, or selectable to standard CIF and QCIF resolutions.

I call Intel tech support (a toll call). We run some diagnostics. Intel says the line was improperly installed and tells me to call NYNEX.

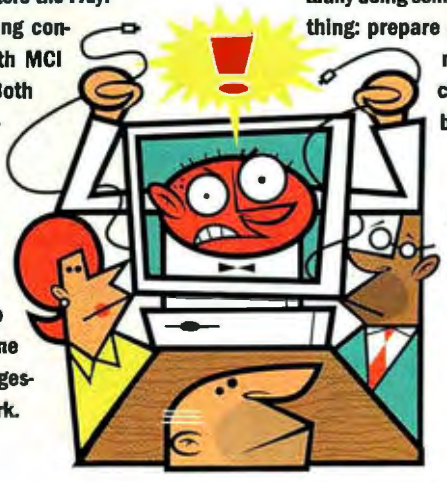
I call NYNEX repair. They tell me to call NYNEX installation. Installation says she's never heard of ISDN and suggests I call repair. I get angry. She puts me on hold for 16 minutes. She says another field technician will check the line on Monday.

Monday isn't soon enough. I call the NYNEX business office. I'm transferred to repair. I explain the situation. Repair identifies the problem: "Installation is passing the buck."

Oct. 3—The Debacle Continues:
Monday, I call the NYNEX salesperson who originally took my order. She says the line will be checked out. Later, a technician checks the line and says everything is fine. It isn't; more error messages.

I call Intel again. We run diagnostics. I change an IRQ setting. The rep offers to send updated software. Net result: My company foots the bill for a 45-minute call to Intel tech support, and the product still doesn't work.

Oct. 4—MCI Enters the Fray:
I conduct a long conference call with MCI and NYNEX. Both of the companies agree to check into the problem. NYNEX agrees to talk with Intel and get back to me. MCI calls me twice with suggestions. None work.



Oct. 5—Desperation:
Normal avenues are proving fruitless. I consider sacrificing a live chicken in my office. I consider canceling the ISDN line and returning the ProShare to Intel. I realize I've wasted three days on this nonsense and consider actually doing some work. Instead, I do the smart thing: prepare a list of people to blame if I miss any deadlines. Culprits include MCI, Intel, and NYNEX—both repair and installation.

Oct. 6—Resolution:
A mysterious NYNEX technician calls and says he's found the problem: The line was configured incorrectly. I conduct my first video conference with San Francisco.

—Randy Ross

CHIP WASS

The PCS 100 consists of two full-length ISA boards and an inch-long ribbon cable that runs between them, so your system *must* have adjacent full-length ISA slots available. Worse, the product uses its own graphics adapter, an onerous burden that forces you to disable any existing VGA adapter. With its hardware-assisted video processing and high price, the PCS 100 is best for turning 386 and 486 PCs into conferencing workstations, or for making calls to PictureTel's room-based systems. *PictureTel, 800/716-6000* **Reader service no. 765**

Michael Desmond is an associate editor, Randy Ross is East Coast editor, and Anita Hamilton is an assistant editor for PC World. *Testing in San Francisco was conducted by Dean Andrews, Jeff Bertolucci, Ulrike Diehlmann, Susan Silvius, and Kirk Steers. Testing in Boston was conducted by Randy Ross.*

For more information about all products in this article, circle reader service no. 911.

FEATURES COMPARISON

ISDN Systems Have the Edge in Video Quality, Features

● Yes
○ No

	Alpha Systems Lab MegaConference	AT&T Vistium 1200	Creative Labs ShareVision PC3000	Intel ProShare Video System 200	PictureTel Live PCS 100
Standard features					
Price as configured	$1100	$2400	$1599	$2499[1]	$4995
Telephone line type	POTS[2]	ISDN	POTS	ISDN[3]	ISDN
Maximum data throughput (kbps)	28.8	128	28.8	128	128
Video compression type	software	software	software	software	hardware
Minimum system requirement	486DX	486DX	486DX	486DX	386SX
Hardware					
Speaker and microphone	○	speakerphone	earpiece	earpiece[4]	speakerphone
Camera controls	○	focus	○	○	focus, zoom, brightness
Camera upgrade available	○	●	○	○	●
Length of communications board	1/2	1/2	1/2	full	full
Length of video board	full	full	3/4	3/4	full
H.320 compliant	○	●	○	○	●
Uses existing graphics adapter	○	●	●	●	○
Software features					
Application sharing	○	●	●	●	●
Share open application	○	○	●	●	●
Method of assuming shared mouse control	○	mouse movement	mouse movement	mouse movement	keyboard or mouse click
Whiteboard software	●	●	●	●	●
File transfer	●	●	●	●	●
Capture image in video window	●	●	●	●	○
Software video image controls	○	brightness, contrast	brightness, contrast, pan and zoom	color controls, zoom	○
Minimum video window size (pixels)	96 x 72	192 x 144	96 x 80	160 x 120	192 x 144
Maximum video window size (pixels)	320 x 240	938 x 768	160 x 112	320 x 240	938 x 768
Service and support					
Warranty (years)	2	1	1	3	1
Money-back guarantee (days)	○	○	○	60	○
Toll-free support	○	●	○	○	●
Daily support (hours)	11	24	16	○	9
Weekend support	○	●	●	○	○

[1] Price may be significantly lower when purchased with ISDN installation.
[2] Uses two POTS lines, one for voice and one for video/data.
[3] LAN capability included.
[4] Optional speakerphone available.

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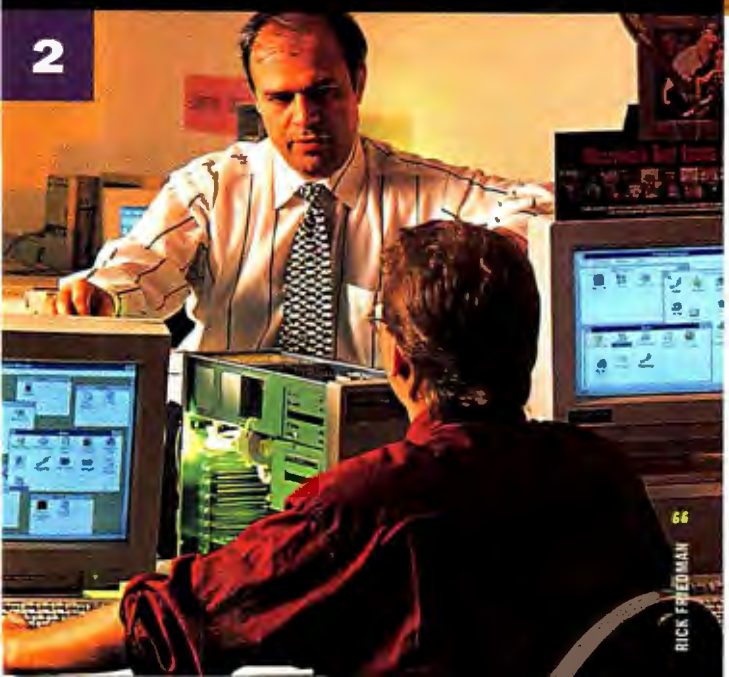
WHERE TO BUY YOUR NEXT PC—AND HOW TO GET A GREAT DEAL IN THE BARGAIN.



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5 Warehouse Stores/p. 200

MAKE A DEAL

BY DANIEL TYNAN

Aside from a house or car, a PC could be the most expensive purchase you'll ever face—and certainly one of the most complicated. Buyers must navigate an ocean of options, and system prices and features change more often than the tides. The flood of PCs available in superstores, consumer electronics shops, and discount warehouses only adds to the confusion.

What's the best place to buy a computer? Is it possible to negotiate a lower-than-advertised price? How do you know you're getting a good deal? To find the answers, *PC World* went shopping. We hired operatives in Boston, Minneapolis, and San Francisco to pose as shoppers at some of the biggest computer superstores, electronics chains, and warehouse outlets in the country. They infiltrated each store, grilled the sales staff, and tried to wrangle a good deal on our dream machine: a multimedia Pentium-90 with 16MB of RAM, a 15-inch monitor, a 14.4-kbps fax-modem, and a comprehensive suite of applications.

Then we called the direct sales lines at Compaq, Dell, Gateway 2000, and IBM, plus CompuAdd and Micron, two smaller mail-order firms with solid reputations. Our shoppers also visited an independent retailer in each area to see how the little guys stack up against the giants. Next, we asked corporate buyers for their best advice,

and slipped behind the scenes to talk to sales personnel at large retailers to get the inside scoop on the best deals.

What did we find out? While you can buy a PC just about anywhere, the vast majority of desktop PCs sold retail come from the same four manufacturers—AST, Compaq, IBM, and Packard Bell—with a sprinkling of systems from Acer, Leading Edge, Pionex, and others. If you want something else, you'll need to go the mail-order route or have a PC built to your specifications by a local independent retailer. Whichever route you choose, it is still possible to swing a good deal on a PC, although tight margins make most dealers reluctant to negotiate on sticker prices.

But the best deal is not necessarily the lowest price on the fastest machine. When you buy a computer, you're buying a relationship—with the salesperson who sold it, the company that built it, and the technicians who support it. How easy it is to deal with them and how well they stand behind their products ultimately may be more important than a machine's price or performance.

PICKING THE RIGHT SYSTEM

Before you start shopping, ask yourself how you plan to use the computer—now, and two years from now. Your answers will help you decide what kind of PC to buy and how much you should spend.

Home PCs, which used to be the 98-pound weaklings of the computing world, are now more powerful than many so-called business machines, thanks to the hardware requirements of multimedia. Sure, there are still plenty of underpowered 486-33s at many retail stores (and at less than $1000 they're mighty attractive to first-time buyers), but the majority of desktop PCs we found were respectable 486DX2-66 machines equipped with a CD-ROM drive and a sound card. Pentiums, the ultimate hedge against processor inflation, were not as plentiful when we shopped last October. Only Packard Bell and Acer had introduced Pentium-based systems in their home lines.

When deciding which class of system to buy, keep in mind that in general, the faster the processor, the longer the life span of the computer. But in two years, even today's swiftest Pentiums will seem gimpy. The smartest strategy is to look for the sweet spot in the market: a PC one or two notches below the fastest, most expensive machines currently available. These days, a 60- or 90-MHz Pentium is the best compromise between product life and price. Once you've decided what kind of computer you want and how much to spend, you need to research what's out there. There are hundreds of systems available from scores of manufacturers; your job is to narrow the choice to a handful.

The best place to start your research is by reading comparative reviews in magazines like this one. *PC World*'s Top 20 provides side-by-side rankings of machines from every major PC company, along with tips on key features. *PC World* also includes regular updates on how readers rate companies for reliability and service, both critical components of customer satisfaction (see "For Better or Worse," November 1994).

With a computer and a modem, you can also do some sleuthing online. The CompuServe Buyers Guide lists current prices and features for thousands of computers, along with profiles of each company (type **go compdir**). But use your time wisely: The service costs $4.80 or $9.60 per hour, depending on modem speed, plus $1 per report on each system or firm. Internet users can dial up The Internet Shopping Network (**http://shop.internet.net**) and browse a catalog of more than 20,000 hardware and software products (call 800/677-7467 for more information).

But don't stop there. Clip ads from local newspapers for stores advertising good deals and sales. Call the leading mail-order companies to get the latest skinny on prices and features. Finally, ask friends and colleagues who've recently bought a PC about their experiences.

After you've winnowed your list to five systems or fewer, you're ready to shop. Now the question becomes, where? The answer depends a lot on your expertise, your willingness to do research, and the amount of risk you can live with. Here's what we uncovered when we shopped around.

TIPS FOR SMART SHOPPING

No matter what kind of computer you buy or where you do your shopping, following this checklist should go a long way toward ensuring that you get the best possible deal on your brand-new pride and joy.

- **Know what you want. Information is the best defense against buying more (or less) computer than you really need.**
- **Ask companies for spec sheets listing each system's features. Then have sales reps fill in things the spec sheet leaves out—like the size of the RAM cache, type of video card, the number of available slots or drive bays, and so on. (The Instant Reference Card "PC Buyer's Checklist" in this issue will remind you what to ask and help you keep track.)**
- **Get price quotes and system configurations in writing (by fax, if shopping over the phone), along with the salesperson's name and number. This makes it easier to compare machines later and helps you avoid bait-and-switch sales tactics.**
- **Insist on a free trial period, so you can return the PC if you don't like it. All the companies we contacted offer a 30-day money-back guarantee, except for Sam's Club, which gives you seven days to decide.**
- **Watch out for restocking fees. Many stores and mail-order companies charge as much as 20 percent of the original purchase price if you return the machine.**
- **Check out tech support before you buy (see the sidebar "The Tech Support Shuffle").**
- **Always pay by credit card. The credit card issuer can help mediate disputes between you and the company and will refund the amount charged if the product never arrives. But not all card issuers follow the same policies, so be sure to check with your bank before you whip out the plastic.**
- **If you can't pay by credit, order COD, then set up the machine and test it before you open your wallet—even if UPS is waiting at the door. That way you'll know you didn't spend good money for a dead PC.**

ILLUSTRATIONS: TIM CARROLL; PHOTO: GERRY GROPP

MAIL ORDER: LONG-DISTANCE OPERATORS

Description: Companies that take orders for their PCs over the phone and ship to your door

Where We Shopped: Compaq, CompuAdd, Dell, Gateway, IBM, Micron

Pros: Cutting-edge technology on the cheap; often built to your specifications

Cons: Buying sight unseen; may involve shipping costs

Who Should Buy Here: Bargain hunters and those who don't mind changing PC parts

Best Price on Multimedia Pentium: $2898, Micron P-90 Home MPC (includes shipping)

Are you looking for cutting-edge technology at bargain prices? Then mail order is an excellent way to shop. CompuAdd, Dell, Gateway, and Micron all offered multimedia Pentium-90s and were willing to configure them exactly the way we wanted. The salespeople usually knew their stuff, and prices were among the lowest we encountered.

Compaq and IBM both sell their PCs by phone, but we found neither the state-of-the-art technology nor the low prices of other mail-order firms. Compaq's direct sales line offered up a Deskpro XE 5/60, a 60-MHz Pentium that topped out at a mind-boggling $4800 when loaded to our specs. (Compaq now has a 90-MHz Pentium in its DeskPro XL line, and a 100-MHz Pentium may be shipping by the time you read this.) IBM's PC Direct wasn't taking orders for its PC300 Pentium series, but the salesperson quoted us a price around $3200 for a P-60, not including shipping or taxes.

The mail-order companies we called are established firms with known reputations. Before you get hooked by low prices and cutting-edge technology offered by smaller firms, do a background check. Investigate how the PCs perform in the Top 20 and where the manufacturer falls in *PC World*'s service and reliability rankings. If you still don't have enough information, call the Better Business Bureau or state attorney general's office in the company's area to see if consumers have lodged complaints.

When you call a company, have the specs for the PC you want close at hand, and don't be afraid to quote prices from competitors. But remember, with prices already pared to the bone, there's little room for haggling. When we shopped, only Micron was willing to negotiate down from its advertised price, lopping $50 off its P-90 Home MPC for a total of $2898—the best price we found anywhere.

When you compare mail-order prices, remember to factor in taxes, shipping charges, and insurance. Some mail-order firms collect sales tax for the state where you live; others (like Micron and CompuAdd) collect it only for buyers in their home states (Idaho and Texas, respectively). Be aware that some states may try to collect those sales taxes from you even if the seller doesn't. Shipping and insurance charges add from $40 to $100 to the cost; if you don't like the system and decide to return it, you'll typically have to pay the shipping charges both to and from your home.

But shopping by mail isn't for novices. At some point—even if you get an on-site service contract—you may have to pop your PC's hood, remove a part, ship it back for a replacement, and install the new one—not a job for the technologically squeamish.

BRAND-NAME BARGAINS: REMANUFACTURED PCS

How do you buy a big-name PC for a small price? Go for a remanufactured system. You can save as much as 19 percent from such top-tier vendors as Gateway, NEC, IBM, Dell, and Compaq.

These PCs were demonstration units or were purchased and returned without being used. The vendor can't sell the PCs as new, so they refurbish, retest, and repackage them, then price them well below new systems.

How do you find them? Gateway and NEC sell them over the phone. IBM sells by phone and from its outlet store in Morrisville, North Carolina. Dell and Compaq only sell remanufactured units at their outlet stores in Austin and Houston, respectively.

The savings will impress you. For example, last November, Gateway quoted me $1703 for a remanufactured P5-60 system with a 60-MHz Pentium processor, 340MB hard drive, 8MB of RAM, PCI local bus video with 1MB of VRAM, and a 14-inch monitor. At the time, Gateway was selling similar new systems for $2099.

You can get a bad apple, though. In one case, someone bought five remanufactured Gateways and had to return three of the monitors. And the warranties may be shorter than on a new system. Dell includes only a 90-day warranty with remanufactured computers, while Compaq and Gateway give you one year. Also, some vendors will charge you for tech support calls.

But if you want a name brand and you're comfortable with these limitations, a remanufactured computer could be the way to go. —Laurianne McLaughlin

WHERE TO BUY

Gateway 800/846-2410
IBM 800/426-7015
NEC 800/632-4636

LOCAL RETAILERS: SHOP GLOBALLY, BUY LOCALLY

Description: Local shops that typically put together their own machines

Where We Shopped: NPC Computer Corp. (Newton, MA); PC Tailors (Arden Hills, MN); UC Computers (Berkeley, CA)

Pros: Low prices; knowledgeable help; build machine to order; may haggle

Cons: Quality of parts and reputation of business can vary

Who Should Buy Here: The technically savvy who want a local resource for repairs

Best Price on Multimedia Pentium: $3017, Pentium VLB 90 (includes MS Office; for Intel motherboard add another $98); UC Computer, Berkeley, CA

If the thought of buying a PC sight unseen gives you the willies, consider a local retailer. These shops typically assemble systems from name-brand components; prices are generally low, and most stores will build the PC to your specifications. If the machine breaks, you can usually have them fix it, and local dealers are often more willing to negotiate than mail-order firms or big retail chains.

All the local retailers in our three target markets were willing to build exactly the computer we wanted, and at least one had no qualms about haggling. When we quoted a lower mail-order price for a P-90, one store owner in Northern California knocked $150 off the sticker and offered us a copy of Microsoft Office for just $350. When we balked at that, she offered to load the software on the hard disk for free, provided we could live without the manuals or tech support. (Naturally, we declined.) She also said we'd get another 3 percent discount if we paid "real cash"—presumably a satchel of $50 bills—as opposed to the normal 2 percent surcharge for credit card purchases.

While the other locals were less aggressive, they still offered customizable systems, cash discounts, and in the case of the Minneapolis store we visited, a five-year warranty.

When you examine a PC at a local shop, ask what company makes each component and whether you can specify parts from a particular manufacturer. (For example, one retailer gave us the option of spending $100 more for a PC with an Intel motherboard.) Then ask what kind of testing the store performs on each system. A simple "burn-in"—leaving the PC running for a certain number of hours—isn't enough. Does the burn-in include running diagnostic software? Do they test the fax-modem, CD-ROM drive, or sound card for incompatibilities? Do they load Windows or application software? Ask for a demonstration on a floor model with the same components, and before you take your new PC home, ask them to start it up and test each component (hard drive, fax-modem, CD-ROM drive, and so on) and show you it's all working.

As with small mail-order firms, it's a good idea to investigate the store by calling the Better Business Bureau and other local consumer agencies. Find out how long the store's been in business and ask for references from other customers (preferably local businesses). Although companies can fail at any age, long-established shops tend to be safer bets.

SUPERSTORES: HIGH-TECH SUPERMARKETS

Description: Supermarkets of technology, with row upon row of software and PCs

Where We Shopped: CompUSA, Computer City

Pros: One-stop shopping; fairly broad selection

Cons: No negotiating; sales help can be wildly inconsistent

Who Should Buy Here: Beginners and others who want to compare brand-name systems quickly and conveniently

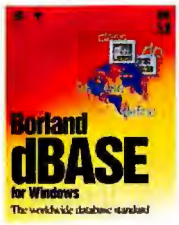
Best Price on Multimedia Pentium: $3350, Compudyne 90MHz Pentium Processor Mini-Tower (includes 340MB hard drive, Lotus SmartSuite); CompUSA, Emeryville, CA

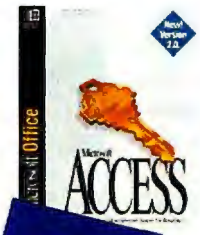
Superstores like CompUSA or Computer City are virtual supermarkets of technology. Tall rows of software packages are stacked neatly like cereal boxes, with PCs displayed on low shelves off to one side, like frozen foods. Superstores tend to be slightly pricier than mail-order or local shops, but they offer the comfort of seeing before you buy and choosing from a handful of familiar brands.

But the superstores we visited were not the hotbeds of cutting-edge hardware we expect-

ABOVE: RICK FRIEDMAN; BELOW: GERRY GROPP

Use any of these?





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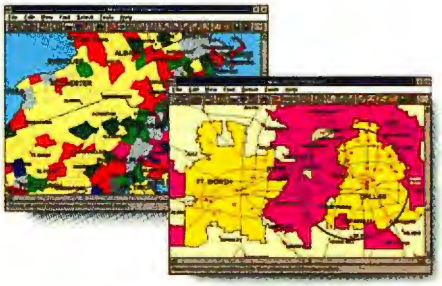

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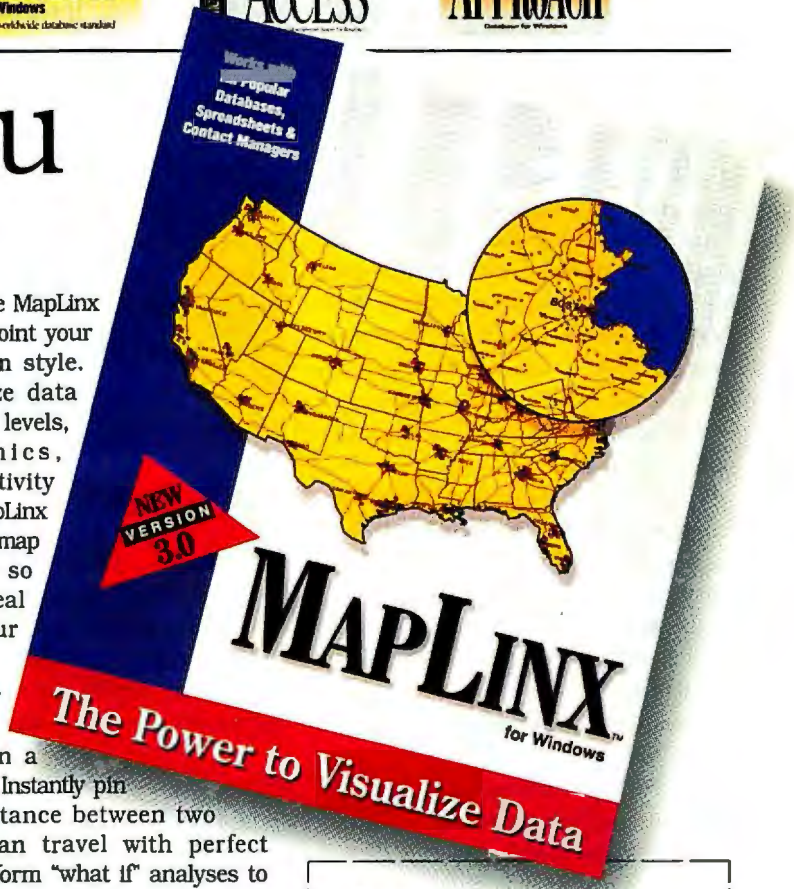

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All rights reserved. All other brands are the property of their respective owners. MapLinx also available at Best Buy, Electronics Boutique, Elek-Tek, Fry's Electronics, Lechmere, Micro Center. Prices listed in U.S. Dollars.

Circle 186 on reader service card

ed. Multimedia Pentium-90s were few and far between. Although each store had a repair center on the premises, most systems were sold as is, with upgrades limited to adding RAM or installing a multimedia kit. And the level of technical expertise—and misinformation—varied greatly, depending on which salespeople we talked to.

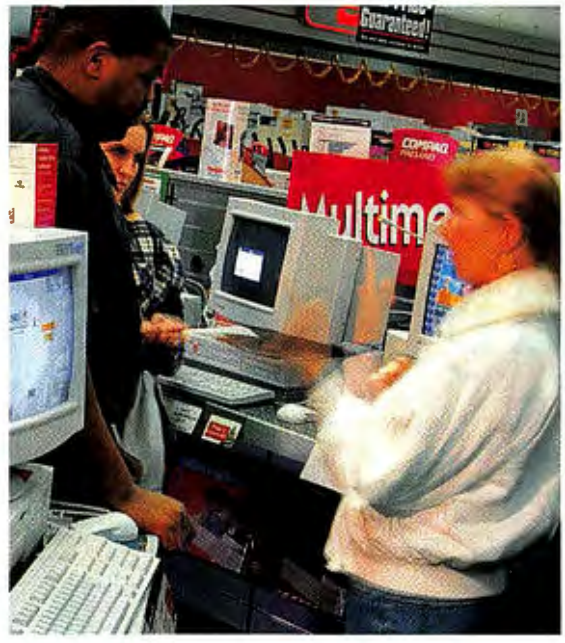
For example, when we visited a CompUSA in Northern California, the first employee we approached told us the only Pentium-90 they had in stock was a Packard Bell, which he warned us not to buy due to alleged incompatibilities with some monitors. But another salesperson in the same store showed us two other Pentiums from Pionex and Compudyne tucked away on a rear shelf, then spent half an hour trying to configure a Compudyne P-90 that would fit our budget. Unfortunately, he explained, he was not allowed to negotiate the machine's $3350 price. He suggested we'd get a better deal if we called the company's toll-free sales line.

When we did so, we heard an entirely different sales pitch. The phone sales rep aggressively pushed the Packard Bell P-90, offering to drop $80 from the final price, plus another $100 if we purchased a $260-per-year extended service contract—a dubious bargain at best.

Our experience at Computer City proved slightly better. The stores we visited offered a broader selection of Pentium machines, including models from Acer, Canon, Leading Edge, and US Logic. Sales help was scarce, but the employees we encountered were usually knowledgeable.

However, like CompUSA, bargaining power at Computer City was limited to matching competitors' advertised prices. In fact, when confronted with an ad, a sales rep in one Computer City outlet dropped the price on an Acer Pentium 90 by $300. The catch? The comparable systems must be identical—same brand, model, and features. Aside from matching ads, the superstores we visited declined to negotiate, though some offered slight discounts for buying returned merchandise or floor models.

CONSUMER ELECTRONICS: REEL DEALS?



Description: Known for high-pressure sales of stereos, TVs, and home appliances, many now push PCs

Where We Shopped: Circuit City

Pros: Reasonable selection; matches competitors' ad prices

Cons: Minimal bargaining; limited expertise, customizing limited to RAM and multimedia upgrades

Who Should Buy Here: People who feel more comfortable in stereo stores than in computer stores

Best Price on Multimedia Pentium: $3439, Packard Bell Legend 110CDT (90-MHz Pentium with 810MB hard disk); Circuit City, Natick, MA

Judging from the ads in newspapers and magazines, the hottest items at electronics stores aren't TVs, stereos, or even Sega Genesis boxes, they're computers. And when we visited Circuit City stores in our three target markets, we did find a surprising number of systems on the shelves. But the selection was confined to the usual round of suspects—486s from AST, Compaq, and IBM, plus the obligatory Packard Bell Pentium—and the sales help could not be described as stellar.

Given Circuit City's reputation for aggressive, commission-driven sales, we thought we'd have employees circling us like hungry sharks, but when we got there, they were

SHOPPING THE SWAPS

You've never been to a computer swap meet? You haven't lived. Imagine finding your dream machine—over and over again. And all at prices low enough to make your mouth water. But if you shop the swaps, you need to take some extra precautions: along with the bargains, there are always some unscrupulous characters (and I'm not talking about the ASCII kind) who are out for your hard-earned bucks.

Swap meets—huge events where small dealers come to offload merchandise—offer a dazzling array of choices. So before you walk in the door, do your homework—you'll have more buying power if you know exactly what you want. Don't ever rely on a dealer for information about products—it'll likely be wrong. If you have a choice of dealers, buy from one with a store near you in case you run into trouble later.

Many products at swap meets are *gray-market* items, meaning the manufacturer hasn't authorized the dealer and might not honor its warranty. In other words, if the CD-ROM drive in your hot new Pentium goes kaflooey, too bad. In larger cities, many swaps are held monthly, so don't be in a rush to buy. Go to one meet just to gather prices, model availability, and information about the dealer. When you get back home, call up the manufacturers to find out if they will honor their warranties. Check out the dealer's reputation, too. If there is a user group in your area, ask for recommendations. Then, if there is anything you *still* want to buy, go back to the swap meet for it. For more information, see *Home Office* in this issue. —Steve Bass

PHOTO: ANDY FREEBERG; ILLUSTRATION: TIM CARROLL

The First and Only Solution for True 486 to 586 Upgradability

The Cian™ PC family is the first to combine universal processor compatibility, true 64-bit processor upgradability, and multiple bus options for virtually unlimited access to today's peripheral products. Cian gives you 486 performance and pricing today, and an upgrade path to true "fifth generation," 64-bit processors. With Cian you don't have to sacrifice your initial investment as you upgrade to the latest in processor technology.

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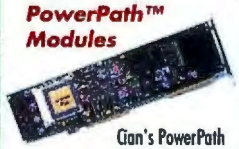
PowerPath™ Modules



Cian's PowerPath plug-in processor modules allow you to upgrade to the CPU you want, when you want it!

Part of the secret to Cian's processor upgradability is its PowerPath™ plug-in processor modules which preserve your original motherboard. They plug directly into the motherboard and make upgrading from a 486 to 586 quick and easy!

In addition, service and support are greatly enhanced due to the commonality of parts. Using one motherboard as a base platform makes upgrading and servicing faster, easier, and less expensive.

Cian PCs from Alaris are the first systems that let you preserve your hardware investment and take advantage of the latest in processor technology. They give you more room to grow, and something no other PC can offer -- "freedom of choice". For the first time ever, you are free to choose the processor you want, when you want it, and from whom you want it. Set yourself free and call us at 1-800-317-2348 for more information.

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Circle 20 on reader service card

ViewSonic has become synonymous with providing superior high performance color monitors to a demanding industry. As a recognized price/performance leader, we are committed to designing outstanding monitors that continue to win awards. In fact, here are some comments from a few editors:

"Some folks crave performance. Some look for price. And then there are those who want it all. If you belong to the third crowd, the ViewSonic 17 is the monitor for you." – **PC World; April 1994**

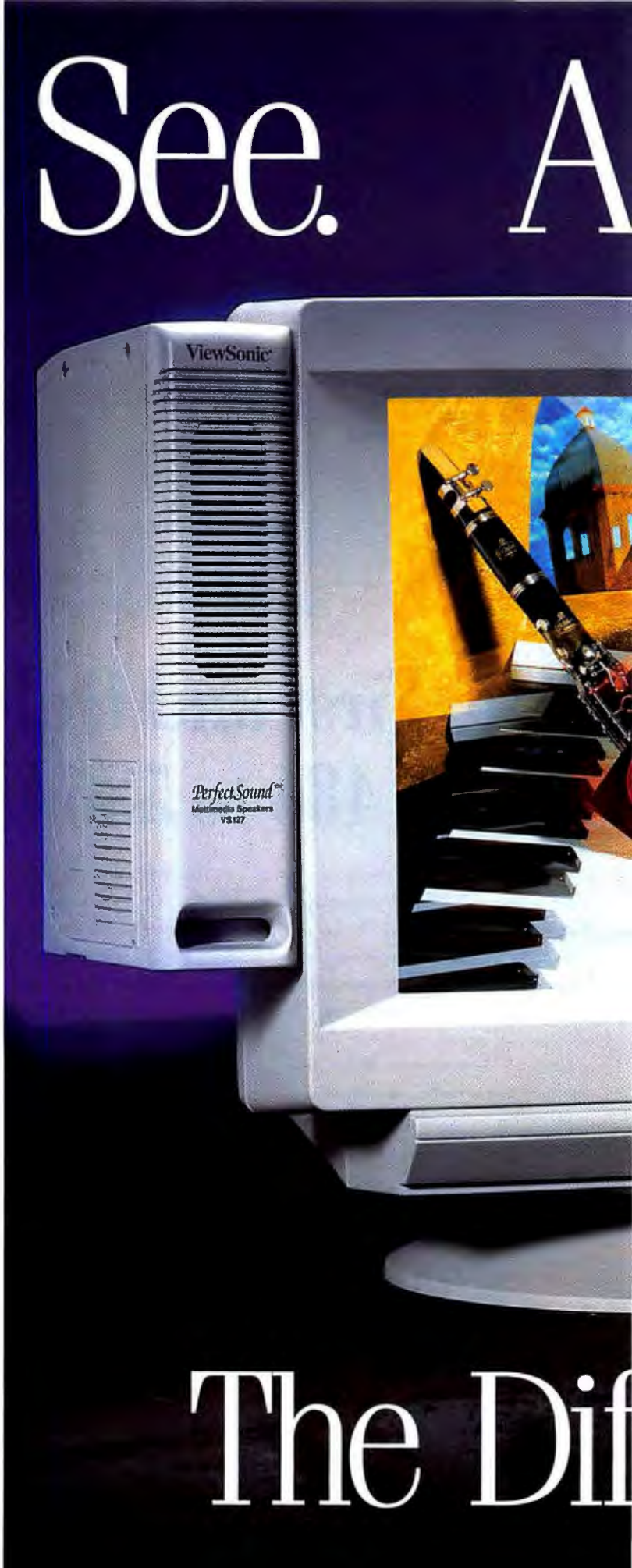
"Best color quality, best sharpness and best versatility – what more could we ask of the ViewSonic 17? Frankly, we were surprised that one monitor could do it all."

– **PC Computing; January 1994**

"ViewSonic has one of the sharpest, most detailed and well-focused displays around."

– **Windows; September 1994**

Our ***new*** ViewSonic 17 monitor is loaded with features including OnView™ controls (on-screen menu to adjust screen images to your liking), ViewMatch™ (matches screen colors to printer output), ARAG® coating (virtually eliminates screen glare and reflection), and refresh rates up to 160Hz. No wonder this 17" monitor (15.7" diagonal viewable area) keeps on winning awards, generation ... after ... generation!



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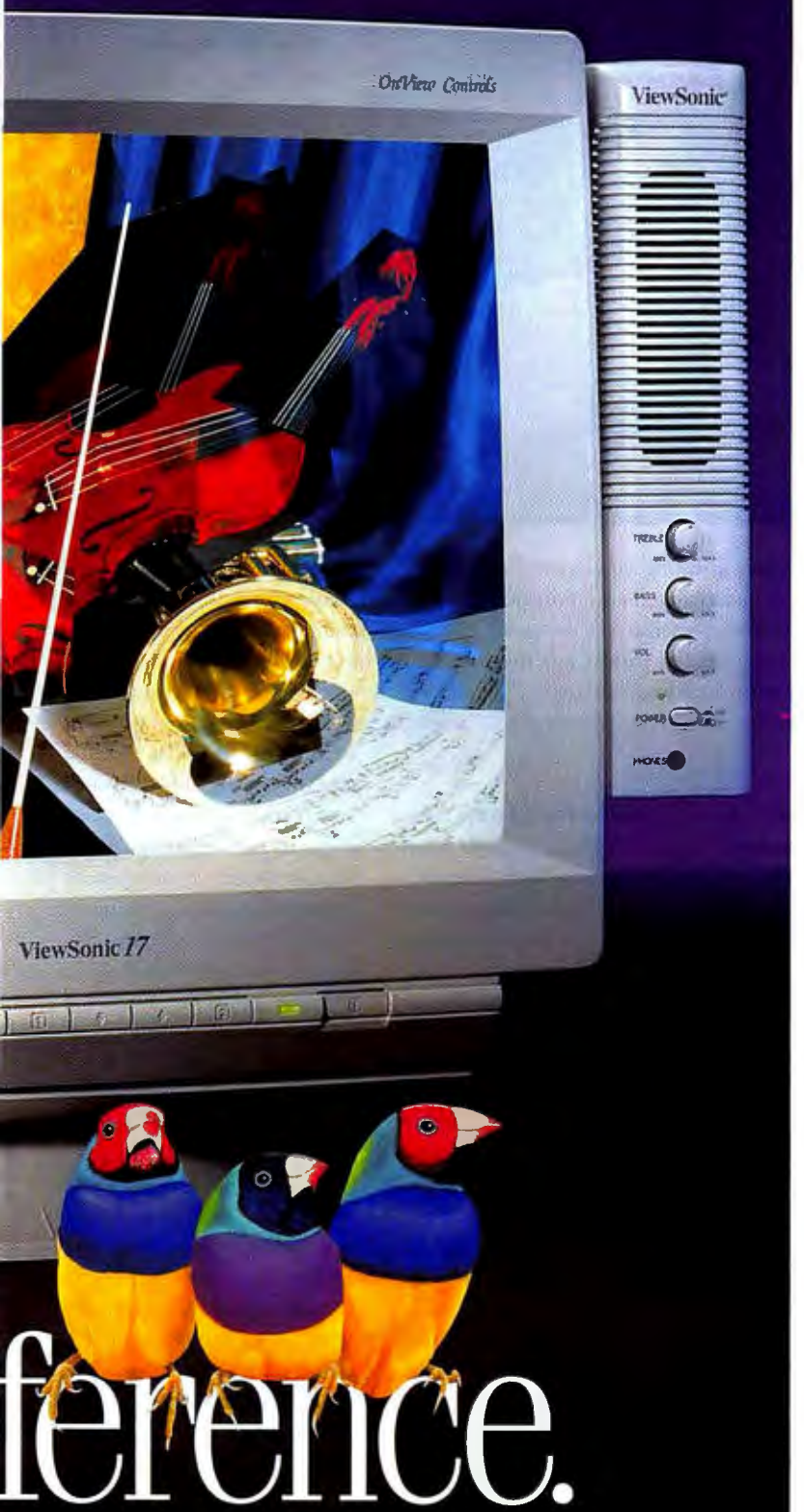

ference.

With an eye and ear towards the future, ViewSonic is expanding into the world of multimedia – with our new ***PerfectSound***™ Model VS127 speakers. These ***amplified, magnetically shielded*** speakers are designed to be attached to the monitor or stand alone. In fact, when attached to our monitor they blend in so well they appear to be built-in. And they utilize state-of-the-art ***wave guide technology*** combined with a bass enhancing ***super woofer***. These speakers pump out high fidelity sound with such power and clarity that you'll find it hard to believe you're listening to a compact 20 watt system. ***PerfectSound***™ speakers offer advanced audio technology combined with an ***ergonomic, space saving design*** – each speaker is only 2.4" wide! Controls include bass, treble and master volume.

Sounds so vibrant and realistic, you'll swear you're sitting in front of an orchestra – not your computer!

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Circle 218 on reader service card

more like minnows. Circuit City offers not only to match advertised prices but to refund 10 percent of the difference between its price and the one you found; other than that, though, we discovered deals were hard to come by. One salesperson at a Northern California store suggested rather vaguely that we might get a slight discount if we purchased a printer along with the PC and offered to skip the charge for installing the RAM upgrade. At the Boston store a salesperson grudgingly offered to toss in a copy of AddStor's SuperStor—an outdated product from a defunct manufacturer—or some other software that the salesperson would select for us. No thanks.

Another salesperson tried earnestly to convince us we really didn't want a Pentium at all and directed us toward a lower-end 486. The moral: Beware of salespeople who try to sell you systems that don't fit your requirements. Either they don't understand your needs or they're trying to get rid of old inventory.

WAREHOUSE STORES: LOST IN THE AISLES

Description: Where Godzilla goes grocery shopping: cavernous stores featuring volume discounts on everything from hair dryers to hot dogs, plus a smattering of PCs

Where We Shopped: Sam's Club

Pros: Dirt cheap

Cons: Selection of PCs is limited and unpredictable; no sales help to answer technical questions

Who Should Buy Here: Bargain hunters who don't need a lot of hand-holding

Best Price on Multimedia Pentium: $2179, Packard Bell Pack-Mate 3960CD (Pentium-60 with 420MB hard drive); Sam's Club, Sacramento, CA

You may also find good deals on brand-name systems at office-supply stores like OfficeMax or members-only warehouses like Sam's Club. Just don't expect much selection or service.

OfficeMax may be a great place to get a gross of paper clips, but the choice of PCs is paltry, and you must virtually set yourself on fire to get attention. When we dragged an employee to the computer aisle, he told us they couldn't customize any systems but would happily sell us extra RAM if we wanted to upgrade to 16MB. Like the other big chains, OfficeMax will match ad prices, but otherwise prices are nonnegotiable. At the Boston store, a salesperson offered this lackluster incentive: Purchase their sole Pentium (a Packard Bell P-60—what else?), and they'd cut 5 percent off the price of a floor-model monitor.

Shopping for a PC at Sam's Club is an experience best described as surreal. Nestled between the cellular phones and the 50-gallon drums of peanut oil is an unpredictable assortment of PCs. At one site we found an IBM PS/1, a couple of Compaqs, and some aging Dells; at another, 60-MHz Pentiums from AST and Packard Bell for less than $2000, including monitors.

The real challenge at Sam's was finding help. We had a near-

DO I HEAR $75?

Auctions are thrilling. Under the steady rhythm of the auctioneer's prattle, you find yourself whipped into bidding on some piece of antiquity—and walking away happy and lighter of wallet. I went to a computer auction advertised in my local paper for that thrill and with hope of picking up a laptop slightly past its prime (but with plenty of life) for a paltry sum.

What I found resembled an antique auction, except the cheesy auctioneer knew nothing about computers and did a poor job of faking it. I saw old IBMs without hard drives and 8088 clones from the early days of DOS. If I were stocking a technology museum this would be pay dirt.

I saw little that was useful by today's standards, but no one was spending much, either. One bidder picked up a couple of CD-ROM games for $5; another hauled away a 486SLC/33 desktop with a 90MB hard drive for $450—not exactly state-of-the-art, but a good deal if you have limited computing needs and little money. Several 386 machines sold for $150 or less (including monitor); 286 motherboards went for just $4 each.

It was hard to tell if the computers worked, because none of them came with software. Many were from companies that had long since gone out of business, so it's unlikely that buyers could get parts or service for them. There was nothing I wanted. The only laptops for sale were large, underpowered Packard Bell 286s with 1MB of RAM each. I didn't wait around to see what they went for. They were at the end of the roster, and this auctioning of museum pieces was a very slow process.

—Christina Wood

PHOTO: GERRY GROPP; ILLUSTRATION: TIM CARROLL

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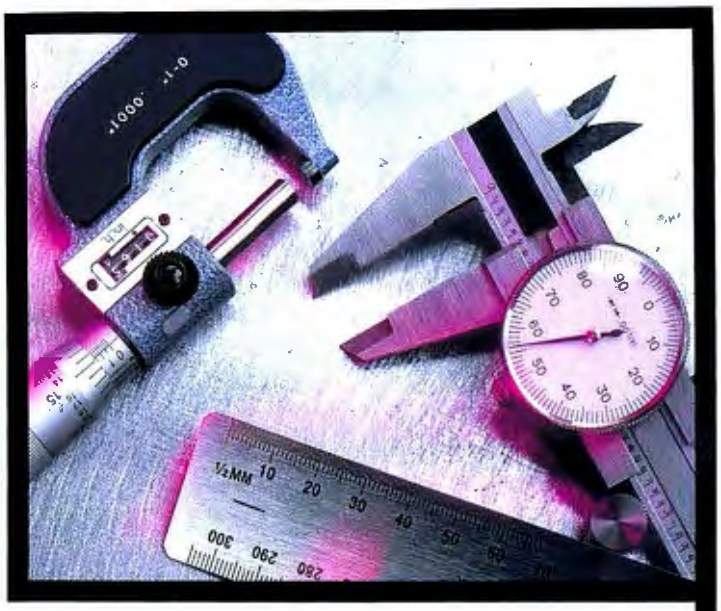

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* Three-year limited hardware warranty. Certain restrictions and exclusions apply. **July 1994 issue.

service experience at the Northern California store, as a Sam's employee rushed past us to help some people buy a TV set, but that was the last we saw of her. Our Boston operative managed to snare a customer service rep, who told us Sam's doesn't negotiate or match prices and can't customize systems, but will sell user-installable options such as memory.

Buying a PC at an office club or warehouse is strictly for people who don't need hand-holding or customization. But if you find what you want, you could luck onto a good deal.

BUY HERE NOW

Shopping for a computer is mostly an exercise in gathering information and then narrowing your choices. Of course, in a few months you'll see the exact system you're shopping for—or a better one—for less money. This poses the eternal question: Should you buy now, or wait until prices drop even further? The best strategy is to buy a computer when you need one. There are always good deals to be had for those willing to look.

Daniel Tynan and Steve Bass are contributing editors, Christina Wood an associate editor, and Laurianne McLaughlin an assistant editor for PC World. *Lou Miranda is a freelance writer. Harry McCracken, an associate editor for* PC World Lotus Edition, *and freelance writer Sarah Klein also contributed to this article.*

SHOPPING FOR PC PERIPHERALS

BY LOU MIRANDA

So you think buying a computer is hard? Just try upgrading one. There may not be as much money at stake, but you have to worry about whether your new addition will work with your existing setup, if you can even install it without a major hassle or doing significant damage.

Finding the right place to buy your peripherals can help preserve your sanity as well as your cash. To help identify such a place, I went shopping for four of the most common upgrades: a modem, a printer, a monitor, and a CD-ROM kit, pricing both high-end models and budget offerings. I picked best-selling products I knew would be available at most stores. I shopped at local branches of three national chain stores: Computer City, Best Buy, and CompUSA. I also called three leading mail-order houses: PC Connection, Computer Discount Warehouse (CDW), and Arlington Computer. My conclusion? There is no shortage of good deals; but, as with computers themselves, you can't assume that the lowest price is the best value.

On most products, prices at the three local stores were so close as to be indistinguishable. (In St. Paul, my home base, the stores are all located within a mile of each other, which simplifies comparison shopping.) The sales staff at each store was well informed and gave good advice, but I had a much harder time just *finding* someone to talk to at Computer City.

Of the three mail-order outlets that we surveyed, PC Connection consistently had the highest prices; Arlington Computer, the lowest. But PC Connection more than leveled the playing field with low shipping fees and a willingness to stay on the phone until all my questions were answered (the firm has won *PC World*'s World Class award for several years running). Arlington and CDW will

THE TECH SUPPORT SHUFFLE

A cheap PC is no bargain if it breaks, and getting through to tech support is like trying to raise the dead. To make sure you can get help when you need it, check out the service and support before you buy.

First, find out who's responsible for fixing the machine. Do you carry it in to the store, or ship it to the manufacturer? Many PC makers offer a year of on-site service with every machine, but you'll have to call tech support and try to solve the problem over the phone first; if that fails, the technician may dispatch a service person—or may first ask you to ship a component back for replacement. Ask if on-site service is available on nights and weekends.

Next, compare each company's phone support. Is there a toll-free number? Is support available on weekends or at night? Call the number at different times and see how long you wait on hold or how quickly a technician calls back. When you get through, ask a question or two and gauge the response. Did you understand the answer? Was the tech willing to explain it to you? Take a look at company forums online to see what users are saying.

Finally, check out each company's warranties. Most PCs come with a one-year warranty on parts and labor, with extended warranties available for an additional $20 to $200 per year. If your machine is going to break, it will probably happen early, so most users can avoid spending the extra money. But if a broken computer will halt your business, an extended warranty makes sense. A better option, however, is to find a system that comes with a manufacturer's three-year warranty, like those from Compaq, IBM, or Gateway.

TIM CARROLL

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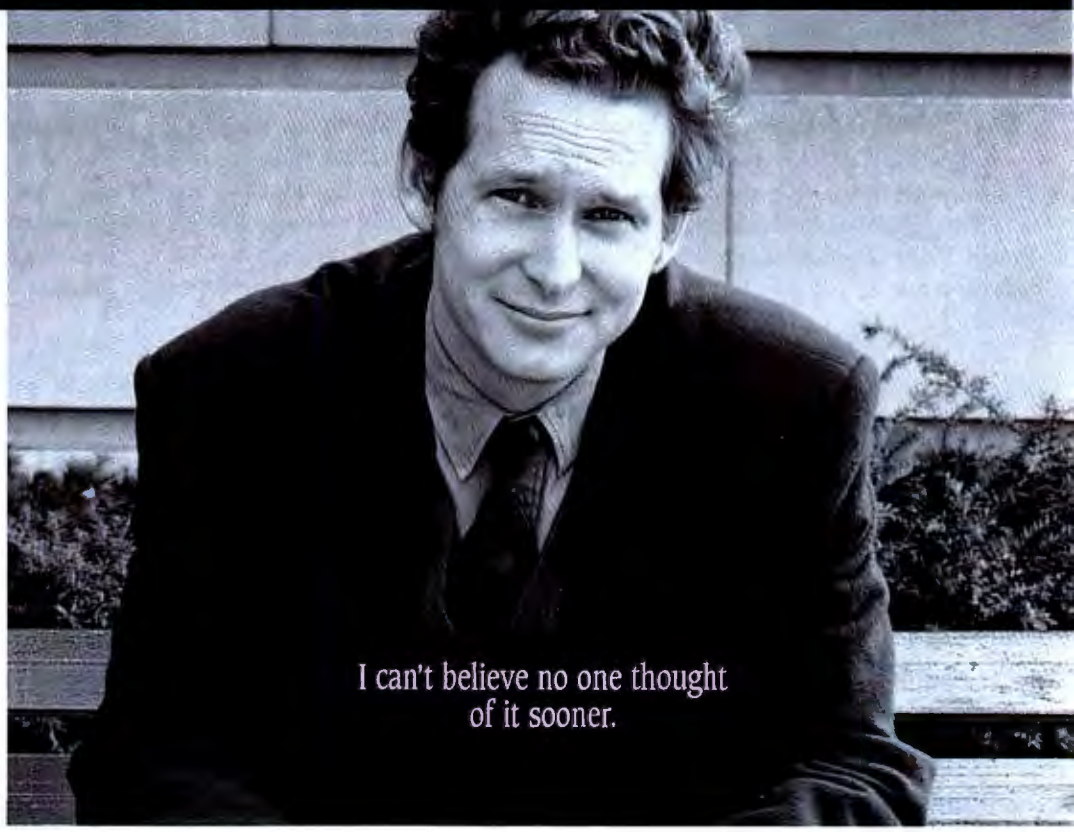

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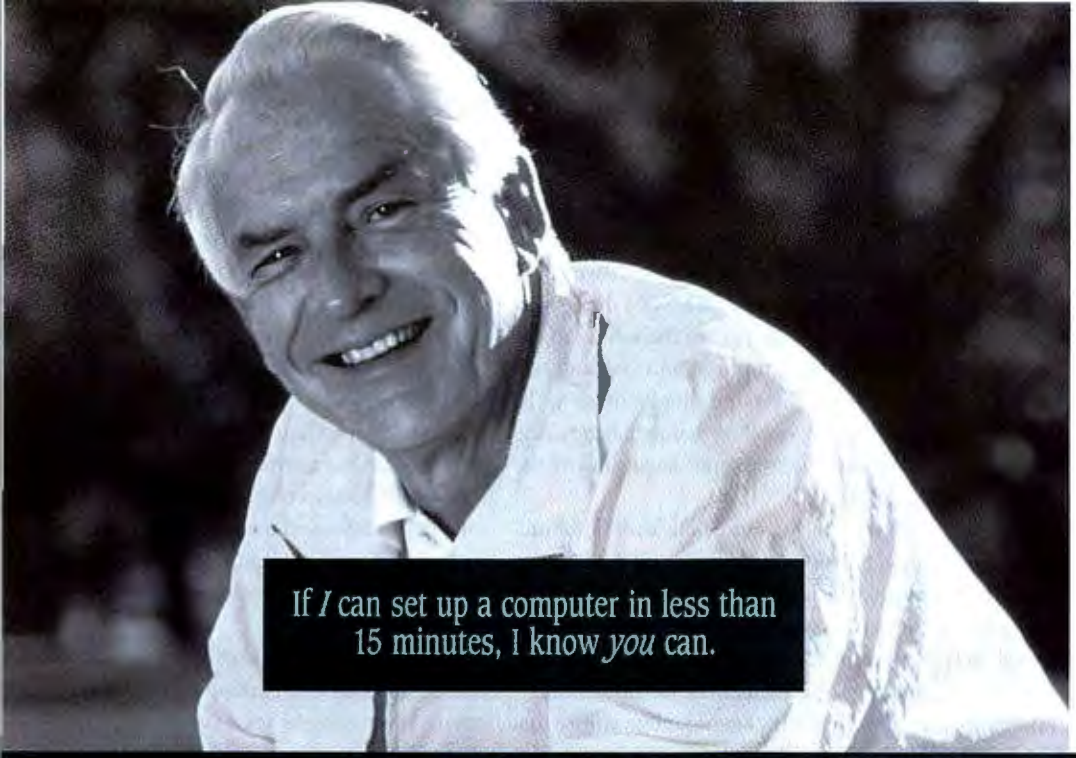

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match competitors' prices, but their salespeople gave me the impression that they wanted me to hurry up, order, and get off the phone.

TRICKS OF THE TRADE

How can you tell a good buy from a quicksand pit? Just follow these tips:

■ Some mail-order firms offer special discounts for *PC World* readers. Discounts are usually mentioned in their advertisements, but if not, ask.

■ Keep shopping even after you buy. All of the stores I visited had the same policy: If they lower their price within 30 days of your purchase, they refund the difference—if you ask them to. So continue to note the store's price for a month after you buy. (None of the mail-order firms had this policy, however.)

■ Install with caution. Hooking up a printer is fairly easy, but installing a CD-ROM drive can be like sailing the Pacific in a sieve. If you're not technically inclined, you can save hours of frustration and hundreds of dollars by having the store install your new addition. This is, by the way, one good reason to shop locally rather than by mail order.

Expect to pay about $40 to $50 to install a modem, and $50 for a CD-ROM drive ($100 for a kit). A large part of the job is simply opening the computer, so installing two upgrades at the same time is likely to be cheaper than installing them separately. And make sure the store runs diagnostics on the installation.

■ Investigate return policies. These studies in fine print vary considerably. Ask about return policies *before* you buy. Some companies give you a full refund; some charge a restocking fee if you want cash; others refuse to take back certain items, such as RAM.

Most mail-order companies require that products be returned in original packaging, *so save the boxes*. Of the stores I visited, Computer City was the biggest stickler for details: It required all the original materials—right down to the registration card—before issuing a refund. Best Buy was less concerned about the details, as long as all the parts were there. In any case, save *all* the packaging and don't fill out any registration cards or special offers until your hardware is up and running. It will leave you in the best position for getting all your money back.

Most dealers offer a 30-day guarantee, and you shouldn't even consider a company that doesn't. PC Connection's policies really stood out with a 120-day warranty on everything: If it breaks during that period, you can just return it—no need to even contact the manufacturer first.

■ Watch out for additional fees. Low prices can be offset by a hefty shipping fee or a surcharge for paying by credit card. Similarly, some stores offer "no payments/no interest" deals of dubious value. In Computer City's loan policy, for instance, an unpaid penny at the end of six months will stick you with a full six months' interest. Not a good deal for the undisciplined. Check the fine print before you do any ordering.

■ Investigate the quality of support. Before you buy, call and try out the technical support department. How well do they answer your questions? Do they sound like they wish you'd hang up? If you're considering a local store, hang around and eavesdrop on a few conversations. How do they treat customers returning items?

■ Visit stores during off hours when they're less crowded so you can get the staff's undivided attention. If the salesperson you collar won't (or can't) answer all your questions, find one who will, or ask the store manager to recommend someone.

■ We've said it before: Use a credit card. Paying by check may seem convenient, but a credit card gives you legal protection that checks can't. You have the right to challenge a payment via a credit card if the vendor doesn't come through. That's a savings in anyone's book.

HOW PERIPHERALS DEALERS MATCH UP

● Yes
○ No
n/a = not applicable

Features	STORES: Best Buy	STORES: CompUSA	STORES: Computer City	MAIL ORDER: Arlington Computer	MAIL ORDER: Computer Discount Warehouse	MAIL ORDER: PC Connection
HP DeskJet 540	$278	$280	$277	$279	$299	$300
HP LaserJet 4 Plus	$1398	$1398	$1470	$1419	$1478	$1500
Plextor 4Plex CD-ROM	n/a	n/a	$500	$469	$490	n/a
Sound Blaster Digital Schoolhouse	$299	$299	$300	n/a	$280	$300
NEC 3V 15" monitor	$434	$438	$460	$459	$467	$500
Sony 17se 17" monitor	$999	n/a	$998	n/a	$970	$1099
U.S. Robotics 28.8-kbps v.34 external fax-modem	$230	$280	$250	$219	$226	$240
Cheapest 14.4-kbps internal fax-modem	$90 Zoom	$70 store brand	$50 store brand	$70 GVC	$90 Boca	$70 Zoom
30-day money-back guarantee	●	●	●	●	●	●
Manufacturer warranty	●	●	●	●	●	●[1]
Restocking fee for damaged and incomplete returns	●	●	●	●	10%[2]	●
Shipping fees	n/a	n/a	n/a	$15	Cost + insurance	$5
Competitive price matching	●	●	●	●	●	○
Vendor phone number	n/a	n/a	n/a	800/ 548-5105	800/ 266-4239	800/ 800-5555

All prices as of October 1994.

[1] 120-day replacement by PC Connection if defective.

[2] If returned for no obvious reason.

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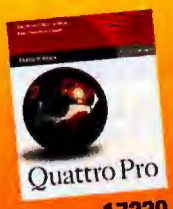

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16658	Microsoft Home Mouse	39.95
1690	Microtek ScanMaker II HR	1069.95
16811	Polaroid SprintScan	2099.95
16151	UMAX BizCard Reader	199.95
13287	UMAX UC630 Color Scanner	599.00
6714	Visioneer Papermax	399.95

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16593	Ahead, Inc Virtual Guitar	$89.95
17582	AITECH Wireless Bandit (joystick)	59.95
16600	IVI Pub. AnnaTommy—Windows	34.95
16598	IVI Pub. What is a Belly Button?	34.95
16419	Jasmine VidGrid	29.95
17449	Passport Design Encore	369.95
17448	Passport Design MusicTime 2.0	89.95
17348	WordPerfect Paper Planes	24.95
16622	WordPerfect Read w/ Me CD 1&2	49.95
15875	WP Wallobee Jack & Thai Sun	24.95
16624	WP Wallobee Jack & Secret Sphinx	24.95

STORAGE

17659	CMS Trakker 700MB Port. Tape	$449.95
16709	Conner Periph CFA540A IDE HD	299.95
16291	Conner Periph CFA810A IDE HD	449.95
2530	Iomega Bernoulli 90MB Cartridge	89.95
16852	Iomega Bernoulli 230MB Cartridge	99.95
16820	Iomega Bern. 230MB Transportable	499.95
17345	Western Digital 1GB IDE Drive	499.95

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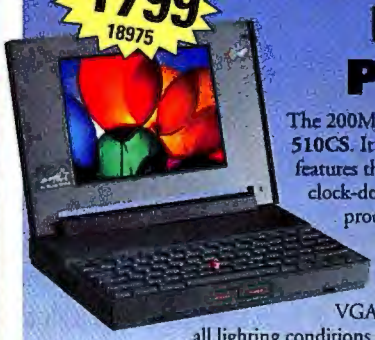

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PC WORLD

Instant Reference Card #52

For use with PC World Instant Reference Card Portfolio

PC BUYER'S CHECKLIST

	Model:	Model:	Model:	Model:
VENDOR				
Type (mail order, independent dealer, franchise dealer, superstore)				
Phone number				
Address				
Salesperson				
COST				
System price (as configured)	$	$	$	$
Shipping charges	$	$	$	$
Taxes	$	$	$	$
Other charges	$	$	$	$
TOTAL CHARGES	$	$	$	$
CASE, BAYS, SLOTS, AND PORTS				
Case style (desktop, tower, minitower)				
Power switch location (front, back, left, right)				
Free externally accessible 3½-inch/5¼-inch drive bays	3½____ 5¼____	3½____ 5¼____	3½____ 5¼____	3½____ 5¼____
Free internal 3½-inch/5¼-inch drive bays	3½____ 5¼____	3½____ 5¼____	3½____ 5¼____	3½____ 5¼____
Free expansion slots (32-bit EISA/16-bit ISA/8-bit ISA)	32-bit ____ 16-bit ____ 8-bit ____	32-bit ____ 16-bit ____ 8-bit ____	32-bit ____ 16-bit ____ 8-bit ____	32-bit ____ 16-bit ____ 8-bit ____
Free local bus slots	PCI ____ VL ____	PCI ____ VL ____	PCI ____ VL ____	PCI ____ VL ____
Serial/parallel ports	/	/	/	/
MOTHERBOARD				
CPU manufacturer (Intel, AMD, Cyrix, IBM)				
CPU model/clock speed (MHz)	/	/	/	/
CPU upgrade method (OverDrive for SX or DX, Pentium OverDrive, plug-in card)				
Zero-insertion force socket	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____
BIOS developer (AMI, Award, Phoenix)/date	/	/	/	/
Flash/Plug and Play BIOS	Flash ____ PnP ____	Flash ____ PnP ____	Flash ____ PnP ____	Flash ____ PnP ____
Secondary cache installed/maximum (K)	/	/	/	/
MEMORY				
RAM installed/maximum (MB)	/	/	/	/
Type of SIMMs supported (512K, 1MB, 2MB, 4MB, 8MB, 16MB)				
Number of SIMM pins	30-pin ____ 72-pin ____	30-pin ____ 72-pin ____	30-pin ____ 72-pin ____	30-pin ____ 72-pin ____
SIMM sockets/number free	/	/	/	/
STORAGE				
Hard disk manufacturer and model				
Size (MB)				
Interface (IDE, SCSI)				
Adapter manufacturer				
Average access time (ms)				
Transfer rate (MB/sec)				
Floppy drive (1.2MB, 1.44MB, 2.88MB, combo)				

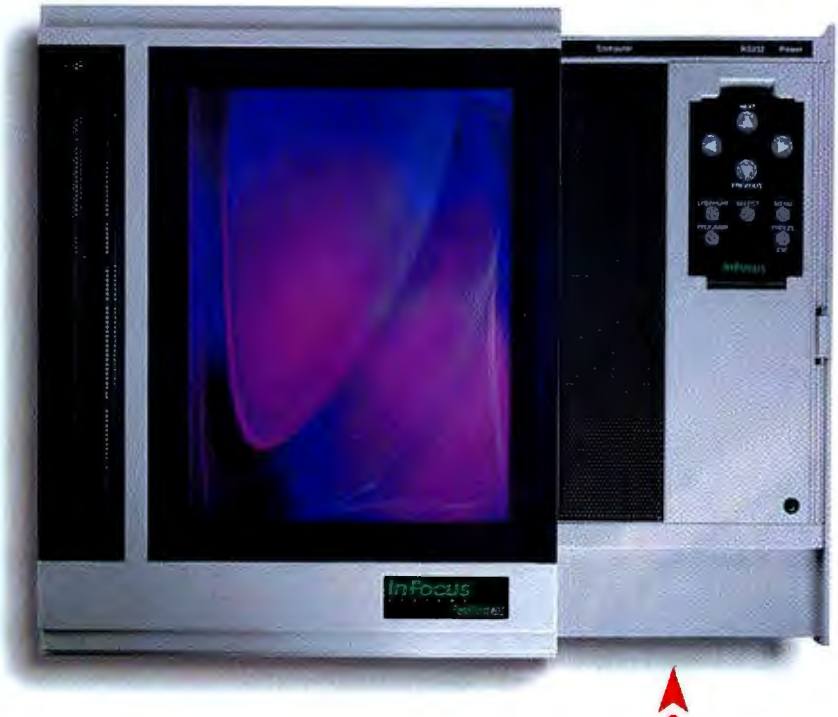
PC WORLD

Instant Reference Card #52

For use with PC World Instant Reference Card Portfolio

PC BUYER'S CHECKLIST

	Model:	Model:	Model:	Model:
GRAPHICS				
Monitor manufacturer and model				
Size (diagonal inches)/dot or stripe pitch (mm)	/	/	/	/
Intended resolution (640 x 480, 800 x 600, 1024 x 768, 1280 x 1024)				
Refresh rate at intended resolution (Hz)				
Front-mounted controls	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____
Graphics adapter manufacturer and model				
Installed VRAM/DRAM (MB)	/	/	/	/
Adapter form (integrated, plug-in card)				
Local bus adapter	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____
KEYBOARD AND MOUSE				
Keyboard manufacturer and model				
Number of keys				
Mouse/trackball manufacturer and model				
Number of buttons				
FAX-MODEM				
Fax-modem manufacturer and model				
Price	$	$	$	$
Fax speed/modem speed (kbps)	/	/	/	/
Error correction (MNP4, MNP10, V.42)				
Data compression (MNP5, MNP7, V.42bis)				
Fax program				
CD-ROM DRIVE AND SOUND CARD				
CD-ROM drive manufacturer and model				
Price	$	$	$	$
Interface type (IDE, SCSI, proprietary)				
Speed factor (1X, 2X, 3X, 4X)				
Access time (ms)/transfer rate (K/sec)	/	/	/	/
Sound card manufacturer and model				
Price	$	$	$	$
Speakers and headphones	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____
INCLUDED OR DISCOUNTED SOFTWARE				
SERVICE AND SUPPORT				
Warranty (years)				
Money-back guarantee (days)				
On-site service price/restocking fee	$ /$	$ /$	$ /$	$ /$
Service center turnaround (days)				
Toll-free support	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____
Weekday support hours	____ a.m. to ____ p.m.	____ a.m. to ____ p.m.	____ a.m. to ____ p.m.	____ a.m. to ____ p.m.
Weekend support hours	____ a.m. to ____ p.m.	____ a.m. to ____ p.m.	____ a.m. to ____ p.m.	____ a.m. to ____ p.m.
BBS support and fax support	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____	Yes ____ No ____



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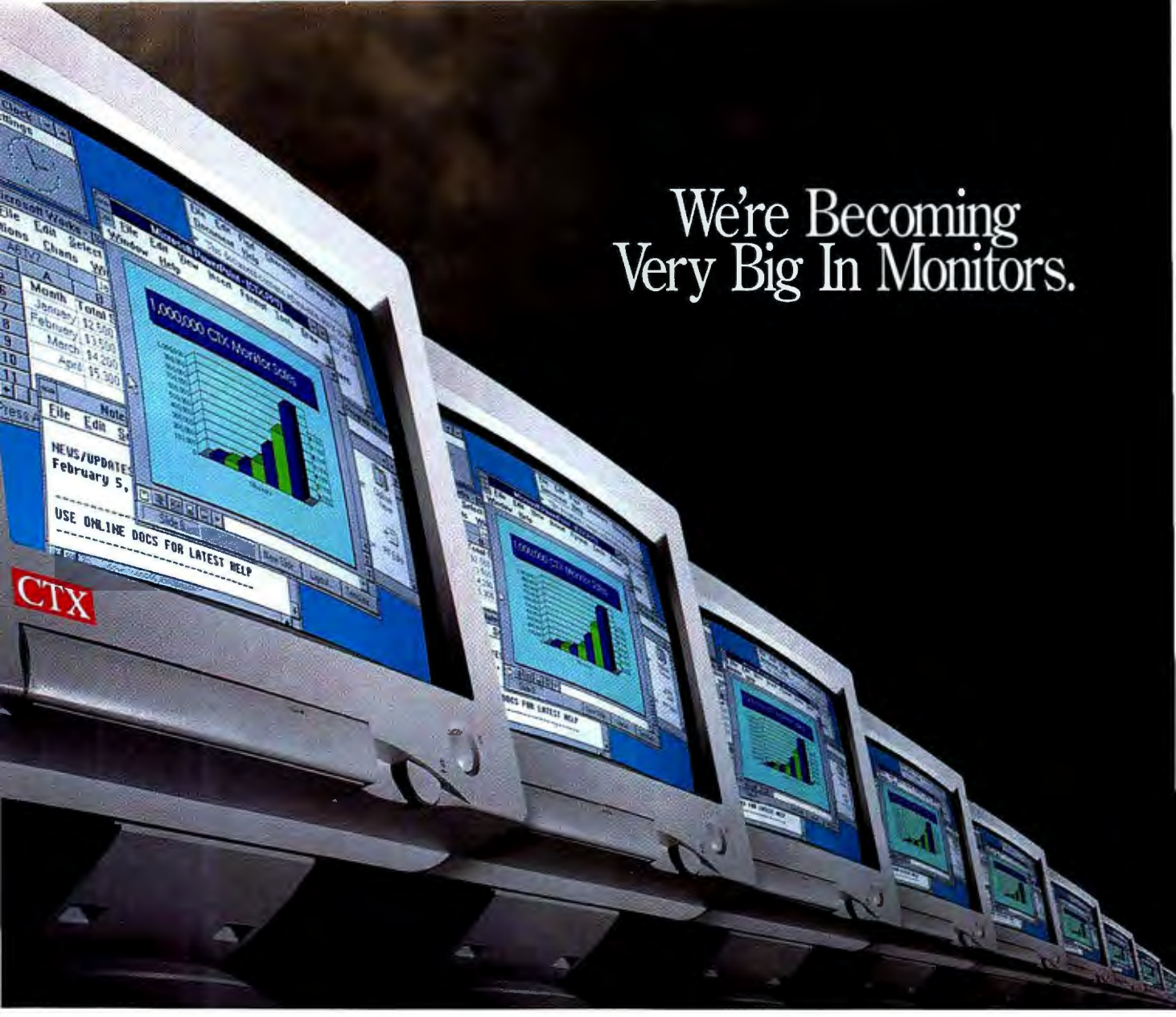
Circle 132 on reader service card



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*Official 1993 Monitrak U.S. monitor sales research.

Circle 74 on reader service card

Cheaper by the Gigabyte

Have fat Windows files maxed out your hard disk? Fight back with these affordable hard drives, from 420MB to 4.3GB.

By Melissa Riofrio

ILLUSTRATION: JAMES YANG; PHOTOS: JIM WILDRETH

Only a year or two ago, 200MB was ample room on a hard drive, but now operating systems and applications occupy much vaster tracts of disk space. Windows, by far the most common operating environment, is a prime example of these hard drive land barons. Along with DOS, but without additional font and graphics files, Windows claims more than 20MB on your hard disk. Windows 95 will probably take between 30MB and 40MB, and current releases of applications

such as Microsoft Word and Excel can occupy an added 20MB each. Multimedia applications and files are staking out their territory, too: A typical 30-second sound clip takes about 750K, while a 1-minute video clip can weigh in at 3.5MB or more.

If no amount of archiving and deleting can relieve the storage squeeze, it's time to think about upgrading drive capacity—either by adding a second drive or by scrapping your old drive for a larger one. And if you plan to buy a new PC in the near future, you'll profit from knowing more about storage options.

PC World tested six IDE drives and five SCSI drives, focusing on the performance issues important for a typical desktop; then we compiled a list of 39 420MB and larger IDE drives and 54 SCSI drives with 705MB or bigger capacity, so you can compare prices and features.

Hard drive prices continue to drop (see "IDE Prevails on Price"), but overall quality and reliability are better than ever. Disks are also shrinking—you rarely find a 5¼-inch drive these days, and most are no more than an inch thick. Energy-saving sleep modes are becoming standard, and drives can withstand greater physical jolts.

The IBM Deskstar XP DPEA-31080 performed slightly faster than the other IDE drives using the same VLB controller.

Give Your PC Room to Grow

Hard disk additions or upgrades make the most sense if you have a newer system. A 486 or better can probably handle just about anything, but if you're using anything slower, technological gulfs between old and new could stunt performance advantages, lead to incompatibilities, or worse. The generation gap could be so wide, in fact, that components might not work together at all. If you can't test a prospective drive in your system before buying it, call the manufacturer to ask about the drive's compatibility.

Whether you're buying a new PC or just upgrading storage, current systems give an indication of typical requirements. Drive capacities of 300MB or less were standard on systems sold one or two years ago, but 300MB now represents the low end. Solid budget systems typically sport 400MB, 500MB, and even larger hard drives. Power desktops commonly offer drives ranging from around 700MB to more than 1GB. Today's standard drive will likely be tomorrow's crammed closet, so buy the largest size you can afford.

IDE or SCSI?

Will you need an IDE or a SCSI hard drive? If you currently have an IDE and your work is confined to general business computing, this interface is your best choice. New advances in the interface standard have improved performance considerably and allowed capacities over 528MB without requiring an extra partition. But SCSI still works best for certain situations: If you're setting up a server or a multitasking workstation, or you need to connect many devices to a single interface, choose a SCSI model.

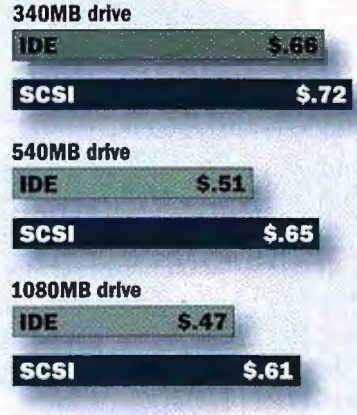
An IDE setup tends to cost less than SCSI, primarily because there's an inexpensive IDE interface already supplied with most modern motherboards. SCSI hard drives often come at a premium, and unless you already have a SCSI host adapter, you'll have to buy one.

Vendors currently market second-generation IDE products under three classifications: Enhanced IDE, Fast ATA, and Fast ATA-2. The differences among these standards mean more to the hard drive manufacturer than to the consumer. In our tests, products performed almost identically regardless of their classification.

SCSI drives can come in a number of combinations. The basic technology is SCSI-2, but Fast SCSI and Wide SCSI offer greater performance. Today's SCSI drives are nearly all Fast SCSI-2 drives; Wide SCSI doubles data transfer rates. However, if you're using business apps in a single-user installation, you'll realize little difference.

IDE Prevails on Price

Cost per megabyte



Cost per megabyte of typical drives tends to go down as capacity goes up, so it makes sense to buy the largest hard drive you can afford. At any capacity, IDE drives cost less than SCSI. Prices do not include an adapter.

The Bus and the Drive for Performance

With software disk caching and our suite of business and graphics applications, we set out to uncover performance issues relevant to business use on individual PCs. What we found may surprise you: There's little difference between IDE and SCSI drives in the business applications we use in our performance tests. Of the IDE drives we tested using the same VESA local bus adapter, the IBM Deskstar XP DPEA-31080 performed fastest overall by a very slight margin. Even on our most disk-intensive benchmark—the Paradox 3.5 for DOS test—the IBM edged its closest competitor by just 10 percent.

SCSI drives ran slightly slower in our tests; however, in a multitasking environment (such as a busy server on a heavily trafficked LAN), a SCSI drive is able to perform far more efficiently because of its ability to queue multiple write requests. In addition, high-capacity SCSI hard drives generally run at more revolutions per minute, and are

Compression Software: The Other Hard Disk Upgrade

Granted, you need more disk space; but if replacing or adding a hard drive is not an option, you can still make space on your desktop or notebook PC's hard disk—with software. Real-time compression utilities automatically compress and decompress files as you use them.

Users of DOS 6.0 and later versions already have a compression utility as part of the operating system, but its features and capabilities are limited compared to full-fledged versions. Of the leading products, Stac Electronics' Stacker 4.0 for Windows and DOS gives you the most options. The company claims Stacker achieves compression ratios as high as 2.5 to 1. Typically, Stacker has a fairly slight impact on performance, but you can select a lower compression ratio if you want more speed. Stacker also provides an uninstall feature if you get cold feet, and the company gives you a 60-day money-back guarantee. The recently announced Multimedia Stacker includes Helix's Multimedia Cloaking, which helps reclaim conventional RAM taken by drivers in multimedia systems. All versions of Stacker are available for under $100. • *Stac Electronics; 800/522-7822, 619/929-3900.* Reader service no. 783

A final word: Before you install any real-time compression utility, back up your entire hard drive, and follow all instructions to the letter.

designed to perform well under even the most demanding conditions.

What about local bus versus ISA bus connections? That's a big consideration if you're upgrading a non–local bus system. Usually, ISA bus PCs are at a disadvantage only in the most disk-intensive apps. Otherwise, for both IDE and SCSI drives, differences in performance using the VLB, PCI, and 16-bit ISA adapters we tested were negligible. However, on the disk-intensive Paradox for DOS test, the 16-bit ISA times were about 20 percent slower than benchmarks measured using a VLB or PCI bus adapter.

We logged one conspicuous exception to the VLB-versus-ISA rule: Using a 16-bit Future Domain TMC-1680 ISA SCSI adapter yielded Paradox times comparable to many of our VLB results. We didn't test adapters comprehensively—other high-performance SCSI adapters may also boost performance levels. But none of the other 16-bit adapters we used were able to match the Future Domain's results. This outcome indicates that the adapter can be as important as the hard drive in achieving optimum results—and this is good news for owners of earlier 486DX-33s and DX-50s, many of which were manufactured before local and PCI buses became de rigueur on new systems.

Putting It All Together

The hard disk upgrade path is not too rocky, although you have to watch out for some potholes. If you're upgrading a non–local bus model, call the drive manufacturer to ask about potential incompatibilities and BIOS conflicts. Also, all older systems—and some currently sold—come with BIOSes that need help dealing with the second-generation IDE drives featured here. Usually, the manufacturer supplies a utility that gets you past the original PC BIOS's limitations, allowing single-partition access to all storage on drives bigger than 528MB. The most elegant solution for an older ISA PC, particularly if you want a new drive to coexist with it, is a special IDE adapter. The 16-bit ISA Model 18 board from GSI—available for under $50—has its own software-upgradable BIOS, and it lets you access up to 8.4GB in a single partition without requiring a device driver. GSI's $139 Model 4C provides more functionality; it comes with four IDE connectors that let you attach up to eight devices (two per connector), including IDE tape drives and CD-ROM drives. If you're buying a new PC, ask if the BIOS supports a single partition on IDE drives over 528MB without needing a device driver.

In general, we found SCSI installations to be headache-free: The setup software is as easy as connect-the-dots. Conversely, many of the IDE adapters challenged even our experienced PC World Test Center staff. Compared with the complete manuals that came with the SCSI controllers, the documentation we received for the IDE adapters was inadequate, usually consisting of a double-sided sheet of paper that offered few if any directions.

For both IDE and SCSI drives, differences in performance on VLB, PCI, and 16-bit ISA adapters we tested were negligible—except on the disk-intensive database test.

Ultra-Affordable IDE Drives Store up to 1280MB

● = Yes
○ = No
n/a = not available [1]

		KEY FEATURES		PERFORMANCE		
Company	Model name	Formatted capacity (MB) [2]	Street price [3]	Rotational speed (rpm)	Data transfer rate (MB/second, disk to RAM)	Burst transfer rate (MB/second, on-disk cache to RAM)
CONNER PERIPHERALS 800/426-6637, 408/456-4500	Filepro Advantage CFA425	425	$205	4500	4–7	n/a
	Filepro Advantage CFA850	850	$390	4500	4–7	n/a
	Filepro Advantage CFA1275	1275	$550	4500	4–7	n/a
	Filepro Series CFS425	425	$220	3600	13.1	n/a
	Filepro Series CFS540	540	$270	3600	13.1	n/a
	Filepro Series CFS850	850	$365	3600	13.1	n/a
	Filepro Series CFS1275	1275	$525	3600	13.1	n/a
FUJITSU COMPUTER PRODUCTS OF AMERICA, INC. 800/626-4686, 408/432-6333	M2684TAU	530	n/a	4500	2.8–4.7	11.1
HITACHI AMERICA, LTD. 800/448-2244, 415/589-8300	DK211-51	510	$365	4464	2.6–5.9	8
	DK211A-68	680	$445	4464	2.6–5.9	8
	DK212A-10	1080	$620	4464	3.7–6.1	11.1
	DK212A-81	810	$540	4464	3.7–6.1	11.1
	DK222A-54	540	$325	4464	3.7–6.1	11.1
IBM CORP. 800/426-7299	Deskstar XP DPEA-31080	1080	$585	5400	3.2–4	10–11.1
	Deskstar 70G8486	530	$270	4500	3.8–5.6	8.3–10
	Deskstar 70G8511	730	$355	4500	3.8–5.6	8.3–10
MAXTOR CORP. 800/262-9867, 408/432-1700	7420AV	420	$195	3551	2.7–4.75	11.1
	7540AV	540	$235	3551	2.7–4.75	11.1
	7546A	546	$315	4500	3.47–5.57	11.1
	71050A	1050	$540	4500	3.97–6.19	17.5
	71260A	1260	$553	4500	3.97–6.19	17.5
QUANTUM CORP. 800/624-5545, 408/894-5000	Daytona 514	515	$450	4500	13	13
	Lightning 540	540	$260	4500	6	13
	Lightning 730	730	$325	4500	6	13
	Maverick 540	540	$260	3600	6	13
	ProDrive LPS 540	540	$260	4500	6	13
SEAGATE TECHNOLOGY 408/438-8111	Decathlon 850 ST5850A	855	n/a	5400	16.6	n/a
	Medalist 425xe ST3491A	425	$230	3811	13.3	n/a
	Medalist 545xe ST3660A	545	$235	3811	13.3	n/a
	Medalist 720 ST3780A	720	$360	4500	16.6	n/a
	Medalist 1080 ST31220A	1080	$560	4500	16.6	n/a
SAMSUNG ELECTRONICS AMERICA 800/933-4110, 201/691-6200	SHD-30560A	560	$235	3600	4.75	11
TOSHIBA AMERICA INFORMATION SYSTEMS 714/457-0777	MK 2526 FC	530	$380	4200	5.47	6–12
	MK 2528 FC	705	$525	4200	5.47	6–12
WESTERN DIGITAL CORP. 800/568-9272, 714/932-5000	Caviar AC1425	425	$220	4500	5.26	11.1–13.3
	Caviar AC2540	540	$290	4500	6	11.1
	Caviar AC2700	730	$380	4500	5.26	11.1–13.3
	Caviar AC31000	1080	$545	4495	5.26	11.1–13.3
	Caviar AC31200	1280	n/a	4495	5.26	11.1–13.3

[1] Vendor does not publish this information. [2] Rounded to the nearest 5MB. [3] Prices are vendor quoted where possible; otherwise they are the results of PC World research.

Megabytes, Not Megabucks

Drive costs have fallen steeply: We saw street prices as low as 40 cents a megabyte—about half what you'd have expected to pay a year ago. Prices vary widely depending on the source. Mail-order houses and some local dealers generally offer even better deals than computer superstores and membership warehouses. In any case, make sure the drive comes with a cable that fits (if you don't already have one), a manual, and a valid warranty.

Take hard drive specifications with a grain of salt. Different manufacturers measure differently—particularly when calibrating an average seek time—so it's hard to compare specifications. When the drives use software disk caching with business apps, performance differences tend to level out. Here's what storage mavens eye most closely:

• *Data and burst transfer rates.* These describe rates for moving data from disk to RAM and from on-disk cache to RAM, respectively.

• *Rotational speed.* The faster the disk spins beneath the read/write head, the more data it can inhale or exhale.

• *Cache on drive.* You'll see cache amounts of 64K to 512K on most hard drives. The performance effect of the on-drive cache varies depending on the environment and the application, and whether you

		ADVANCED FEATURES				RELIABILITY AND SUPPORT				
Average seek time (ms)	Cache on drive (K)	Mode 3 PIO	Mode 4 PIO	I/O Channel Ready	Multiword DMA	Warranty (years)	Contact start-stop cycles	G-shock rating (operating/ nonoperating)	Energy-saving or sleep modes	Reader service number
12	64	●	●	●	●	3	40,000	5/75	●	627
12	256	●	●	●	●	3	40,000	5/75	●	627
12	256	●	●	●	●	3	40,000	5/75	●	627
15	64	●	○	●	●	3	n/a	5/75	●	627
14	64	●	○	●	●	3	n/a	5/75	●	627
15	64	●	○	●	●	3	n/a	5/75	●	627
15	64	●	○	●	●	3	n/a	5/75	●	627
12	256	●	○	●	○	2	n/a	5/50	●	628
12–15	64	○	○	●	○	3	50,000	100/150	●	629
12–15	64	○	○	●	○	3	50,000	100/150	●	629
12	64	●	○	●	●	3	50,000	150/250	●	629
12	64	●	○	●	●	3	50,000	150/250	●	629
12	64	●	○	●	●	3	50,000	150/250	●	629
10.5	512	●	○	●	●	3	40,000	10/75	●	
12	96	○	○	●	●	3	40,000	10/75	●	
12	96	○	○	●	●	3	40,000	10/75	●	
12	32	●	○	●	●	2	20,000	35/300	●	630
12	32	●	○	●	●	2	20,000	35/300	●	630
12	256	●	○	●	●	2	20,000	35/300	●	630
12	256	●	○	●	●	2	40,000	35/300	●	630
12	256	●	○	●	●	2	40,000	35/300	●	630
17	128	○	○	●	○	1	20,000	10/300	●	631
11	128	●	●	●	●	2	20,000	10/60	●	631
11	128	●	●	●	●	2	20,000	10/60	●	631
14	128	●	●	●	●	2	20,000	10/70	●	631
12	128	●	●	●	●	2	20,000	10/60	●	631
11	256	●	●	●	●	3	40,000	10/75	●	632
14	128	●	○	●	●	3	40,000	2/75	●	632
14	128	●	○	●	●	3	40,000	2/75	●	632
12	256	●	●	●	●	3	40,000	10/75	●	632
12	256	●	●	●	●	3	40,000	10/75	●	632
12	128	●	○	●	○	2	50,000	10/75	●	633
13	128	●	○	●	●	2	40,000	10/100	●	634
13	128	●	○	●	●	2	40,000	10/100	●	634
10–12.5	64	●	○	●	●	3	50,000	10/150	●	635
11–13	128	●	○	●	●	3	50,000	10/70	●	635
10–12.5	64	●	○	●	●	3	50,000	10/150	●	635
10–12	128	●	○	●	●	3	50,000	10/70	●	635
10–12	128	●	○	●	●	3	50,000	10/70	●	635

For more information about all products in this table, circle reader service no. 904.

have a software cache or a caching controller. All the caches on the drives we tested read ahead, gathering the data you'll likely need next, and all perform write caching.

• *Warranty.* Obviously you want the longest warranty you can get. Most are three to five years. Be sure to check how the drive warranty relates to the reseller's or PC vendor's: The manufacturer may honor its warranty above and beyond the retailer's, which could be as little as one year. However, your first recourse is to go through your vendor.

• *Durability.* While the warranty speaks volumes about the manufacturer's faith in its product, the contact start-stop (CSS) and G-shock ratings are also important. The CSS rating indicates how many times you can access the drive before the read/write heads damage the disk platters—a significant measure now that more drives offer power-saving sleep modes. The G-shock rating represents the manufacturer's assessment of how well the drive handles jolts at rest or in motion.

A few features are specific to IDE drives. Mode 3 PIO and Mode 4 PIO are protocols that give the disk drive (not the CPU) control over data transfers. They specify timings for certain drive functions; Mode 4's are somewhat quicker. I/O Channel Ready indicates how much data an IDE drive puts out. It works with Mode 3 or Mode 4 to sense

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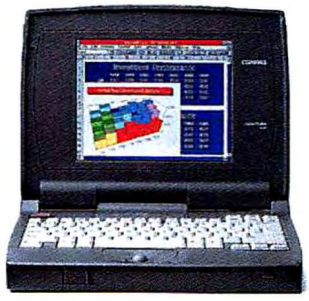

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● = Yes
○ = No
n/a = not available [1]

Company	Model name	KEY FEATURES: Formatted capacity (MB) [2]	KEY FEATURES: Street price [3]	PERFORMANCE: Rotational speed (rpm)	PERFORMANCE: Data transfer rate (MB/second, disk to RAM)	PERFORMANCE: Burst transfer rate (MB/second, on-disk cache to RAM)
CONNER PERIPHERALS 800/426-6637, 408/456-4500	Filepro Performance CFP1060	1060	$550	5400	3.8–6.8	n/a
	Filepro Performance CFP1080	1080	$590	5400	4–6.8	n/a
	Filepro Performance CFP2105	2145	$950	5400	4.3–9.1	10–20
	Filepro Performance CFP2107	2110	$1000	7200	6–11	10–20
	Filepro Performance CFP4207	4220	$2150	7200	6–11	10–20
CORE INT'L 800/688-9910, 407/997-6055	COREdisk Slim 1000F	1000	$725	5400	10	3.88
	COREdisk Slim 2000F	2000	$1425	5400	10	5.7
DIGITAL EQUIPMENT CORP. 800/786-7967	SWXD3-SB	2100	$1370	5400	2.7–5.5	10
	SWXD3-SC	1050	$790	5400	2.7–5.5	10
FUJITSU COMPUTER PRODUCTS OF AMERICA, INC. 800/626-4686, 408/432-6333	M2694EQA	1080	n/a	5400	3.2–5.2	20
	M2694ERA	1080	n/a	5400	3.2–5.2	20
	M2694ESA	1080	n/a	5400	3.2–5.2	5–10
	M2903	2100	n/a	5400	4.7–6.8	10–20
	M2909	3100	n/a	5400	4.7–6.8	10–20
	M2915	2100	n/a	7200	6.9–8.7	10–20
HEWLETT-PACKARD 800/826-4111	SureStore 1000S	1050	$710	5400	2.8–4.7	10
	SureStore 2000S	2100	$1400	6400	3.2–5.1	10
HITACHI AMERICA, LTD. 800/448-2244, 415/589-8300	DK328C-10	1050	$625	5400	5–10	10–20
	DK328C-21	2100	$985	5400	5–10	10–20
	DK328C-43	4300	$1750	5400	5–10	10–20
IBM CORP. 800/426-7299	2.0GB Hard Disk Drive	2015	$1145 [4]	5400	5.22	10–20
	Deskstar 94G2442	730	$375	4500	3.8–5.6	8.3–10
	Deskstar XP DPES-31080	1080	$620	5400	3.2–4	10
	Ultrastar XP 2160	2160	$1280 [5]	7200	9.6–12.6	10–20
	Ultrastar XP 4320	4320	$2330 [6]	7200	9.6–12.6	10–20
MICROPOLIS CORP. 800/395-3748, 818/709-3333	Model 3243	4300	$3765	7200	4.1–7.2	10–20
	Model 4221	2100	$2320	7200	4.4–7.3	10–20
OPTIMA TECHNOLOGY 714/476-0515	DisKovery 1000	1010	$820	5411	5.1	10
	DisKovery 2100	2040	$1555	7200	7	10
QUANTUM CORP. 800/624-5545, 408/894-5000	Atlas XP 31070	1075	$795	7200	10	20
	Atlas XP 32150	2150	$1400	7200	10	20
	Atlas XP 34300	4300	$2100	7200	10	20
	Capella VP31110	1110	$595	5400	10	20
	Capella VP32210	2215	$995	5400	10	20
	DSP 3107L	1370	$725	5400	10	20
	DSP 3133L	1710	$900	5400	10	20
	DSP 3210L	2690	$1295	5400	10	20
	Empire 1400	1400	$945	5400	10	20
	Grand Prix XP32151	2150	$1400	7200	10	20
	Grand Prix XP34301	4300	$2100	7200	10	20
	Lightning 730	730	$325	4500	6	13
SEAGATE TECHNOLOGY 408/438-8111	Barracuda 1 ST11950N	1690	$1350	7200	10	n/a
	Barracuda 2 2HP ST12450W	2135	n/a	7200	20	n/a
	Barracuda 2 LP ST31250N	1020	$1035	7200	20	n/a
	Barracuda 2 LP ST32550N	2145	$1450	7200	20	n/a
	Barracuda 2 ST12550N	2140	$1300	7200	20	n/a
	Barracuda 4 ST15150N	4295	$2375	7200	20	n/a
	Hawk 1 LP ST31200N	1050	$670	5411	20	n/a
	Hawk 2 LP ST31230N	1050	$575	5411	20	n/a
	Hawk 2 LP ST32430N	2145	$1385	5411	20	n/a
	Hawk 2 ST11900N	1700	$1000	5411	20	n/a
	Hawk 2 ST12400N	2150	$1175	5411	20	n/a
	Hawk 4 ST15230N	4295	$2040	5411	20	n/a
TOSHIBA AMERICA INFORMATION SYSTEMS 714/457-0777	MK 2528 FB	705	$525	4200	5.47	10

[1] Vendor does not publish this information.
[2] Rounded to the nearest 5MB.
[3] Prices are vendor quoted where possible; otherwise they are the results of *PC World* search.
[4] Estimated selling price for Fast/Wide SCSI-2 is $1212.

						RELIABILITY AND SUPPORT				
	SCSI-2	Fast SCSI	Wide SCSI	Average seek time (ms)	Cache on drive (K)	Warranty (years)	Contact start-stop cycles	G-shock rating (operating/ nonoperating)	Energy-saving or sleep modes	Reader service number
	●	●	●	9	512	5	20,000	5/75	●	636
	●	●	●	11	256	5	40,000	5/75	●	636
	●	●	●	8.5	512	5	n/a	5/75	○	636
	●	●	●	8.5	512–2048	5	n/a	5/75	n/a	636
	●	●	●	8.5	512–2048	5	n/a	5/75	n/a	636
	●	●	○	8.5	512	5	n/a	n/a	●	637
	●	●	○	9	256	5	n/a	n/a	●	637
	●	●	○	9.5	1024	5	10,000	10/10	○	638
	●	●	○	9.5	512	5	10,000	10/10	○	638
	●	●	●	10	512	5	n/a	5/50	n/a	639
	●	●	●	9.5	512	5	n/a	5/50	n/a	639
	●	●	○	9.5–10	512	5	n/a	5/50	○	639
	●	●	●	10	512	5	n/a	5/50	n/a	639
	●	●	●	10	512	5	n/a	5/50	n/a	639
	●	●	●	9	512	5	n/a	5/50	n/a	639
	●	●	●	9.5	512	5	10,000	10/50	○	640
	●	●	●	8.9	256	5	10,000	10/50	○	640
	●	●	●	9.8	512	5	50,000	5/60	○	641
	●	●	●	9.8	512	5	50,000	5/60	○	641
	●	●	●	9.8	512	5	50,000	5/60	○	641
	●	●	●	9.2	512	5	n/a	5/60	○	
	●	○	○	12	96	3	40,000	10/75	●	
	●	●	○	10.5	512	3	40,000	10/75	●	
	●	●	●	7.5	512	5	n/a	5/70	○	
	●	●	●	8	512	5	n/a	5/70	○	
	●	●	●	8.9	512	5	12,000	10/60	○	642
	●	●	●	8.9	512	5	12,000	10/60	○	642
	●	●	○	10.5	256	1	n/a	n/a	n/a	643
	●	●	○	8	1024	1	n/a	n/a	n/a	643
	●	●	●	8.5	1024	5	20,000	10/n/a	●	644
	●	●	●	8.5	1024	5	20,000	10/n/a	●	644
	●	●	●	8.5	2048	5	20,000	10/n/a	●	644
	●	●	●	8.5–9.5	1024	5	20,000	10/n/a	●	644
	●	●	●	9.5	512	5	20,000	10/n/a	●	644
	●	●	●	9.5	512	5	20,000	10/n/a	○	644
	●	●	●	9.5	512	5	20,000	10/n/a	○	644
	●	●	●	9.5	512	5	20,000	10/n/a	n/a	644
	●	●	●	9.5	512	5	20,000	10/60	●	644
	●	●	●	8.6	512	5	20,000	10/60	○	644
	●	●	●	8.6	512	5	20,000	10/60	○	644
	●	●	○	11	128	2	20,000	10/60	●	644
	●	●	○	8	1024	5	n/a	2/50	●	645
	●	●	●	8	1024	5	n/a	2/50	●	645
	●	●	●	8	512	5	n/a	2/50	●	645
	●	●	●	8	512	5	n/a	2/50	●	645
	●	●	●	8	1024	5	n/a	2/50	●	645
	●	●	●	8	1024	5	n/a	10/60	●	645
	●	●	●	9	256	5	n/a	10/75	●	645
	●	●	●	9	512	5	n/a	10/60	●	645
	●	●	●	9	512	5	n/a	10/75	●	645
	●	●	●	9	256	5	n/a	10/60	●	645
	●	●	●	9	256	5	n/a	10/60	●	645
	●	●	●	9	512	5	n/a	10/60	●	645
	●	●	○	13	128	2	40,000	10/100	●	646

[5] Estimated selling price for Fast/Wide SCSI-2 is $1350.
[6] Estimated selling price for Fast/Wide SCSI-2 is $2425.

For more information about all products in this table, circle reader service no. 905.

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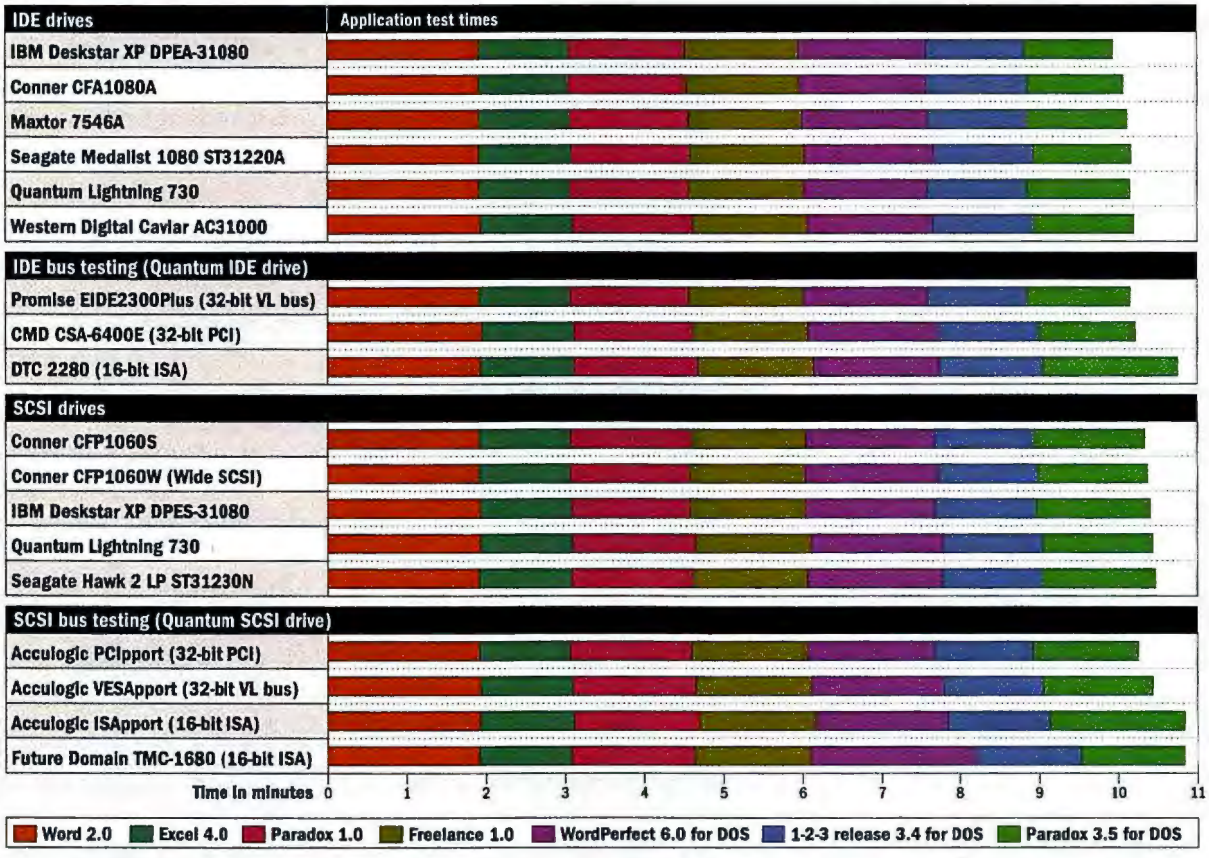
Circle 89 on reader service card

TEST REPORT: THIS MONTH'S CONTENDERS

Drives Run a Virtual Dead Heat Using Business Apps



Products are arranged in order of overall performance from best to worst.

Test Methodology We tested all drives using a Mitsuba Premiere Pentium 90 with 16MB of RAM and 256K of secondary cache, running the *PC World* Test Suite of standard business applications. Before testing each drive, we formatted and partitioned it; then we installed DOS VERSION 6.21, Windows 3.1, any necessary device drivers, and the Test Suite. For the bus testing we repartitioned the drive. Before installing each controller, we reformatted the drive but did not repartition it.

IDE drive testing We compared the performance of a number of IDE drives connected to a VESA local bus IDE controller (the Promise EIDE2300Plus).

Bus testing for IDE drives We compared the performance of one IDE drive connected to three different bus types.

SCSI drive testing We compared the performance of a number of SCSI drives connected to a VESA local bus SCSI controller (the Acculogic VESApport).

Bus testing for SCSI drives We compared the performance of one SCSI drive connected to three different bus types.

Data based on tests designed and conducted by the PC World Test Center. All rights reserved.

when the data path is clear for a top-speed burst of data. Windows, multimedia programs, and other apps that transfer large blocks of data should benefit most. Finally, Multiword DMA (Direct Memory Access) is another way to speed data transfers. It allows the hard disk to transfer data directly to system RAM without CPU intervention.

Before you buy a drive, think about your needs. The rule of thumb is to buy as much storage as you can afford—and with average prices in the neighborhood of 50 cents a megabyte, that can mean acres of disk space. If you're adding storage to an existing system—and your budget is screwed down tight—figure on buying at least 150MB for each additional year you plan to own the system. That should leave you some room for software upgrades and new applications.

Generally you can feel confident about shopping for the best combination of price and warranty. Brand loyalty won't hurt and could help—especially if you have only one IDE connector in your system and want to hook on a second drive. Troubleshooters from a top manufacturer of IDE drive adapters tell us buying both drives from the same manufacturer is your best bet for avoiding compatibility problems.

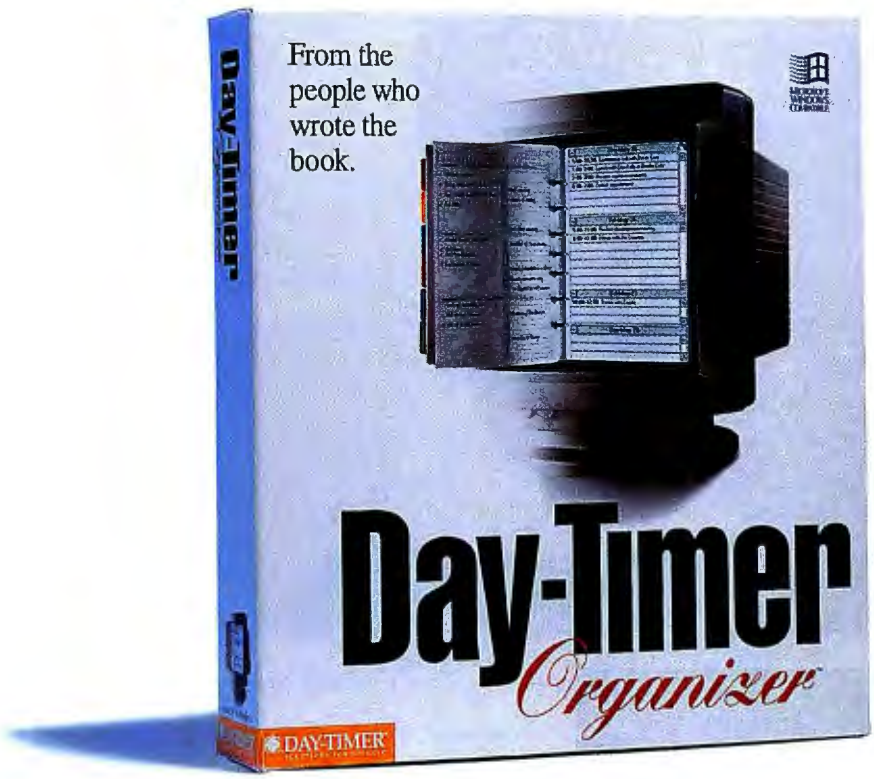
Melissa Riofrio is an assistant editor for PC World.

Where to Buy

TMC-1680 SCSI adapter; Future Domain, 714/253-0400
Reader service no. 787

Model 18, Model 4C IDE adapter boards; GSI, 800/486-7800
Reader service no. 788

Only One Company Could Fit 47 Years Of Time Management Experience On A Disk.



The people who elevated time management to an art form, announce Day-Timer Organizer™— software that integrates a calendar, address book, to-do lists, notebook and expense tracker in one easily accessible place. Start it up and you'll immediately notice a striking resemblance to your daily planner, with its clear and familiar layout. Look a little closer and discover how the power of a computer lets you instantly retrieve and sort information. Of course, there are times when you're nowhere near your desktop but still need to keep information at hand. No problem. Day-Timer Organizer lets you print lists, schedules—anything you need— in formats that fit most planners. To learn more, see your favorite software retailer, or call 1-800-859-6955 and mention key #142791. Available in Windows, DOS or Network versions.

Editors' Home Office Computing Pick · Windows 1995 Win 100 · Buyers Assurance Seal November 1994

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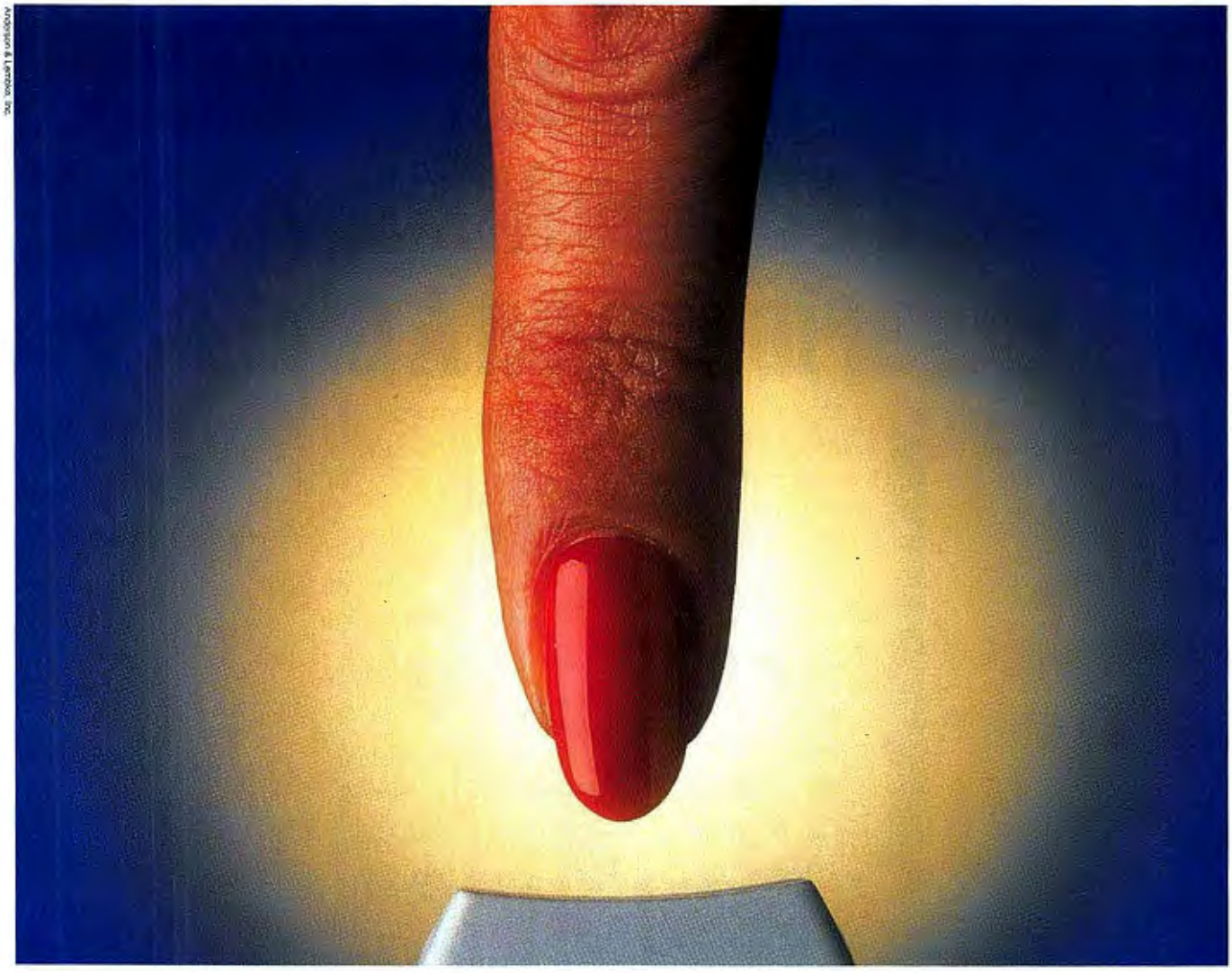

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That's because StudioScan II was designed for simple operation. Two levels of scanning software are built in — easy-to-use Agfa FotoSnap and comprehensive Agfa FotoLook. Plus, our exclusive, 42-page *Introduction to Digital Scanning* will guide you through the scanning process.

What's more, every StudioScan II comes complete with Agfa FotoTune color management software and our IT-8 reference target, along with Adobe PhotoShop™ LE and OmniPage Direct™ OCR software. All in a 400 x 800 ppi, 30-bit, one-pass scanner. And all for about $1,000.

So if you want an easy way to bring a scanner into your office, all it takes is the new StudioScan II. And your finger. Call 1-800-685-4271, ext. 2719 to find out more information on Agfa's new scanners.

AGFA

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PC WORLD
SPECIAL REPORT

Small Office Home Office

From high-rise to home: How to set up a small office that works.

EDITED BY STEVE FOX

ILLUSTRATIONS BY JOTTO SEIBOLD

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Secrets to Marketing Your Business

Is that deafening silence the sound of your phone not ringing? Use these marketing strategies to find—and keep—clients. By Leslie Crawford

STARTING YOUR OWN BUSINESS is like getting married. Many take the plunge with romantic notions of a blissful ever after, but few stop to ponder the realistic chances of success. About 57 percent of small businesses fail after five years. Even marriages have a higher survival rate.

Why the grim statistic? Because starting a business and getting business are entirely different beasts. And to get business you must practice the *M* word—marketing—the process of identifying potential customers and getting your message to them. Unfortunately, the very mention of the word gives some entrepreneurs the willies. After all, most self-starters go into business for themselves because they're terrific accountants, splendid muffin makers, or awesome consultants—not because they're certified marketing mavens.

If this sounds like you, don't fret. A good attitude and a good product put you two-thirds of the way toward your goal. For the final third, you need a marketing plan—a systematic approach to defining your target market. The marketing plan is a kind of road map to your business that ensures that you won't ignore the important work of getting new clients. Your plan can be as simple as a list of short- and long-term goals or as formal as a printed, bound document.

Whichever approach you take, the marketing plan should ask, and answer, some tough questions: Who are my customers? How do I reach them? How many do I want? How can I fulfill their needs better than the competition can? How much time and money can I afford to invest? What unique benefits does my product or service offer?

Building Word of Mouth

Any good marketing plan addresses the problem of getting customers. For a start-up company, your primary marketing strategy is easy: Send notes or call colleagues and friends to alert them that you're now a free agent. For example, if you're an attorney leaving a big law firm, you might call ten lawyers you know and say, "I know entertainment law is not your field, and I'm starting my own business."

But you can't survive long simply on the patronage of friends. A growing business must rely on the kindness of strangers to widen its circle of new clients. "Ultimately, what makes a small business prosper is positive word of mouth," attests Michael St. Lawrence of the Dale Carnegie Institute in Washington, D.C. "After you've completed a job for a client, don't be shy about saying, 'I'm just starting out and would appreciate the referral.'"

"If you're going to stay in business," says Michael Phillips, coauthor of *Marketing Without Advertising* (Nolo Press, 1992), "you need a high proportion of customers who not only come back to you but recommend you to friends." A satisfied customer is the best advertising you've got. It's estimated that in one month, a satisfied customer tells three people about his or her positive experience; within a week, an unhappy one tells seven people of a bad experience.

JOTTO SEIBOLD

So find a justification for getting in touch with clients. Send them birthday cards, interesting articles, or congratulations on a recent promotion or award. If you have extra tickets to the theater, call and offer potential clients the seats. Try to have lunch with someone new once a week. "This type of mensch marketing is too often overlooked," says Salli Rasberry, coauthor of *Marketing Without Advertising*.

Finally, be able to describe what you do in 6 seconds or less. It will help you spread the word about your rubber-stamp business when you bump into a prospective client at a cocktail party or even at the dry cleaners. This sound bite is more formally known as your *mission statement*—the bare bones of your business strategy.

Hitting the Target

Establishing word-of-mouth advertising is a time-tested strategy for getting customers to come to you. To succeed in your business, however, you must also go to customers, and for that you'll need to locate a target market. If your plan calls for reaching a large clientele—say, a mail-order business—the public library is a great place to start. To identify companies that might require your services, try Gale Research's *Directories in Print 1995* or Standard & Poor's *Industry Surveys* updates. The *Statistical Abstract of the U.S.* will help you find clients according to demographics and income. And for almost every industry, there's a *Who's Who*.

If your business will draw from a smaller client base, think locally. When Jeri Metz of Cabin John, Maryland, was starting Mother Herb, her organic herb business, she would deliver a sample bunch of fresh basil to nearby restaurants and health food stores. "Each one was worth about $10," says Metz, "but soon they were ordering produce from me."

Along with samples, try donating time. Join a key civic organization, give speeches and seminars, and circulate your name in as many venues as possible, from trade journals to listings of alumni associations. Establish expertise in your field and offer yourself as a resource to be interviewed for radio, television, newspapers, and magazines. Micki Lipson, who runs Access Network, a Chicago-based business-relocation firm, speaks on panels and has served on the board of the National Association of Women Business Owners. "It helps with business and makes me more visible and credible in the industry."

You should also consider displaying your wares at a trade show. If you're a trade-show novice, check out the *Trade Shows and Exhibits Schedule*, published by Successful Meetings and sold by Trade Show Bureau (303/860-7626).

Fear of Phoning

"You can't sit by the phone like a hopeful teenager waiting for it to ring," says Kim T. Gordon, author of *Growing Your Home-Based Business* (Prentice-Hall, 1992). "The problem is, some people have a fear of the telephone." If you have phone phobia, get over it. The telephone is the best way to get new business.

But how do you get people's phone numbers in the first place? Do your homework. Look in an industry directory for appropriate businesses to contact, or even buy a list (look under "List Brokers" or "Direct Mail List Brokers" in the Yellow Pages). Brokers can help you set up the best list to match your business. Or ask a comple-

Going to Market for New Clients

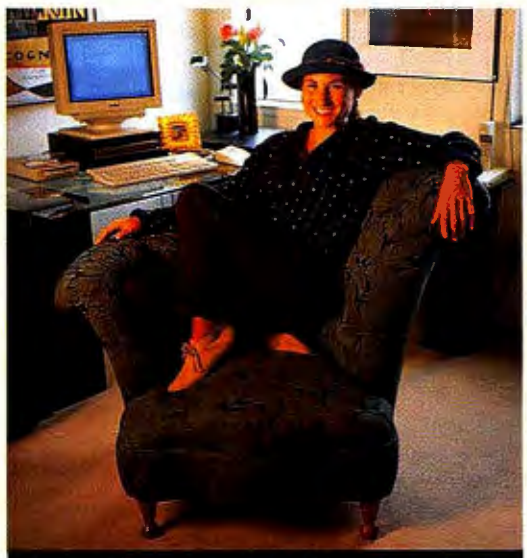
I'm passionate about my work," says San Francisco–based marketing whiz Hope Frank, who attributes her success to enthusiasm, coupled with professional and personal attention to her clients. "My clients receive the same level of follow-through they'd get from a larger corporation, but with a personal flair."

Four years ago, freelance writer/producer Frank joined forces with graphic designer Cheryl Harrison and environmental designer Charles Perez to create the marketing firm Frank Harrison Perez. "We realized we could reach a higher caliber of client collectively than we could individually," says Frank. What began as a loose association has developed into a solid partnership with a 14-person staff comprising full-time employees and independent contractors.

Frank estimates she spends roughly 20 percent of her time cultivating new clients. Referrals are her best source: "Whenever one of our clients mentions someone else who could utilize our services, I make a call as soon as I can."

Finding innovative ways to attract new clients comes naturally to her. For example, Frank does pro bono work for such nonprofit organizations as the Mill Valley Film Festival and the Gorbachev Foundation. "Even if you don't think you have the energy for it, you have to make your presence known."

Pressed for her secret to success, Frank divulges her most valuable kernel of advice. Even if you plan to keep your business small, she says, "you have to dream huge."



Even small businesses have to "dream huge" if they want to reach their target markets, says Hope Frank.

ERIC BUTLER

New device turns any electrical outlet into a phone jack

Engineering breakthrough gives you unlimited phone extensions without wires or expensive installation fees

By Charles Anton

You don't have to have a teenager to appreciate having extra phone jacks. Almost everyone wishes they had more phone jacks around the house.

When I decided to put an office in my home, I called the phone company to find out how much it would cost to add extra phone jacks. Would you believe it was $158?

No more excuses. Today, there are a thousand reasons to get an extra phone jack and a thousand excuses not to get one. Now an engineering breakthrough allows you to add a jack anywhere you have an electrical outlet. Without the hassle. Without the expense. And without the miles of wires.

Like plugging in an appliance. Now you can add extensions with a remarkable new device called the Wireless Phone Jack. It allows you to convert your phone signal into an FM signal and then broadcast it over your home's existing electrical wiring.

Just plug the transmitter into a phone jack and an electrical outlet. You can then insert a receiver into any outlet anywhere in your house. You'll be able to move your phone to rooms or areas that have never had jacks before.

Clear reception at any distance. The Wireless Phone Jack uses your home's existing electrical wiring to transmit signals. This gives you sound quality that far exceeds cordless phones. It even exceeds the quality of previous devices. In fact, the Wireless Phone Jack has ten times the power of its predecessor.

Your range extends as far as you have electrical outlets: five feet or five hundred feet. If you have an outlet, you can turn it into a phone jack—no matter how far away it is. The Wireless Phone Jack's advanced companding noise reduction features guarantee you crystal-clear reception throughout even the largest home.

Privacy guarantee. You can use The Wireless Phone Jack in any electrical outlet in or around your home, even if it's on a different circuit than the transmitter. Each Wireless Phone Jack uses one of 65,000 different security codes. You can be assured that only your receiver will be able to pick up transmissions from your transmitter.

Unlimited extensions—no monthly charge. Most phone lines can only handle up to five extensions with regular phone jacks. Not with the Wireless Phone Jack. All you need is one transmitter, and you can add as many receivers as you want. Six, ten, there's no limit. And with the Wireless Phone Jack, you'll never get a monthly charge for the extra receivers.

Works with any phone device. This breakthrough technology will fulfill all of your single-line phone needs. It has a special digital interface for use with your fax machine or modem. You can even use it with your answering machine just by plugging it into the Wireless Phone Jack receiver.

The Wireless Phone Jack lets you add a phone, modem, fax machine or answering machine almost anywhere.

Special factory-direct offer. To introduce this new technology, we are offering a special factory-direct package. For a limited time, the transmitter is only $49. One transmitter works an unlimited number of receivers priced at $49 for the first one and $39 for each additional receiver. Plus, with any Wireless Phone Jack purchase, we'll throw in a phone card with 30 minutes of long distance (a $30 value) for only $9.95!

Try it risk-free. The Wireless Phone Jack is backed by Comtrad's exclusive 30-day risk-free home trial. If you're not completely satisfied, return it for a full "No Questions Asked" refund. It is also backed by a one-year manufacturer's limited warranty. Most orders are processed within 72 hours and shipped UPS.

Wireless Phone Jack transmitter ...$49 $4 S&H
Wireless Phone Jack receiver .....$49 $4 S&H
save $10 on each additional receiver—$39

30-minute long distance phone card.....~~$30~~
$9.95 with Wireless Phone Jack purchase

Please mention promotional code **017-NW1300.**

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To order by mail, send check or money order for the total amount including S&H (VA residents add 4.5% sales tax). Or charge it to your credit card by enclosing your account number and expiration date.

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Is the Wireless Phone Jack right for you?

The Wireless Phone Jack works with any single-line phone device. Almost anyone could use it, especially if...

- **Few jacks.** *You want more phone extensions without the hassle and expense of calling the phone company.*
- **Bad location.** *You have jacks, but not where you need them most, like in the kitchen, garage, home office or outside on the deck.*
- **Renting.** *You want to add extensions, but you don't want to pay each time you move.*
- **Other phone devices.** *You have an answering machine, modem or fax machine you want to move to a more convenient place.*

The Wireless Phone Jack System consists of a transmitter (right) and a receiver (left). One transmitter will operate an unlimited number of receivers.

TECHNOLOGY UPDATE

900 MHz breakthrough!

New technology launches wireless speaker revolution...

Recoton develops breakthrough technology which transmits stereo sound through walls, ceilings and floors up to 150 feet.

Breakthrough wireless speaker design blankets your home with music.

by Charles Anton

If you had to name just one new product "the most innovative of the year," what would you choose? Well, at the recent *International Consumer Electronics Show*, critics gave Recoton's new wireless stereo speaker system the *Design and Engineering Award* for being the "most innovative and outstanding new product."

Recoton was able to introduce this whole new generation of powerful wireless speakers due to the advent of 900 MHz technology. This newly approved breakthrough enables Recoton's wireless speakers to rival the sound of expensive wired speakers.

Recently approved technology. In June of 1989, the *Federal Communications Commission* allocated a band of radio frequencies stretching from 902 to 928 MHz for wireless, in-home product applications. Recoton, one of the world's leading wireless speaker manufacturers, took advantage of the FCC ruling by creating and introducing a new speaker system that utilizes the recently approved frequency band to transmit clearer, stronger stereo signals throughout your home.

Crystal-clear sound anywhere. Just imagine listening to your stereo, TV, VCR or CD player in any room of your home—without running miles of speaker wire. Plus, you'll never have to worry about range because the new 900 MHz technology allows stereo signals to travel distances of up to 150 feet through walls, ceilings and floors without losing sound quality.

A single transmitter, unlimited receivers. The powerful transmitter plugs into an audio-out, tape-out or headphone jack on your stereo or TV component, transmitting wirelessly to speakers or headphones. The speakers plug into an outlet. One transmitter broadcasts to an unlimited number of stereo speakers and headphones. And since each speaker contains its own built-in receiver/amplifier, there are no wires running from the stereo to the speakers.

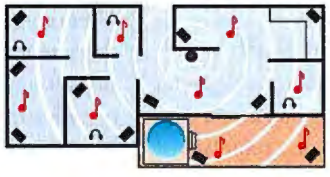
Full dynamic range. The speaker, mounted in a bookshelf-sized acoustically constructed cabinet, provides a two-way bass reflex design for individual bass boost control. Full dynamic range is achieved by the use of a 2" tweeter and 4" woofer. Plus, automatic digital lock-in tuning guarantees optimum reception and eliminates drift. The new technology provides static-free sound in virtually any environment. The speakers are also self-amplified; they can't be blown out no matter what your stereo's wattage.

Stereo or hi-fi, you decide. These speakers have the option of either stereo or hi-fi sound. Use two speakers (one set on right channel and the other on left) for full stereo separation. Or, if you just want to add an extra speaker to a room, set it on mono and listen to both channels on one speaker. Mono combines both left and right channels for hi-fi

150 foot range through walls!

Recoton gives you the freedom to listen to music wherever you want. Your music is no longer limited to the room your stereo is in. With the wireless headphones you can listen to your TV, stereo or CD player while you move freely between rooms, exercise or do other activities. And unlike infrared headphones, you don't have to be in a line-of-sight with the transmitter, giving you a full 150 foot range.

The headphones and speakers have their own built-in receiver, so no wires are needed between you and your stereo. One transmitter operates an unlimited number of speakers and headphones.



Recoton's transmitter sends music through walls to wireless speakers over a 70,000 square foot area.

Factory-direct savings. Our factory-direct pricing allows us to sell more wireless speakers than anyone! For this reason, you can get these speakers far below retail with our 90-day risk-free home trial."

Add headphones and save $100. For a limited time, when you order two speakers and a transmitter, you can add wireless headphones for only $49. That's a savings of $100 off the price of the headphone system. This exclusive offer is available only through Comtrad. Your order will be processed within 72 hours and shipped UPS.

Recoton transmitter	**$69**	$7 S&H
Recoton wireless speaker	**$89**	$9 S&H
Wireless headphone system	~~$149~~	$9 S&H

save $100 with special package offer—only $49

Please mention promotional code **168-NW1301.**

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AWARD WINNING WIRELESS SPEAKER

Built-in receiver and amplifier:
The wireless speaker and headphones both contain a built-in receiver and amplifier. Signals are picked up and transmitted as far as 150 feet away through walls without the use of wires.

Size: 9"H x 6"W x 5.5"L
Signal-to-noise ratio: 60 dB
Channel Separation: 30 dB
Two-way bass reflex design
10 watts/channel RMS amps
Frequency Response: 50 Hz-15 KHz

Don't take our word for it. Try it yourself. We're so sure you'll love the new award-winning Recoton wireless speaker system that we offer you the **Dare to Compare Speaker Challenge.** Compare Recoton's rich sound quality to that of any $200 wired speaker. If you're not completely convinced that these wireless speakers offer the same outstanding sound quality as wired speakers, simply return them within 90 days for a full "No Questions Asked" refund.

Recoton's Design and Engineering Award

Business Help in a Box

The homemade look may work if you're in the business of selling cookies, but it won't cut it for other small enterprises. Here's a sampling of software that will give your small business a professional edge.

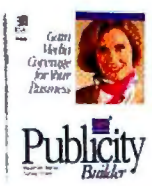
BizPlan Builder. Outlines how to write business and marketing plans; gives integrated financial statements ($129, Jian Tools for Sales, 800/346-5426). **Reader service no. 614**

Business Insight. Marketing strategy package asks hundreds of questions about your business, then assesses its strengths and weaknesses ($495, Business Resource Software Inc., 800/423-1228). **Reader service no. 611**

MarketPro 2.1. Supplies demographic information from the 1990 U.S. Census and the U.S. Postal Service's database ($499 for a metropolitan area, $999 for a 6-to-12-state region, $3500 for the entire United States; DataMap Inc., 800/533-7742). **Reader service no. 612**

MyProfessionalMail-Manager. Handles mailing lists (up to 100,000 names), prints bar codes and addresses to meet postal regulations ($129.95, MySoftware Co., 800/325-3508). **Reader service no. 616**

Plan Write for Marketing. Step-by-step guide to writing a marketing plan. Integrated spreadsheet and charting simplify financial planning ($129.95, Business Resource Software Inc., 800/423-1228). **Reader service no. 611**



Publicity Builder. The basics for spreading the word about your business, including writing press releases and reaching the media ($129, Jian Tools for Sales, 800/346-5426). **Reader service no. 614**

Venture Business Planning & Analysis System. Suggests business and marketing strategies, helps organize finances ($149, Team Tech Systems, 908/530-1805). **Reader service no. 613**

mentary business to share its list. For example, if you have a house-painting business, you might exchange client lists with a carpeting firm.

And remember, patience is more than a virtue when it comes to marketing—it's a necessity: On average it takes at least eight contacts to make a sale, and depending on what you're selling, it can take anywhere from a few days to a year.

It's in the Mail

The mail, too, is an invaluable conduit for delivering your message. To save money on postage and paper, be selective. Smaller businesses should eschew enormous CD-ROM mailing lists, an expensive method of crop-duster campaigning. Instead, locate clients through a service like American Business Information (402/593-4500). ABI produces mailing lists compiled by title, specialty, geographic location, or industry group.

Whatever your list's size, make sure it's always up-to-date and purged of obsolete names. A contact-management software package like Symantec's Act is an effective way to track clients and correspondence.

The Right Stuff

Image counts. Whether you're posting a letter or sending out direct-mail brochures, you'll want a professional, cohesive family of printed material. Pinching pennies by using cheap paper or creating shoddy business cards is a false economy that undermines your credibility. Fortunately, today's desktop publishing programs can make even small businesses appear big-time. For instance, you can use software such as MyBrochure (from MySoftware Company, 800/325-3508) to create slick, multifold brochures. Retail paper houses such as Paper Depot (805/373-0596) and PaperDirect (201/271-9300) offer handsome selections of paper for creating fliers, envelopes, and stationery.

But if writing promotional copy or designing a brochure isn't your forte, don't do it yourself. Contract out such work. Too often, small-business owners think they have to wear all the hats. "You wouldn't rewire your home," says author Gordon. "Figure out what you do best, and hire someone to do what you can't."

To Advertise or Not to Advertise?

Classifieds or Yellow Pages? Billboards or bus shelters? Magazines, radio, or television? "Advertising is the least successful means of getting the word out," says Rasberry. "It's a crapshoot most little businesses can't afford." To up your odds, target your market. If you sell sailboats, advertise in small, seaside publications and start with a small ad. If you get a good response, continue—and even upgrade to a larger ad. And don't overlook classified ads and listings in trade publications.

For most small businesses, the Yellow Pages is a sure bet. But it depends on your business: While 24-hour plumbers may get most of their jobs through the Yellow Pages, a French translator would fare better posting an ad on a university bulletin board.

Support Systems

Don't forget. No one is a island. So don't hesitate to plug yourself into the marketing mainstream. Networking organizations such as The Business Network (800/825-8286), the American Business Association (212/949-5900), or Ali Lassen's Leads Club (800/783-3761) can help you locate colleagues and clients across the country. For an hourly fee, the National Marketing Federation (800/276-5834) provides small businesses with professional advice.

Some final advice. Regardless of your type of small business, treat marketing like daily flossing: Do it regularly, and the process will become habit.

Leslie Crawford is a freelance writer based in San Francisco.

For more information about all products in this article, circle reader service no. 901.

One play can mean the difference between winning and losing. One fax can mean the difference between the right play and the wrong one. Perched high in a press box at Soldier Field with a bird's eye view of the opposing defense, Chicago Bears offensive coordinators diagram plays and send them down to the sideline. They send them down to a Muratec plain-paper fax with superfine resolution and image smoothing. After all, a picture can be worth more than a thousand words. Six points to be exact. Muratec. **1-800-543-4636**

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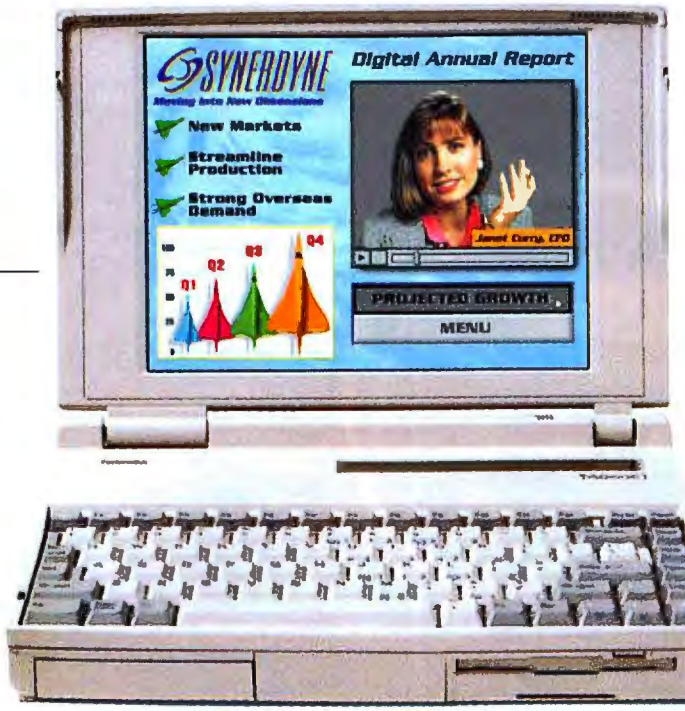

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3 YEAR LIMITED WARRANTY

T4850CT FEATURES:

- 75MHz IntelDX4™, 3.3 volt processor, 16KB cache
- 10.4" dia. color SVGA TFT-LCD active matrix display
- 810 Million Byte (= 772MB) HDD or 520 Million Byte (= 500MB) HDD
- 8MB RAM expandable to 24MB
- Two PCMCIA slots (16mm and 5mm)
- VL local-bus video
- Integrated graphics accelerator
- 65,536 (64K) simultaneous colors
- .WAV Audio and MIDI sound
- Audio jacks: headphone, built-in speakers and microphone
- 6.9 lbs.
- NiMH battery for extended life
- 3.5" 1.44MB floppy disk drive
- Ballpoint™ Mouse with QuickPort™
- Pre-installed software: DOS®, Windows for Workgroups™, Windows Sound System™, Run Time Video for Windows™, Indeo™ video and Fn-esse™ software
- Toll-free Technical Support – 7 days a week/24 hours a day

intel inside

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IRS to Taxpayers:

Don't Work at Home

Tax laws are tough, but here's how to make your home office as deductible as possible.

By Kristin Anundsen

BLAME IT ALL ON NADER SOLIMAN. A Virginia anesthesiologist who practiced in three different hospitals, none of which gave him an office, Soliman used a room in his home instead. From there he contacted patients and surgeons, maintained all his records and medical library, did his paperwork, and kept up with his professional education. He spent 10 to 15 hours a week in that office and claimed it as a home office tax deduction for 1983.

The IRS begged to differ, disallowing his claim. But Soliman decided to fight and found himself in federal tax court, which in 1990 ruled in his favor.

At the time Soliman filed that 1983 tax return, the generally accepted definition of home office was "principal place of business." Some of its crucial characteristics:

- The home office was essential to the taxpayer's business.
- The taxpayer had no other available office.
- The taxpayer spent a "substantial" amount of time there.

The 1990 tax court ruling affirmed this interpretation. Self-employed taxpayers and their accountants let out a sigh of relief.

Alas, the IRS wasn't satisfied. It pursued the hapless Soliman all the way to the U.S. Supreme Court and, in January 1993, *won*. In its decision, the court mandated a stricter definition of "principal place of business": Are goods or services primarily produced or delivered to the customer there? If the answer is unclear, the IRS can look at the relative time spent at all locations. Based on that, Soliman apparently had not done mission-critical work in his home office.

When Is an Office an Office?

Today, if you want to claim a home office deduction, you must:

- Use the space on a "regular" basis (the space can be less than or more than one room, but it must be a definable space). Several times a week, possibly several times a month should qualify, but seasonal use probably won't cut it.
- Use the space only for business.
- Use the office as a "principal place of business," under the strict definition, or meet with patients, clients, or customers there on a regular basis.

If the space is a separate structure, however, you can deduct it even if it isn't your principal place of business, as long as you use it exclusively and regularly in your work.

Tax-Exempt Jobs

Unfortunately, these rules leave certain professions out in the cold and others on a chilly borderline.

If you're a tradesperson whose work is performed on the client's site, your home office *won't* qualify, even if you use it on a regular basis and for business only. Salespeople who spend most of their time at home phoning customers and filling mail orders *might* qualify, but not if they make their sales on the road.

If you're a freelance software developer and you spend more time writ-

5 Reasons You May Not Want to Declare a Home Office

1. You could trigger an audit.

2. Home expenses such as mortgage interest and property taxes are deductible whether or not you have an office in your home. So you might not save any money.

3. Completing Form 8829, as well as associated forms, is difficult and time-consuming. If your accountant does it, you may pay more for their time.

4. You can take numerous office-related deductions already by listing them as miscellaneous expenses on Schedule C (Profit or Loss from Business)—such as office furniture, advertising, computers, business phone, and phone calls.

5. If you sell your home after you've declared a home office deduction, you must recapture the depreciation, and you'll be taxed on the capital gain for the office part of the sale value. Avoid this problem by not taking the home office deduction for a couple of years before the sale.

ILLUSTRATIONS BY JOTTO SEIBOLD

ing code at home than you do testing the programs in your clients' offices, your home space would qualify if the IRS decided that writing code was more important to your business than testing it. Otherwise, thumbs down.

Confused? So are a lot of tax professionals, especially since the IRS and the courts are continually redefining what is and is not legitimate.

For instance, according to tax law, if you use a portion of your home for storage of your product inventory (in other words, whatever it is you sell), you may take a deduction if your home is the only fixed location of your business, the storage space is used on a regular (not necessarily exclusive) basis, and the space is separately identifiable and suitable for storage. But the courts haven't addressed (and the IRS hasn't yet defined) what "suitable" means, notes San Francisco CPA Russell Stanaland.

On the other hand, if you use your home to provide day care services to children, people over 65, or people incapable of caring for themselves, and you are licensed by the state (when licensing is required), you need not meet the exclusive-use test.

Other bright spots: Even if you have a full-time job away from home, you can take a home office deduction if you conduct a separate business in your residence. You can even claim an office in the home if you're an employee of someone else's business—provided you work at home for your employer's convenience and not for your own. (The deductions, however, must not exceed 2 percent of your adjusted gross income.) For example, your boss may require you to work at home because he or she can't afford office space for you. To claim a deduction in such a situation, you need to use Form 2106.

Obviously, the tax laws concerning home offices are rife with contradictions. The situation will probably just get worse as technological advances and business environments allow more people to work at home.

"Telecommunications have made an office in the home more and more practical," declares Michael van den Akker of accounting giant Price Waterhouse. "There are lots of advantages, from sparing the environment to lowering stress to encouraging a spouse to become a wage earner. I'm disappointed that the rules have become *tighter* rather than looser. Congress could pass tax bills that reflect today's realities, and I hope it will."

Until then, be careful and good luck.

Kristin Anundsen is a business writer and author of Creating Community Anywhere *(Tarcher, 1993).*

What's Deductible?

If you're a property owner, home depreciation will account for most of your home office's deductibility—see Part III of IRS Form 8829. And if you're a renter, you can deduct a percentage of your year's rent in Part II of the same form.

Other deductible items (list them under "Indirect Expenses" unless they apply *only* to your business) include utilities and water; property taxes, mortgage interest, and home insurance; general maintenance, such as housecleaning (no Zoe Baird problems, please), carpet cleaning, painting, electrical work, plumbing, and a new roof (depreciated over several years); any related supplies and materials; and outdoor landscaping if your office is used for client visits.

For business expenses not related to the home (office furniture, computers, business fees, travel, and entertainment) use Schedule C of Form 1040.

When you claim a home office, you can deduct the cost of transportation from your home to a client's site. The trip is not considered commuting, even if you visit the client daily. Use Schedule C for this deduction.

Take the Byte Out of Taxes

HARDWARE The IRS unrealistically expects PCs to depreciate over five years. But you can depreciate your computer faster. You usually gain most by writing it off at one time under Title 26 of the U.S. Code, Section 179 (so long as write-offs total less than $17,500 for the year). Even if you started to depreciate the computer in a prior year's return, you can deduct what's left (cost minus previous depreciation). Be sure to do this if you replace your computer before five years are up.

SOFTWARE The IRS won't let you write off your business software along with your paper clips. They call software an "intangible asset" and want it to be amortized (a straight-line depreciation over three years, and a whopping five years if you bought it before 1993). But you can use a faster schedule (or a write-off) if you can prove the software will be out-of-date sooner. And if you spent less than $200 on the software, you can deduct it all as "computer supplies."

SUPPOSE YOU'RE READING A FIFTH GRADE SCIENCE BOOK. Yawn, not much to excite the neurons in here. Now, turn a 180° on the fun scale.

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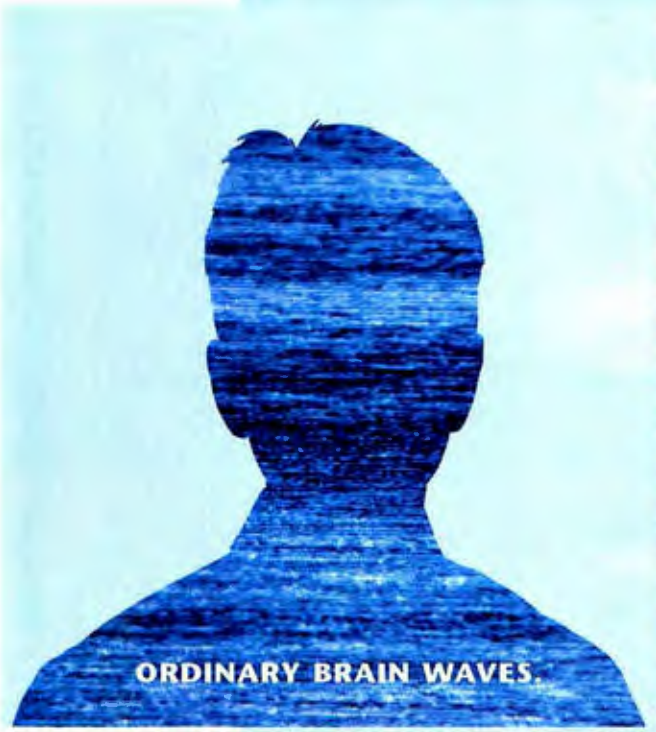
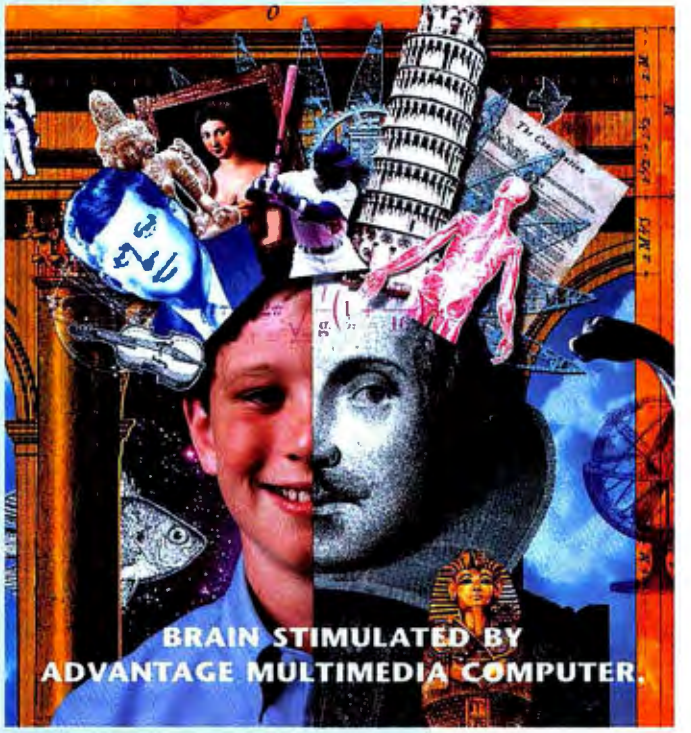
Here's a few more things you won't find on any ordinary computer.





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Hot Picks for the Home Office

These are a few of our favorite things.

By Steve Bass

INTERESTED IN A PAGER that doesn't cost an arm and a leg? How about a CD-ROM that lets you try programs before you buy them, or a device that beams files from one PC to another using radio waves? These and other cool tools can make the work you do at home less costly and more productive.

Stand By Your Printer

ONE OF THE GREATEST things about working from a home office is the benefits: no dress code, free parking, and good food at the commissary. The downside is that office and desk space are at a premium. That's why I use the MediaMate LaserRak Printer Stand to keep my laser printer off my desk but safe from dust on the floor. The plastic stand is roughly 12 inches wide, 17 inches deep, and 9 inches high, with four deep bins for holding paper and envelopes. The stand is cheap—about $25 on the street—and putting it together took less than a minute. The MediaMate isn't exclusively for printers; it also makes a fine home for a fax machine. MediaMate LaserRak Printer Stand $39.95; Hunt Manufacturing; 800/765-5669, 800/663-4868 (Canada), 704/872-1766 (fax).

Reader service no. 737

The MediaMate LaserRak Printer Stand raises laser printers (and fax machines) to new heights.

ILLUSTRATION BY JOTTO SEIBOLD, PHOTOGRAPHS BY JIM HILDRETH

Boot Up, Tune In, Turn On

JUST BECAUSE YOU'RE BUSY working doesn't mean you have to lose touch with the rest of the world. The RadioActive Pro, an inexpensive add-in FM radio card, lets you listen to Brubeck and Mozart or tune in to NPR with a mouse click. Just install the RadioActive in an empty slot, and plug your PC speakers into its 4-watt amplified audio outputs (or connect through your sound card). The RadioActive's visually appealing interface resembles a stereo system, with on-screen buttons for volume, bass, treble, frequency scanning, and nine preset stations. Want to catch news, weather, and sports at noon? It's easy: A timer function tells the software when to turn on and tune in to a specific station. RadioActive Pro $49.95; Novex Technologies; 800/ 725-8324, 918/744-8001.

Reader service no. 738

Get to the Point

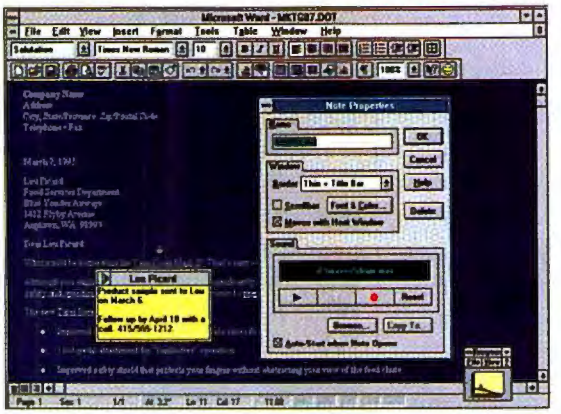
FORGET YOUR MOUSE. Throw away that trackball. With the GlidePoint track pad, you use the best pointer in the world: your finger. The GlidePoint looks like a flat LCD panel and sits next to your keyboard like a miniature mouse pad. Just wiggle your finger in any direction across the GlidePoint's 2½-by-3-inch surface, and the mouse pointer duplicates your movements on screen. Rectangular tabs at the bottom of the unit serve as right and left mouse buttons, or you can simply tap the track pad twice to double-click. The GlidePoint connects to a serial or PS/2 mouse port and costs a mere $75 on the street. So what are you waiting for? Start pointing! GlidePoint $99; Cirque Corp.; 800/454-3375, 801/467-1100.

Reader service no. 739

The GlidePoint track pad lets your finger do the pointing and clicking.

Notes to Yourself

EVER JOT A QUICK MEMO in your word processor and then later forget who you sent it to or why you wrote it? Don't sweat it. Next time, you can use Evergreen Notes to stick a little yellow reminder to the document. Evergreen Notes lets you add text or voice files to documents, spreadsheets, dialog boxes, tool bars, and more. You can have the notes stay on screen all the time, or you can pop them up with a click of the mouse. And if yellow simply isn't your color, you can display the notes in any shade you desire (and that



Add sticky little yellow notes to computer documents with Evergreen Notes.

your monitor can handle). Evergreen Notes $69.95; Evergreen International Technology; 800/667-4340, 604/986-6121, 604/980-7121 (fax).

Reader service no. 740

Batten Down the Hatches

LIVING IN CALIFORNIA, you learn that even a small earthquake can do nasty things to expensive computer equipment. But the last time the earth moved, my PC stayed put, thanks to an ingenious (and cheap) fastening system from Q-Safety. (I didn't actually see it working—I was too busy hiding under the desk, rediscovering religion.) The fasteners use straps, strips of Velcro, and pressure-sensitive adhesives to anchor CPUs, monitors, keyboards, and virtually any other device. When I need to open up my computer or send it in for repair, I can remove the straps and reinstall them in seconds. And at less than $10 per kit, the fasteners are cheap enough to use on any valuable piece of equipment; I've even got one securing my bottled water dispenser. Assorted fasteners $5 to $15 (more for customized straps); Q-Safety; 800/997-2338, 818/449-1590, 818/449-6866 (fax).

Reader service no. 741

Pump Up (and Down) the Volume

IT DRIVES ME CRAZY: One multimedia application forces me to turn up my speakers' sound level; the next application's sound blasts me out of my chair. If I move fast, I can reach behind my computer to adjust my sound card's volume controls before I suffer permanent ear damage. Fortunately, there's now a better way: SC&T's Multimedia Volume Controller, a clever device that connects to your speakers. This slick gadget installs in minutes on the side of your computer or monitor—where any self-respecting volume knob *should* be. Multimedia Volume Controller $15.95; SC&T International; 800/408-4084, 602/470-1334.

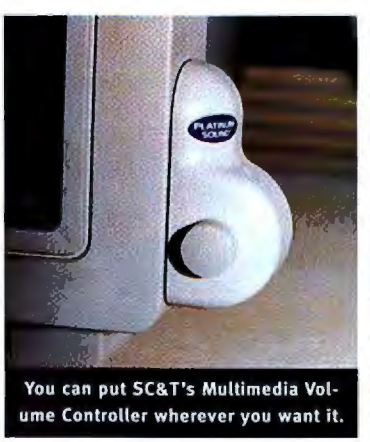
Reader service no. 742

Files Through the Air

MOVING DATA between your notebook and your desktop used to mean doing the floppy fandango—or, at least, the cable cha-cha. But cutting-edge users have discovered LapLink Wireless with AirShare modules, an amazingly cool way to connect two computers. For a street price of about $250, you get LapLink's popular Remote Access software and a pair of 3-ounce, cigarette-pack–size modules. Connect a module to each computer's serial port, and the two PCs can remotely share drives and printers from up to 30 feet apart using radio waves. You can even set the software to automatically synchronize data between the computers whenever it detects a connection. LapLink Wireless makes it possible to move files though the air with the greatest of ease. LapLink Wireless $299.95; Traveling Software; 800/343-8080, 206/483-8088, 206/487-1284 (fax).

Reader service no. 743

With LapLink Wireless, files fly from computer to computer with the greatest of ease.



You can put SC&T's Multimedia Volume Controller wherever you want it.

The CD-ROM Home Shopping Network

SOME PEOPLE LOVE shopping for shoes or cars. Me, I live for the chance to try out new software—as long as I don't have to spend my Saturdays waiting in line at CompUSA. That's why I fell in love with Softbank On Hand. This CD-ROM contains more than 100 commercial programs—such as WordPerfect for Windows, Lotus Organizer, and Print Shop Deluxe—that I can test-drive before I shell out cash for the full package. If I find something I like, I dial an 800 number, hand over my credit card number, and get a password that lets me copy the entire application to my hard disk. Softbank registers the software in my name, and the manufacturer ships me the manual and original disks. While Softbank's prices aren't rock-bottom, they're still better than list, and each application comes with a 30-day money-back guarantee. You can get quarterly updates of the CD-ROM for as little as $10 apiece, and Softbank usually tosses in some extra goodies, such as Microsoft's Custom Entertainment Pack. Softbank On Hand $19.99; Softbank; 800/763-8226, 408/644-7800.

Reader service no. 744

PC World *contributing editor Steve Bass is the president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for contact information).*

For more information about all products in this article, circle reader service no. 910.

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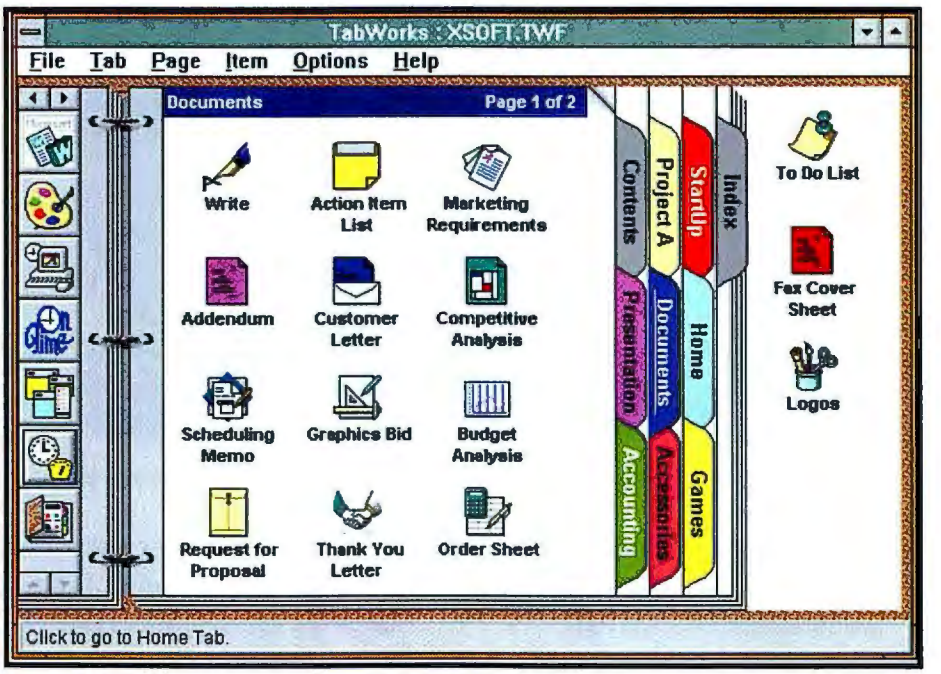

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Here's How

HELP LINE Q&A

Tip of the Month

CD-ROM BOOST: You can significantly improve the performance and, therefore, the quality of multimedia applications by using a disk caching program that supports CD-ROM drives. SmartDrive, in MS-DOS versions 6.0 and later, and the latest versions of several third-party caching programs (including PC-Kwik's Super PC-Kwik Disk Accelerator, Symantec's Norton Speedcache+ for Windows, and the disk cache in Helix's Multimedia Cloaking) can cache CD-ROM drives.

A cache program works by reading in advance the disc information that the CPU will most likely need next and storing it in a RAM cache for faster access. Animation and full-motion video are among the applications that particularly benefit from a CD-ROM drive cache.

Note that a disk caching program can't cache your CD-ROM drive unless it knows your computer has one. That means the line in your AUTOEXEC.BAT file containing the CD-ROM driver (for example, MSCDEX.EXE) must appear before the line that launches the cache program (such as SMARTDRV.EXE).

Andy Rathbone
Author of *Multimedia and CD-ROMs for Dummies* (IDG Books Worldwide, 1994)

Lots of Drive

Q My PC has two IDE hard drives. Now that drive prices are dropping, I'm thinking of adding still more disk space. Is there a way to connect more than two IDE hard drives? Or do I have to mothball one of my older drives to upgrade?
PBSKI, America Online

A Yes, you can put up to four hard drives into your system relatively easily. But the hardware you need in addition to the new drive depends on what your system already has. If your current hard drives are cabled to an IDE connector on your PC's motherboard, and there's another IDE connector next to the first, an additional cable is all you want. However, if the motherboard lacks a second IDE connector, or there's none at all (that is, your hard drives are cabled to an adapter in an expansion slot), you require a new IDE adapter. You could simply get an adapter that supports just two hard drives, but you'll be better off removing the old adapter and replacing it with one that supports four IDE drives on two cables. Many of the adapters from the companies listed below are "intelligent" (that is, they're full-blown controllers) and contain caches—ideal for pumping up the performance of your older, slower drives.

- **ATronics International, Inc.;** 800/488-7776
  Reader service no. 601
- **BusLogic Inc.;** 800/707-7274
  Reader service no. 602
- **CMD Technology, Inc.;** 800/426-3832
  Reader service no. 603
- **Data Technology Corp.;** 408/942-4000
  Reader service no. 604
- **GSI;** 800/486-7800
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- **JDR Microdevices;** 800/538-5000
  Reader service no. 606
- **Longshine Microsystems, Inc.;** 310/903-0899
  Reader service no. 607
- **Perceptive Solutions, Inc.;** 800/486-3278
  Reader service no. 609
- **Promise Technology, Inc.;** 800/888-0245
  Reader service no. 610

For more information about all these products, circle reader service no. 901.

Highway to Your Door

Q I would like to put my home PC on the Internet full-time, just like the computers at work, so that I can put information on the World Wide Web. Can I get Internet service to my home, the same way one gets cable TV?
Stan Mueller, New Orleans

A Yes, you can put your own PC on the Internet, but you may not like the price. A 24-hour connection that's capable of handling World Wide Web traffic (that is, one that's at least 56 kilobits per second and probably faster) could cost you a few hundred dollars per month—and even more outside a major metropolitan area. If you really want to go this route, call the Internet providers in your area (see "The Internet [How to Get There From Here]"

GORDON STUDER

in the January issue) and ask if they can set you up with a leased-line connection. Or, to save money, ask if you can set up your World Wide Web connection on one of their machines. Most Internet providers will let you do this, and it's much cheaper than maintaining a full-time connection of your own.

Scrolls and Other Mysteries

Q What purpose does the <Scroll Lock> key have? Is there any way to use the <Print Screen> key to print a graphics (nontext) screen? What does <Ctrl>-<Print Screen> do?

Sandeep V. Tamhankar, Cornell University

A The <Scroll Lock> key toggles the Scroll Lock feature on and off. Its current status, like that of Num Lock and Caps Lock, is indicated by a light on your keyboard. Many programs ignore the state of Scroll Lock, but those that don't, including the original 1-2-3, use it to lock (and unlock) the cell pointer in a spreadsheet (or the cursor in a document) to its current position. In those programs, when Scroll Lock is on, the cursor keys scroll the spreadsheet (or document) instead of moving the cell pointer (or cursor).

To get <Print Screen> to print out a DOS app's graphics screen, you must load a TSR called GRAPHICS (included with DOS) before you run the graphics app. The range of printers and resolutions that GRAPHICS supports grows with each release of DOS but is still limited (for example, there is no PostScript support). Type **help graphics** at the DOS prompt or check your command reference manual for complete information.

In Windows, <Print Screen> places a copy of the screen in the Clipboard. (If you want to print just the active window, use <Alt>-<Print Screen>.) You can then open Windows' Paintbrush applet, paste in the Clipboard image (*Edit•Paste*), then print it (*File•Print*).

In DOS, <Ctrl>-<Print Screen> (and its alias, <Ctrl>-P) turns printer echo on and off. When printer echo is on, most text sent to the screen also goes to the printer. Echoing to the printer allows you to print DIR listings, as well as the output of other DOS commands, without special redirection commands.

If you want <Print Screen> to print the screen instead of copying it to the Clipboard in an Enhanced-mode Windows DOS session, you must start the session using a properly configured PIF. Open Windows' PIF Editor, load the appropriate PIF (or create a new one), click the *Advanced* button, check the *PrtSc* box in the Reserve Shortcut Keys section, and save the PIF.

Vanishing RAM

Q I have a 386DX-25 PC that came with 4MB of RAM. The RAM is arranged in two banks, each with four slots. The first bank contains four 1MB SIMMs. I recently purchased two 4MB SIMMs. I removed two of the 1MB SIMMs to make room for my two 4MB ones. But when I booted up, the machine still said I had 4MB of RAM. Shouldn't I have 10MB?

Lord Sky, America Online

A There are often restrictions on the size, number, and combinations of SIMMs that will work with a particular motherboard. (For example, many 386 motherboards—especially those with speeds under 33 MHz—won't accept 4MB SIMMs, because that size wasn't widely available until after the 386 became popular and went to 33 MHz.) Always check the manual that came with your motherboard to make sure you've installed an acceptable combination—and that you've changed all the necessary switches and jumpers.

In your case, the problem is almost certainly an invalid combination of SIMMs. If a computer's CPU has a 32-bit external bus (the 386DX, 486DX, and 486SX all do) and it uses ordinary

USER GROUP OF THE MONTH

SLO Bytes PC Users Group

March's user group tips are supplied by the SLO Bytes PC Users Group of San Luis Obispo, California. The group offers a SIG for new users, a general Q&A period, and vendor demonstrations. In addition, SLO Bytes operates a publicly accessible BBS, puts out a monthly newsletter, and maintains a 500-disk shareware library and a CD-ROM lending library. The group meets on the first Sunday of each month at 1 p.m. in the Fisher Science Building on the California Polytechnic State University campus in San Luis Obispo.

For more information, contact Robert Ward, secretary, at 2100 Andre Ave., Los Osos, CA 93402, or call George Campbell, president, at 805/528-1759. The group's BBS number is 805/528-6172. General meetings are free; membership costs $25 a year and includes access to the libraries, the monthly newsletter, an introductory manual on PC operation, and full access to BBS files.

Reader service no. 693

GETTING YOUR GROUPS BACK: If you mistakenly delete your original Windows groups—Main, Accessories, or Games—restore them quickly with this trick: In Program Manager, select *File • Run*, type SETUP /P, and click *OK*. If a group exists but is missing its program icons, this command adds them back. If you're using Windows for Workgroups, type WINSETUP /P in the Run dialog box instead.

Kathy Yakal
SLO Bytes PC Users Group

9-bit-wide SIMMs, a bank must contain four identical SIMMs. If your PC accepts 4MB SIMMs, the best way to upgrade is to use one bank of four 4MB SIMMs and another bank of four 1MB SIMMs, for a total of 20MB. If your PC won't accept 4MB SIMMs, return them and buy four 1MB SIMMs. You can use these to populate the second bank for a total of 8MB.

Blast From the Past

Q I bought a multimedia upgrade kit with a 16-bit sound card that claims to be fully Sound Blaster compatible. But when I try to configure an application to use a Sound Blaster 16 card (as opposed to a Sound Blaster Pro), it doesn't work. Why?
Garman7777, America Online

A This is a source of confusion for many multimedia users and game players. Just because a sound card is 16-bit and claims Sound Blaster compatibility, that doesn't mean it's compatible with a Sound Blaster 16 card. Most often, when you see the term *Sound Blaster compatible*, it means the card can handle software written for the original 8-bit Sound Blaster but not necessarily later models.

Sound Blaster compatibility is useful if you want to run software that existed before your spiffy new 16-bit card was designed. But if you're running more recent software, you won't want to use Sound Blaster emulation anyway, since it will produce tinny, unrealistic sound at best. You'll get much better results—and you'll be able to take advantage of new sound card features like 3-D audio and special effects—if you configure the software for your specific card. Check with the manufacturer of your software—or the sound card—to see if this is possible.

WFW Leaves Him Hanging

Q When I exit Windows for Workgroups 3.11, I get a C> prompt and a flashing cursor, but the system still hangs; the keyboard is so dead, not even <Ctrl>-<Alt>-<Del> brings it back to life. This has happened ever since I added a 486DX2 VLB motherboard and a new VLB video card. How do I fix this problem?
LarHal, America Online

A Most often, when a system locks up upon exiting Windows, the video driver is to blame. To avoid this problem, make sure you have the latest revision of the video driver and that it's installed correctly (it never hurts to reinstall over the existing files). Also, try reconfiguring your 386 memory manager if you have one installed. Sometimes, a more conservative configuration will allow a more stable exit from Windows.

Rescuing the Commodore

Q A friend of mine has a Commodore 64 computer, on which he stores data files that he accesses via the BASIC language. He recently bought a 486 computer and would like to transfer the data files from the Commodore to the PC. Are there any software programs that do this?
RogerWorld, America Online

A The best way to rescue the data is to connect the two machines via a null modem cable (available at any computer store) and transfer the data using a file transfer protocol. If your friend doesn't already have terminal emulation software for his Commodore, he can get a free program called Kermit. There are freely distributable versions for both the Commodore and the PC. However, if his PC already has a terminal emulator, and it supports Kermit (most do), he just needs to find Kermit for the Commodore. Check BBSes, computer swap meets, and Commodore user groups for a copy.

Your friend also faces one other hurdle: making sure that his new PC can process the data he collected on the Commodore. To do this, he may need to write some short BASIC programs to read his binary data files and write them to disk as text (rather than in binary form). If he prints out one data record per line, with commas between the fields, he should be able to import the data into any PC spreadsheet or database.

From Fast to Faster

Q About nine months ago I bought a modem that was supposed to run at 28.8 kbps. This month, my company bought another 28.8-kbps modem so I could communicate with the office PCs at top speed. But so far, I've been able to connect only at 14.4 kbps—half as fast as I'd like. What's wrong? How can I connect at full speed?
Buck O'Hare, Cheyenne, Wyoming

A When you bought your 28.8-kbps modem nearly a year ago, the industry standard for that kind of modem—called V.34 or V.Fast—wasn't finalized. Some manufacturers, eager to bring fast modems to market right away, jumped the gun with products that run at 28.8 kbps but do not conform to the final standard. These modems, most of which say V.FC (standing for V.Fast Class) on the front, can talk at full speed only to each other.

Unfortunately, V.FC modems are different from those that truly conform to V.34, so you'll need to get an upgrade to make them talk to a "real" V.34 modem (which is what your company probably bought). Each modem manufacturer has its own upgrade policy. With some vendors, the upgrade process is as simple as dialing a number and downloading new code into the modem's flash ROM. Other vendors, such as U.S. Robotics and Motorola, have announced that they will do the upgrades for free, while still others charge $50 to $100. It's well worth getting the upgrade, though; without it, you'll be forced to use the older V.32bis standard, at half the speed of V.34, for most of your communications.

By Brett Glass

Brett Glass is a contributing editor for PC World. Help Line *welcomes your questions and pays $50 for published items. See page 12 for contact information.*

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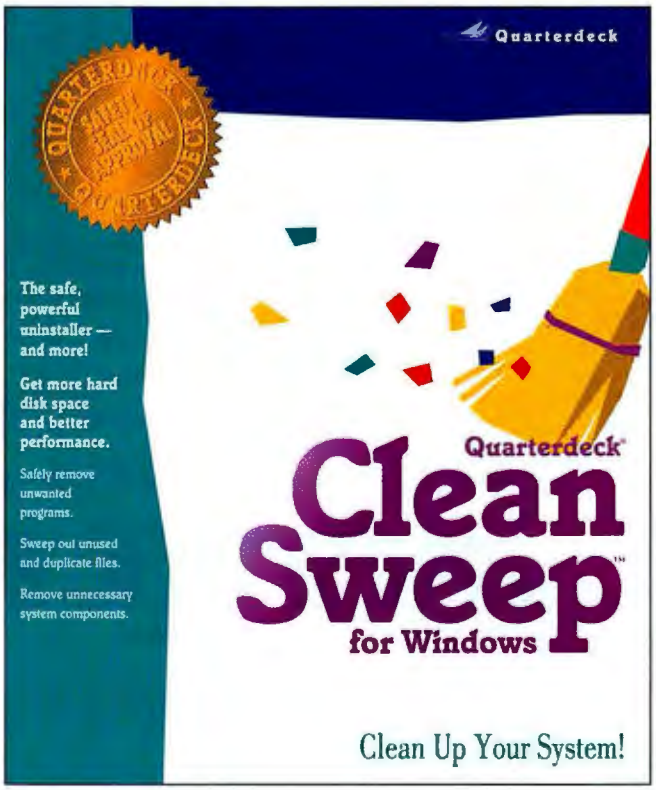

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SPREADSHEETS Q&A

Document Range Names in Any Spreadsheet

Q Back when I used 1-2-3 for DOS, I liked to create range names to make formulas and macros more readable. I would document my worksheets with a list of range names using /Range•Name•Table, which inserts the range names and locations at a user-specified location. But now that I've upgraded to 1-2-3 for Windows, I can't seem to find this command. Is there a way I can do this?

Beth Simpson, Berkeley, California

A Yes, but it's not very high-tech. The only way to access this feature in 1-2-3 for Windows is by making use of the old DOS-style Classic commands. To begin, select the cell where you want the table to begin, press / to invoke the classic menus, select *Range•Name•Table*, and press **<Enter>**. Excel users can create a list by selecting *Insert•Name•Paste*, then clicking *Paste•List*. In Quattro Pro for Windows, you will want to select *Block•Names•Make Table*, then specify a location for the table and click *OK*.

Increasing a Set of Values in Any Spreadsheet

Q I'm a new user of Quattro Pro 5.0 for Windows, and I need an answer to a really basic question. I've entered a set of budget values into a long column of cells and I now realize they must all be increased by a constant amount—say, $500. How can I do this without retyping all the numbers?

Chad Thomas, Fairfax Station, Virginia

A You'll need to build a set of formulas to calculate the increases, then use *Copy* and *Paste Special* to replace the original values with the new ones. Here are directions that will work in the Windows versions of Quattro Pro, 1-2-3, and Excel.

Let's say that your numbers are in range A1..A50. Right-click the column heading at the top of column B, then select *Insert* from the pop-up menu to insert a temporary column that will hold the formulas.

Type the formula **+A1+500** in cell B1 and press **<Enter>**, increasing the amount in cell A1 by 500. Now copy the formula for every budget item. To do this you select the block B1..B50, then in Quattro Pro right-click inside the selection and choose *SpeedFill* from the pop-up menu. (In 1-2-3, the command is *Fill by Example;* in Excel, use *Edit•Fill•Down*.)

Next, you replace the original numbers with the increased values: With the same block selected, right-click again and choose *Copy*. Click cell A1, and choose *Edit•Paste Special*. In the Options section of the resulting dialog box, click *Values Only*, and then click *OK*. (In 1-2-3, click *Formulas as Values;* in Excel, click *Values* in the Paste box.) This last operation ensures that you end up with numbers instead of formulas in column A.

The final step is to delete the temporary column B: Right-click the column heading and select *Delete* from the pop-up menu.

1 Use the Text Box tool to draw the text box. Enter the text, select the box, and use **Format • Object** commands to format it.

2 With the box selected, click the name box in the formula bar, type **NewName**, and press **<Enter>**.

3 Select **Insert • Macro • Module**. Enter the macro statements shown in black and blue in the bottom window. (Comments in green explain each line but don't need to be entered.)

4 Use the button tool to place a button on the worksheet. At the Macro Name/Reference prompt, double-click **PleaseWait()** to assign the button to that macro.

5 Drag across the button name, change it to **Run Macro**, and click the sheet to end. Click the button to run the macro.

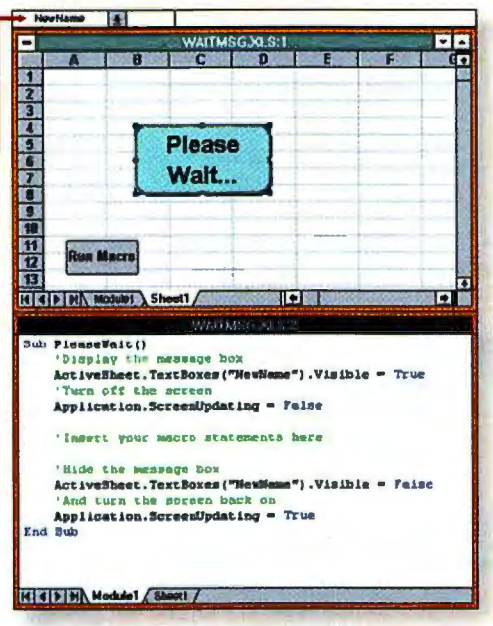

FIGURE 1: SUPPRESS EXCEL'S SCREEN ACTIVITY during macro operation to avoid annoying screen movements and display a text box with a 'Please wait' message.

USER GROUP TIP

Through the Trap Door in Excel

In Excel 5.0, if you overshoot your range when dragging and filling with a cell's fill handle (the small box on the lower right corner of the cell), grab the handle again and drag back over the extra cells until they're gray. When you release the mouse button, the unwanted data will be gone.

Robert Ward
SLO Bytes PC Users Group

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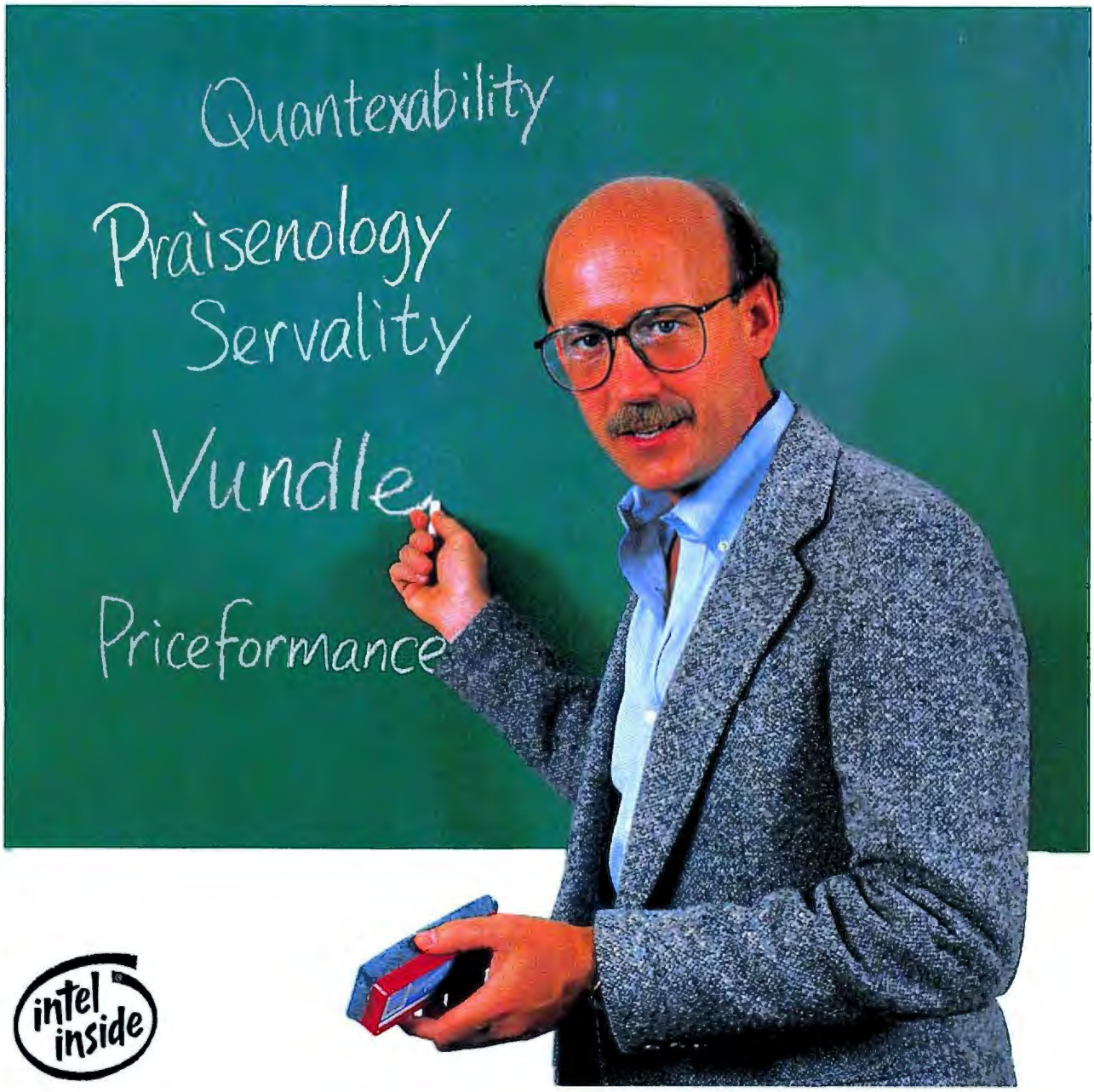

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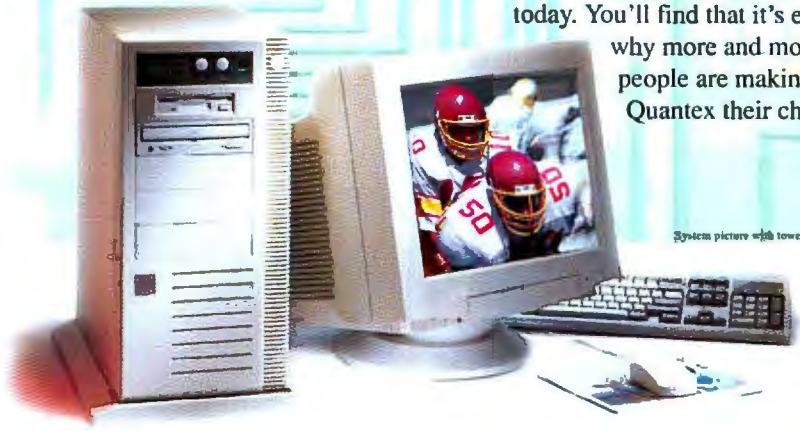

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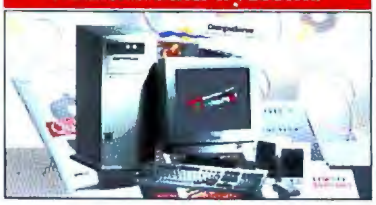

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Adding a 'Please Wait' Message to an Excel 5.0 Macro

Q I have an Excel 5.0 workbook to track the performance of my stocks. It contains a lengthy macro that causes the screen to flash and move around alarmingly. How can I suppress the screen activity and display a 'Please wait' message while the macro runs?
Milan Konecny, Toronto

A You can use Excel's ScreenUpdating property to suppress screen activity. As for the message, I've found it handy to create a text box that displays it, letting the macro unhide it at the beginning of the routine and hide it again at the end. These techniques are illustrated in **FIGURE 1.** To build the model, you follow the steps shown, substituting your own macro statements.

Excel Pivot Table Problems

Q I work for a city transportation department, and we've collected some survey data on how frequently people drive, where they go, and how long they're away. I want to use Excel's pivot table feature to determine the number of trips that were less than 5 minutes in length, between 5 and 10 minutes, and so on. Can you help?
Bill Shivers, Albertsville, New York

A You've hit two potholes common to grouping pivot table values. First, if you based your pivot table on date- or time-formatted data, Excel lets you adjust the size of the grouping interval only in whole-day units. So you need to work with numbers that are not formatted as times. But since Excel stores time values as fractions of a day (for instance, 6 a.m. has the value .25, noon is .5, and so on), simply changing the times to another number format (say, General) produces unwieldy trip duration numbers such as .00347. The solution is to convert fractional days into integer minutes. The second problem is that pivot tables won't allow you to group a variable if its database field contains any missing values, so you'll need to code these with a dummy number such as 999.

FIGURE 2 illustrates how to take care of both problems at once with a formula. It begins with a simplified version of your database worksheet. The start and stop times were entered exactly as shown, so Excel stored them as fractions of a day and formatted them as time values. (You can check or change the format with the command *Format • Cells • Number.*)

The formula shown for cell E2, **=IF(OR(ISBLANK(C2),ISBLANK(D2)),999,ROUND((D2–C2)*24*60,0))**, converts the time values from fractional days to integer minutes and also takes care of any missing values. In this formula, the IF function displays the value 999 if either the start time or the stop time is missing. Otherwise, D2–C2 calculates the duration in days; multiplying the result by 24 and then by 60 converts it to minutes; and the ROUND function with a second parameter of 0 eliminates fractions of a minute, leaving only integer values.

The remaining steps show how to construct a pivot table and group the time values in 5-minute intervals. When you group the values, the missing ones sort out as 999's.

By Richard Scoville

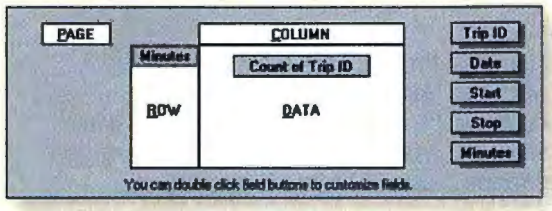
Richard Scoville is a PC World *contributing editor and a software training consultant in Chapel Hill, North Carolina.* Spreadsheets *welcomes your questions and pays $50 for published items. See page 12 for contact information.*

❶ To convert time values into integer minutes and tag missing values, enter the formula shown below into cell E2 and copy it for each row of data.

	A	B	C	D	E	F
1	Trip ID	Date	Start	Stop	Minutes	
2	9	10/1/94	6:30	6:46	16	
3	14	10/1/94	7:02	7:07	5	
4	27	10/1/94		9:25	999	
5	53	10/1/94	10:09	10:27	13	
6	73					
7	74					

=IF(OR(ISBLANK(C2),ISBLANK(D2)),999,ROUND((D2–C2)*24*60,0))

❷ To build the pivot table, follow these steps: Click inside the database and select Data • PivotTable. In step 3 of the PivotTable Wizard, drag Minutes into the ROW area and drag Trip ID into DATA. Double-click Sum of Trip ID, then double-click Count in the 'Summarize by' list box. Step 3 should now look like this:



	A	B
1	Count of Trip ID	
2	Minutes	Total
3	0-5	24
4	5-10	47
5	10-15	22
6	15-20	13
7	20-25	6
8	25-30	2
9	30-35	1
10	35-40	1
11	995-1000	8
12	Grand Total	124
13		

❸ After creating the pivot table, click a data cell inside it and select Data • Group and Outline • Group to enter the grouping parameters. For this example, set the 'Starting at' value to 0 and the 'By' value to 5. The result shows the number of trips between 0 and 5 minutes, 5 and 10 minutes, and so on.

FIGURE 2: AVOID PIVOT TABLE PITFALLS. Excel's ability to group time and date values into equal intervals is quite limited, and it can't group fields that contain missing values. To work around these shortcomings, use a formula to mark missing values and to convert the time and date data into integers.

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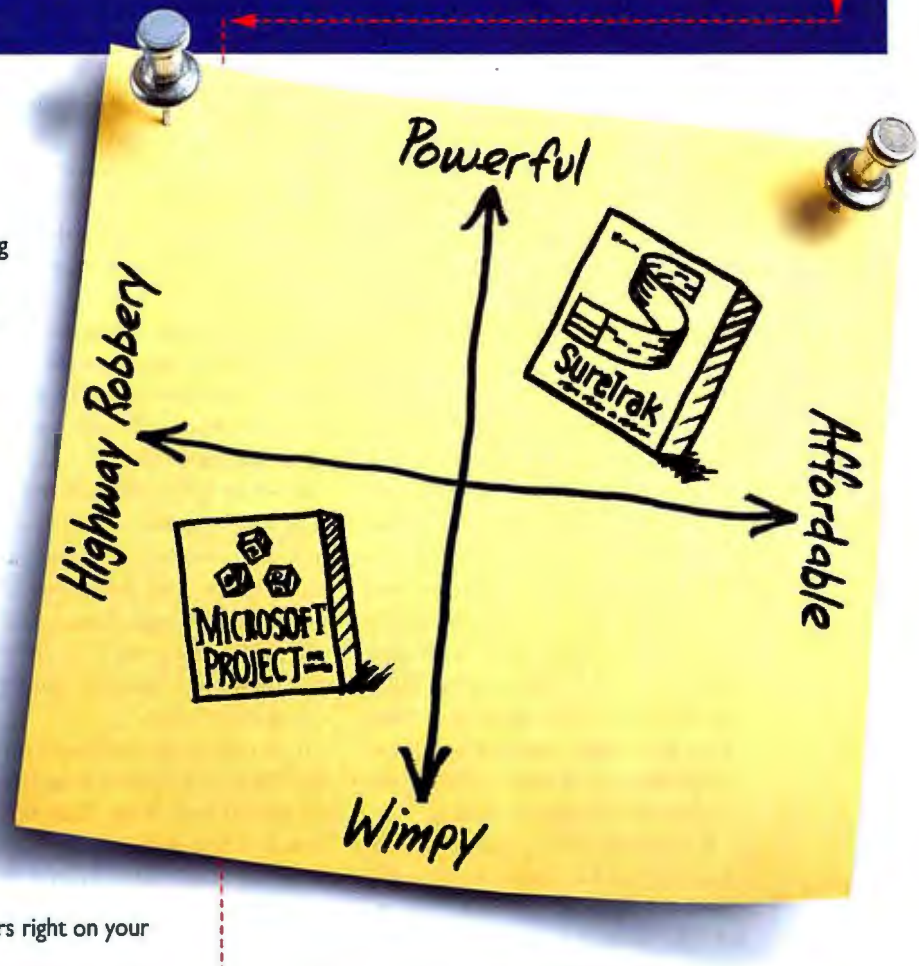

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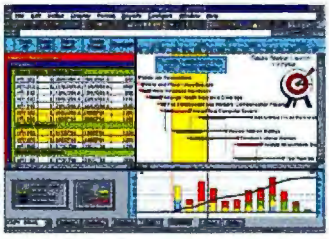

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WORD PROCESSING Q&A

My Fonts Runneth Over

Q I use all three major Windows word processors for different purposes. Now I'm running short of disk space and am looking for files to delete. I've noticed that many TrueType fonts come with italic and boldface variations, each with its own TTF file. But I know Windows automatically generates italics and boldfacing, even if the TTF files for a specific font weight don't exist. Can I save some disk space by deleting those excess TTF files?
Kenric Silva, Novato, California

A The answer is yes, but with some caveats. Let's use the Arial font as an example. This standard Windows font comes in four variations: normal (ARIAL.TTF), bold (ARIALBD.TTF), italic (ARIALI.TTF), and bold italic (ARIALBI.TTF). You'll normally find all these files, along with their associated FOT files, in your WINDOWS\SYSTEM directory. Most TTF files range from 30K to 60K, so removing some of them could reclaim substantial hard disk real estate.

If you delete all files except those for Arial Normal, Windows will still generate bold, italic, and bold italic versions of Arial in your word processor. But there's a trade-off: Your printouts won't look as good. If you want to use bold or italic versions of Arial in important documents, the storage space you save by deleting the font files may not be worth the loss of print quality.

How do you decide? Make a test printout, and then compare the Windows-generated fonts against the real McCoy. First, open one of your word processors, create a generous text sample using the bold, italic, and bold-italic versions of fonts that you're thinking about deleting, and print it. Then, temporarily remove all but the normal weight of the fonts that you're testing. Here's how:

1. Launch Control Panel, then double-click the *Fonts* icon.

2. Select the fonts you want to delete from the Installed Fonts list by clicking them with the mouse. Hold down the **<Ctrl>** key to select more than one font at a time.

3. Select *Remove*. When the Remove Font dialog box appears, make sure the Delete Font File From Disk check box is *not* checked (in case you decide to reinstall a font later).

4. Select *Yes* to uninstall the fonts. Now print your test document again, and compare the two printouts. If you're happy with the quality of the Windows-generated fonts, you can safely delete the actual TTF and FOT files, using File Manager or another file management utility.

If you prefer the real fonts, reverse your tracks and reinstall them. Return to Control Panel's Fonts dialog box and click *Add*. Specify the directory where you keep font files (usually WINDOWS/SYSTEM), then go to the List of Fonts and select the typefaces to restore. When you're through choosing fonts, select *OK*. The fonts will reappear in your Installed Fonts list.

WinWord Macros at Your Command

Q When I edit a macro in Word 6.0a for Windows, I'd like to insert normal WinWord commands without having to type each one of them. A button on the Macro toolbar is supposed to record the next command I give and write it into the macro editor, but when I click the button, almost all the menu commands are grayed out. I know that there must be a way to do this or the button wouldn't be there, but it's got me stumped.
Alex Jackson, Memphis

A The first time I tried using that button, I was stumped too. Then I figured out the secret: You must be in a document window in order to record most commands, since almost no WinWord commands are available while you're in the macro editing window (see **FIGURE 1**). Here's what to do:

First, open an existing document. Then open the macro you want to edit, and position the cursor in the text where you want to insert the command. Now switch to the open document by pressing **<Alt>-W** followed by the appropriate window number, or by holding down **<Ctrl>** and pressing **<F6>** until the document window is active. Make sure you do this before clicking

FIGURE 1: WORD FOR WINDOWS' RECORD NEXT COMMAND BUTTON makes editing macros a snap—just remember to switch to a document window before you use this feature.

USER GROUP TIP

Font Text Moves in WinWord

To save a few mouse clicks and keystrokes when you move text from one WinWord 6.0 document to another, open both the source and destination documents, select Window • Arrange All, select the block of text you want to move, and drag the text into the second document window where you want it to go. (To copy the text rather than move it, hold down the <Ctrl> key before you drag.)

George Campbell
SLO BYTES PC Users Group
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the Macro toolbar's Record Next Command button; otherwise, you'll record the command used to switch to the document. Go back to the Macro toolbar and click *Record Next Command*, then use WinWord's menus or toolbar buttons to issue the command you want to record. You can also call up a dialog box, fill in the fields, and click *OK*—several actions that count as a single command for this purpose.

When you've finished recording, switch back to the macro editing window to continue your manual editing. You'll see the command you just issued, written in WordBasic. If you need to record additional commands, stay in the document window, clicking the *Record Next Command* button before recording each command.

Instant Word Counts in WinWord 6.0

Q Is there any way to make Word 6.0 for Windows' status bar display the number of words in a document? If so, could I have the word count update automatically as I type?

Collin Evans, Racine, Wisconsin

A I'm afraid there's no way to alter Word 6.0 for Windows' status bar. Besides, do you really want WinWord to slow you down by continuously updating the word count? I think not.

But there is an easy way to get a word count in WinWord: Just select *Tools•Word Count* (or press **<Alt>-TW**). The Word Count dialog box will pop up and tell you how many words your document has, how many pages and characters, and other useful information. After you've checked the count, press **<Enter>** to close the dialog box.

Adding Characters to WordPerfect 6.0a

Q I use WordPerfect 6.0a for Windows for desktop publishing and often need to insert special characters (like check marks) throughout a document. It's easy enough to insert a single character using the WordPerfect Characters dialog box, but this gets tedious if I have to do it frequently. How can I make this chore easier?

Cathy Jacobsen, Bradenton, Florida

A The answer is easy, but it's not obvious. Instead of inserting those special characters one at a time as you create your document, type an oddball punctuation character, like a tilde (~) or a caret (^), in its place. Then, use WordPerfect's Find and Replace function to insert all the special characters at once (see **FIGURE 2**). Here's how:

Once you've created your text, press **<Ctrl><Home>** to jump to the top of the document, then select *Edit•Replace*. In the Find and Replace Text dialog box, type the character you want to use as a placeholder in the Find field. Press **<Tab>** to get to the Replace With field. Press **<Ctrl>-W** to call up the WordPerfect Characters dialog box. Click on your special character, and select *Insert and Close*. To finish the job, select *Replace All* and *Close*. Presto! WordPerfect 6.0a inserts the special character in all the right places.

If you frequently need a single instance of the same character, record a macro and assign it a hot key. Start recording by pressing **<Ctrl><F10>**, then follow the steps outlined here to select the character in the WordPerfect Characters dialog box.

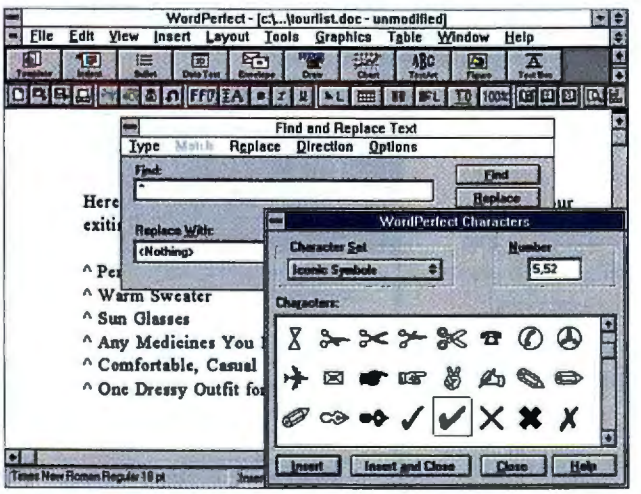

FIGURE 2: WORDPERFECT 6.0'S FIND AND REPLACE feature lets you insert special characters (like check marks) throughout a document.

Ami Pro Templates With Style

Q I use certain Ami Professional documents as templates for other documents. To avoid overwriting the original file, I use File Manager's File Properties dialog box to make it read-only. When I finish editing, I save the altered document with a new name. This works fine, but each time I open a read-only file in Ami Pro, I get a message telling me the file is protected and I can't save changes. I know that already. Is there a way to keep Ami Pro from displaying this annoying message?

Douglas Essinger-Hileman, Mapleton Depot, Pennsylvania

A I'm afraid not. That message box is there for good. But I can suggest an alternative that will save you several steps. Rather than creating templates using read-only files, why not simply turn them into Ami Pro style sheets, replete with text?

Start by loading each of your template documents into Ami Pro as you're doing now. Then, select *as a Style Sheet*. In the dialog box that appears, type a file name for your new style sheet, and add a brief description of it in the Description field. To preserve the text of the template as well as its formatting, mark the With Contents check box before clicking *OK*. To have your document templates appear at the top of Ami Pro's list of style sheets, begin each file name with an exclamation point.

To use your template, select *File• New*, pick your template from the Style Sheet for New Document list, and click *OK*. It's that simple.

By George Campbell

George Campbell is a contributing editor for PC World *and a contributor to* The PC Bible *(Peachpit Press, Berkeley, California, 1995).* Word Processing *welcomes your questions and pays $50 for published items. See page 12 for contact information.*

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WINDOWS Q&A

Mousing Around Program Manager

Q You often publish keyboard shortcuts for using Program Manager, but I prefer to mouse around. Are there any mouse shortcuts that will let me create new icons, modify existing ones, or launch programs?
Matt Linden, America Online

A Sort of. Program Manager does have mouse shortcuts, but they pretty much all involve using the mouse and keyboard together. You'll find them in the figure below.

For those who prefer the keyboard, the no-mouse equivalents are: **<Alt>FN** to create a new program item in the active group, **<Shift><Enter>** with an icon selected to launch the program minimized, **<Alt><Enter>** with a program icon selected to open a Program Items Properties dialog box, **<Alt><Enter>** with a group icon selected to open a Program Group Properties dialog box, and **<Alt>-<Shift>-<F4>** to save your Program Manager configuration.

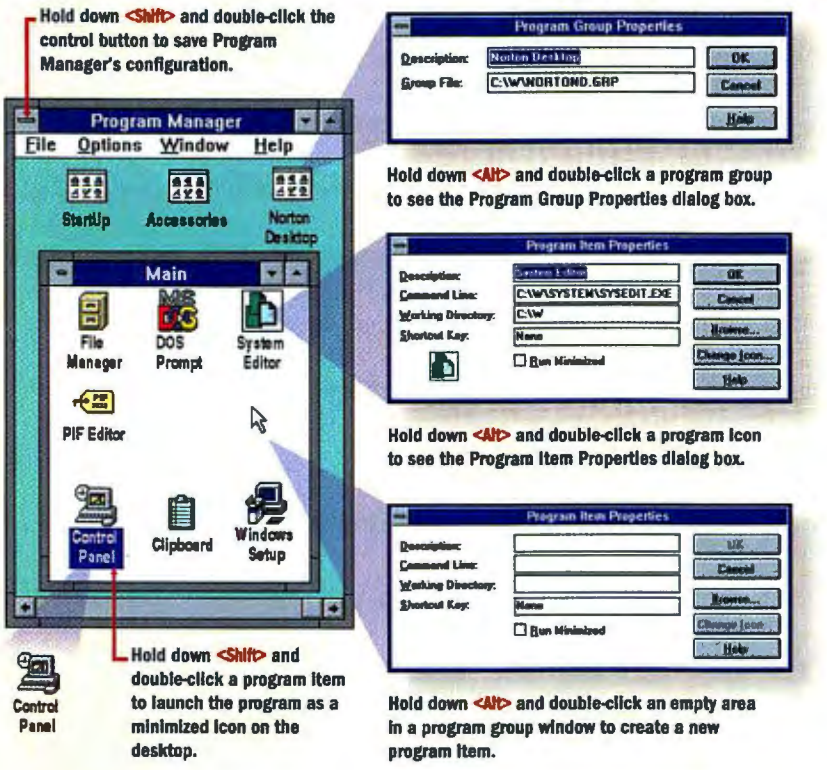
Better Printing From File Manager

Q I like the idea of printing text files from File Manager. But when I do, File Manager opens the file in Notepad, which prints it in a large and ugly variant of Courier. The result looks terrible. All I want to do is print a text file from File Manager in a decent-looking font—say, Arial. Am I missing something?
Jim Hobek,
Sardis, British Columbia, Canada

A Actually, it's Notepad that's missing something: the ability to let users set their preferred printer font. Notepad uses its own default font for screen display, then your printer's default font for printing. Luckily, you can tell File Manager to print TXT files with Write—which uses Arial as its default—and still keep the files associated with Notepad for editing.

First launch Windows' Registration Editor: Select *File•Run* in either Program Manager or File Manager, type **regedit**, and click *OK*. Registration Editor's main window is a list of file types that File Manager knows about. Select *Text File* from the list and *Edit•Modify File Type* from the menus. In the Modify File Type dialog box, under Action, click *Print*. Edit the Command text box so it reads **write.exe /p %1**. Exit the dialog box and Registration Editor.

From now on, when you choose File Manager's *File•Print* command with a TXT file selected, File Manager will launch Write to print the file and then exit Write automatically when the printing is finished. You'll have to do more clicking this way than with Notepad, because Write asks if you want to convert the file type and set printing options (you probably don't). But it's better than completely associating your TXT files with Write; not only is this method faster, but you can still edit those files in Notepad.



Cardfile doesn't have an import tool, so you'll have to bring in the data via repetitive cutting and pasting. Luckily, Windows Recorder's Continuous Loop feature can make this bearable. The only catch is, each record must have exactly the same number of lines.

continued on page 272

Getting Into Cardfile

Q I have a database that I can save in DBF or ASCII format. Is it possible to import this into Windows' Cardfile?
Greg Mollon, Barrie, Ontario, Canada

A Converting data from a database program to Cardfile is a little like trading in a car for a unicycle—not exactly a full-featured alternative. But hey, it's a free country.

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PRESENTING

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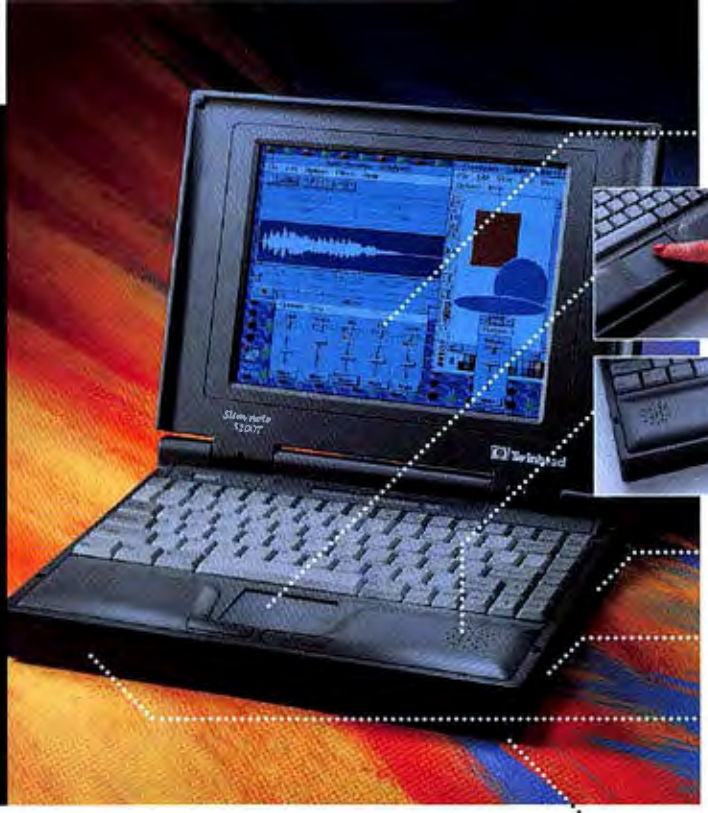

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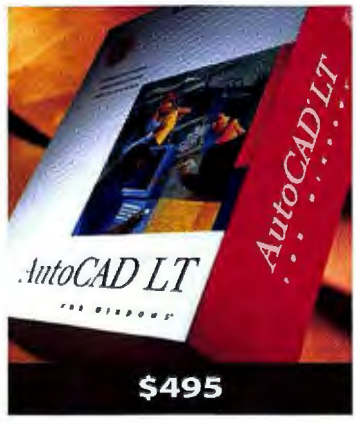

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First, export your database to a single ASCII file. Open the file in a word processor, and make sure all the records have the same number of lines; if there are variations, add extra carriage returns until the records are uniform. Leave the file open in your word processor with the cursor at the beginning of the first line. Start Cardfile and open the file into which you want to import the data. Next, start Recorder and choose *Macro•Record*. In the Record Macro dialog box, type a macro name, set up a shortcut key, set playback to *Same Application*, and set the speed to *Fast*. Be sure *Enable Shortcut Keys* is checked, select *Ignore Mouse*, and click *Start*.

The blinking Recorder icon at the bottom of the screen tells you that you're recording. Hold down **<Alt>** while pressing **<Tab>** until you're in your word processor. Press **<Shift>-<Down>** once to select the first line, and **<Ctrl>-<Insert>** to copy it. Hold down **<Alt>** and press **<Tab>** until Cardfile is active. Press **<F7>** to create a new card, then **<Shift>-<Insert>** to paste the line into the dialog box. This makes the first line of your record the index or title of the card.

Press **<Enter>** to close the dialog box, then **<Alt>-<Tab>** to switch back to your word processor. Press **<Right>** to deselect the first line, then press **<Shift>-<Down>** as many times as necessary to select the rest of the record, including any blank lines at the end. Then press **<Ctrl>-<Insert>** to copy it. Once again, press **<Alt>-<Tab>** to make Cardfile active, and press **<Shift>-<Insert>** to paste the lines into the newly created card.

Finally, press **<Alt>-<Tab>** to switch back to your word processor, and press **<Right>** to deselect the record. You should now be at the beginning of the second record.

At this point, you have finished recording, so click the flashing Recorder icon, be sure that *Save Macro* is selected, and click *OK*. (This is also a good time to choose *File•Save* in Recorder to preserve your macro in a REC file.)

Now press the shortcut key to make sure the macro works on a single record. If you've done everything right, it should copy the second record into Cardfile and end with the cursor in your word processor at the beginning of the third record.

Once you're sure this works, you can either press the shortcut key once for each record (good if you're adding a fairly small number of cards), or let Recorder do all of the work for you (if you're adding a lot).

Now the fun begins: In Recorder, select your macro and choose *Macro•Properties*. Check *Continuous Loop* and click *OK*. The next time you press your shortcut key, the macro runs through the entire ASCII file and creates corresponding cards in Cardfile.

The only glitch: You should keep an eye on the screen, because when the macro gets to the end of your data, it keeps on going. When it gets through the list, press **<Ctrl>-<Break>** to interrupt the macro. If necessary, delete any useless cards the macro adds at the end. Then save your Cardfile file.

Solitary Confinement

Q Solitaire used to come up with a different image on the back of the cards every time I launched it. One day while I was poking around the menus, I chose Game•Deck and selected a particular card back. Now I get that same back every time. How can I make Solitaire go back to choosing card backs randomly?

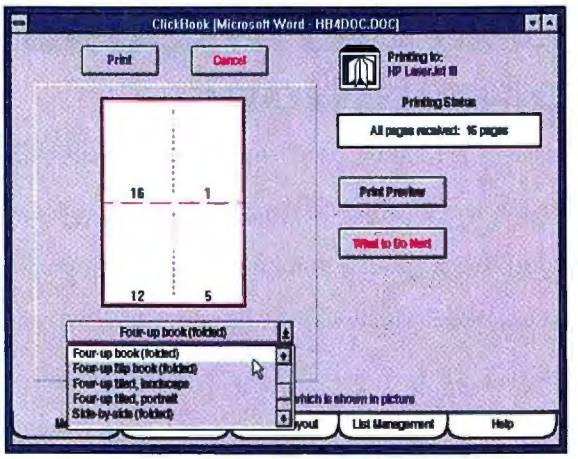
Stan Davenport, Los Angeles

A Easy as pie. In File Manager or Program Manager, choose *File•Run* and type **sol.ini** to open that file in Notepad. You should see a line in the file that begins with 'Back='. Delete the line and save the file. (If you don't care about preserving other options you may have set, you can achieve the same goal simply by deleting the SOL.INI file.) As long as you don't designate a specific card back again, Solitaire will present you with a different deck each time you start it.

By Scott Dunn

Scott Dunn is a contributing editor for PC World *and coauthor of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1992).* Windows *welcomes your questions and pays $50 for published items. See page 12 for contact information.*

Windows Toolbox



ClickBook is the simplest way for Windows users to print a document in booklet form. Just install and use the ClickBook driver with your existing printer to see your text reduced to two pages per side, ready to fold into a booklet. But that's just the default. ClickBook also gives you options for making Day Timer–style sheets of various sizes, landscape flip-books, sheets of thumbnails, and even wallet-size booklets for all those phone numbers you need to carry around. ClickBook automatically installs menu commands in a number of popular word processors, and its print preview function is great for word processing or desktop publishing programs lacking that feature. ClickBook retails for $70 and comes from BookMaker Corp.; 800/766-8531, 415/354-8161, 415/856-4734 (fax).

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(Sort through a fifty page plan to get to the point.)

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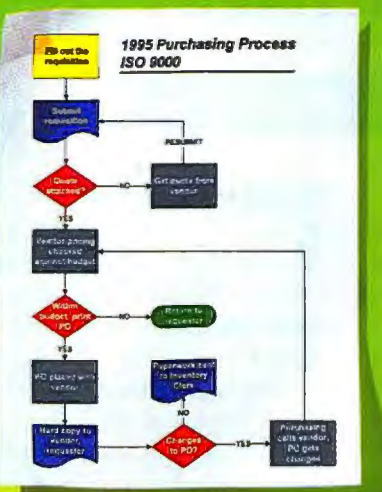

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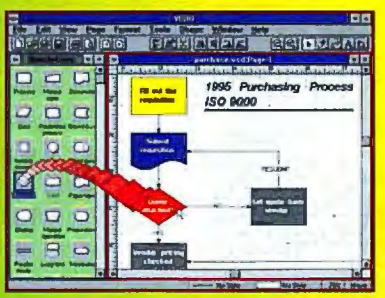

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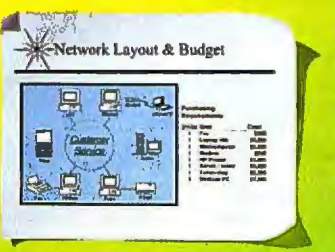

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DATA MANAGEMENT Q&A

Resetting an Access Counter Field

Q How can I reset a counter field in an Access table? I deleted all the records from the table, expecting the counter field in the first new record I entered to have a value of 1. But it had the same value it would have had if I hadn't deleted all the other records first. Is there some trick to this feat?
Joe Halbrook, Jefferson City, Missouri

A There's a super-easy way to reset a counter field in an empty Access table back to 1, and it'll work with Access versions 1.1 and 2.0 (probably with 1.0, too, but I didn't test it). First make sure the database the table belongs to is closed. Then select *File•Compact Database*. In both of the resulting dialog boxes, select the database in question and click *Yes* to confirm that you want to replace the existing file. As it compacts your database, Access rewrites it, resetting any counter fields in empty tables.

Repeating Panels in Approach Reports

Q My company uses Approach 2.1 to enter order information into two files, ORDERS and LINEITEM, that are joined on a common field called OrderID. We enter data with a form that uses a repeating panel to display the multiple LINEITEM records related to each order.

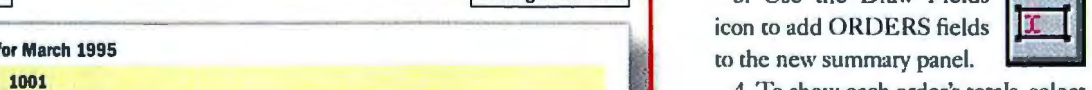
I'm trying to design a report that, like the form, lists every item for each order, along with other order information and a total price. I've tried printing the form, but I get a separate page for each order, which is not what I want. And Approach won't let me put a repeating panel in a report. How can I get the output I need?
Richard Jackson, New Orleans

A The trick to creating a one-to-many report in Approach is to build the report around the "many" table, then add a summary or two for the "one" table's information.

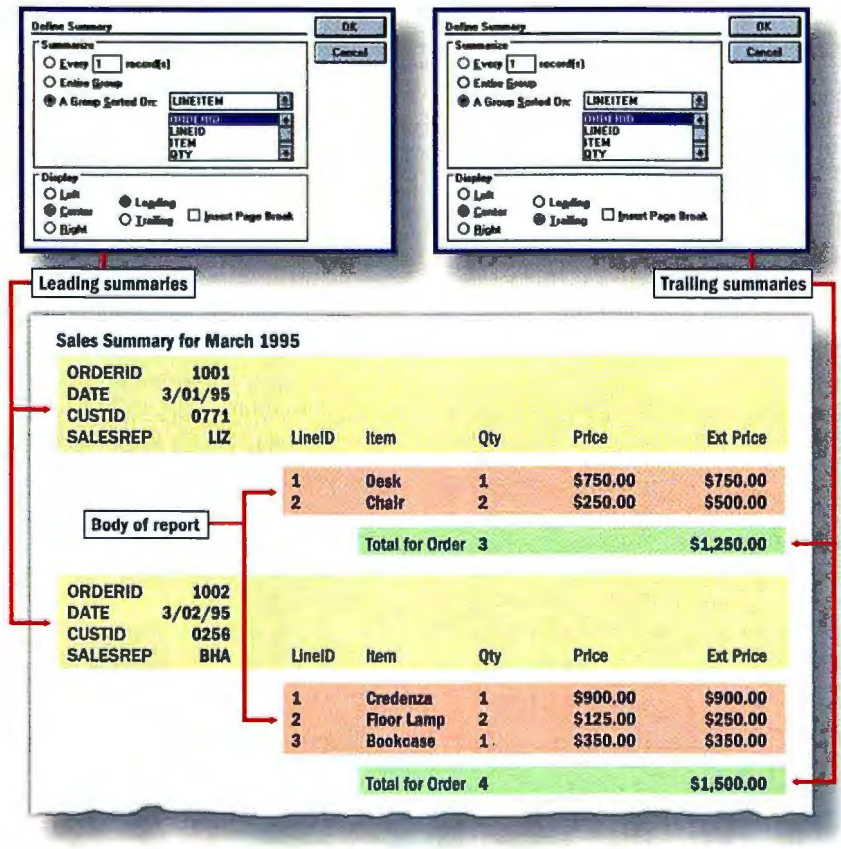
1. In Design mode, select *Design•Create Report;* in the Create Report dialog box, click *Columnar* under Type and select only fields from the *LINEITEM* database. After you click *OK*, Approach produces your report in Design mode.

2. Select *Design•Add Summary*. In the resulting dialog box, check *A Group Sorted On* and select *ORDERS*, then *OrderID* (assuming that's the name of your linking field). In the Display section, check *Center* and *Leading*, and make sure Insert Page Break is not checked. When you click *OK*, Approach puts a summary panel near the top of the report. Unfortunately, it's not at the very top—you'll have to drag your field headers below it.

3. Use the Draw Fields icon to add ORDERS fields to the new summary panel.



4. To show each order's totals, select *Design•Add Summary* again, making the same selections with one exception: Click *Trailing* instead of Leading. After you click *OK*, Approach puts a summary panel under the main part of your report design. Place your calculated field for the total price in this panel. I assume you already have such a field (you'd need it in your form), but you'll have to make one change: In the *Field Definition•Options* dialog box where you edit the formula, set the 'Summarize on' option to the name of your report: *Trailing summaries of groups sorted on LINEITEM.ORDERID*. That's it. You've got a one-to-many report.



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Multifield Record Locates in Paradox

Q In Paradox 5.0 for Windows, I like to find the records I need to edit via the Locate Value command (<Ctrl>-Z). This works great if I want to search on one field, but it doesn't offer me an option for more complex searches. What should I do?
Karen Jarow,
Santa Monica, California

A Use a *live query*—which lets you edit the original data—when Locate Value's one-field limitation is too confining.

Select *File•New•Query* and your table. When the query window opens, click the check box under the name of the table and select the *CheckPlus* icon from the resulting drop-down list. Choose *Properties•Answer Options*, then click *Live Query View* and *OK* to return to the query window. Now enter the criteria for your search and click the *Run Query* button on the Toolbar.

You'll end up with a Query View instead of an ANSWER table. While the table holds copies of any records that are found by a query, the Query View shows you the actual records you were looking for. When you edit a Query View, you are editing the original records.

I know this seems like a long process—especially compared with the Locate Value command. But once you've set up the query, you can leave it open on the Paradox Desktop, revise it, and run it again to find new records. You might even want to use a live query to locate records on a single field, since the resulting Query View immediately shows you the number of records found. (When you use Locate Value, you have to look for additional found records one at a time with <Ctrl>-A.)

Floating Dollar Signs in dBASE IV

Q I have a dBASE IV 2.0 report that lists employees along with their salaries. The Salary field is numeric, with two decimal places, and I'd like to print a dollar sign flush against the number. I tried typing the dollar sign into the report design, but that often leaves a blank space between the sign and the number. Can I get dBASE to show a floating dollar sign?
Joe Green, Chicago

A You need to replace the dollar sign and the Salary field with a single calculated field that combines the two elements. While designing the report, select *Fields• Add field*, then *<create>* under CALCULATED. Give your new field the expression **"$" + ltrim(str(Salary,*W*,2))**, where *W* is the width of the Salary field.

Select *Picture functions*, which brings up another dialog box. Turn on the *Trim* and *Right align* options, and press **<Ctrl>-<End>** twice to return to your report and place the new field. Your money will look right.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World *and author of* The Paradox 5.0 for Windows Handbook *(Random House Electronic Publishing, 1994).* Data Management *welcomes your questions and pays $50 for published items (see page 12 for contact information).* ■

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Circle 206 on reader service card

ONLINE Q&A

Modem From Hell

Q I recently purchased a Cardinal MVP144DSP internal fax-modem. This device claims to be a "digital modem" that employs "downloadable firmware" to control its "16550 UART emulation." How does 16550 UART emulation differ from having a real 16550 UART chip? What does all this gibberish mean?
Christian Hess, Internet

A It means that your modem does not really have a 16550 UART chip—an essential component for high-speed communications, especially if you use Windows. Instead, it's got a fake one rigged out of software and some hardware. A technician I contacted at Cardinal claims users should notice no difference in performance using UART emulation. However, some communications software developers believe that fake UARTs confuse the heck out of communications programs designed to work with the real chip, resulting in botched file transfers and lost data. My advice to you: Either send the modem back, or exchange it for one with a real UART chip.

Taking the Terror out of Terminal Emulation

Q I recently tried to get some information about Carly Simon on CompuServe, and up popped this thing called a terminal emulator. The name alone made my underwear bunch up. (Couldn't they call it something besides *terminal?*) I called CompuServe to find out what I'd done to deserve this, but I'm still waiting for a callback. My questions: What is terminal emulation, and is it fatal?
Pat Poupore, Door County, Wisconsin

A Relax, and rearrange your clothing. Terminal emulation is simply a holdover from the pre-PC days when you used something called a dumb terminal to talk to big mainframe computers. Today when you talk to mainframes—like the ones that run CompuServe—your PC must sometimes pretend it's a terminal, hence the name *terminal emulation.*

Why user-friendly software like Windows CompuServe Information Manager (WinCIM for short) still uses this techno-anachronism is beyond me. Whatever the reason, there are numerous areas on CompuServe, particularly specialized databases like the Knowledge Index, where WinCIM's friendly icons disappear and you're faced with the dreaded terminal emulator. Even worse, not all terminal emulations on CompuServe use the same commands. Most provide a help menu if you type **?**, **H**, or **help** at the prompt; typing **exit** usually returns you to the WinCIM interface.

Terminal emulation is a holdover from the pre-PC days when you used something called a dumb terminal to talk to big mainframes.

The best thing to do when faced with a terminal emulator is stay cool, read the menus, and remember that you can't do any serious damage to CompuServe or your PC if you type something wrong.

Cancer Help on the Info Highway

Q My wife has been diagnosed with breast cancer. We have so many questions—and so many decisions to make. Is there anyplace online where we can find information fast?
Larry Jackson, Little Rock, Arkansas

A You'll find a vast library of cancer information online, and you can get at most of it through CompuServe and America Online.

Start out by getting a copy of the cancer FAQ, which contains answers to frequently asked questions about cancer along with a comprehensive list of other online resources. The FAQ is posted monthly in Usenet's alt.support.cancer news group.

To access this group via CompuServe, enter **GO USENET** at any prompt, then select *USENET newsreader.* The cancer FAQ is posted as a public message in this forum. America Online subscribers should select *Go to • Keyword*, type **INTERNET** in the keyword field, press **<Enter>**, then click the *Newsgroups* button. In either case, you'll then need to subscribe to the alt.support.cancer group and scroll through a long list of messages to find the FAQ. You can also access the file on PC World Online as CANCER.FAQ.

For the latest information about all aspects of cancer, you can hook into OncoLink at the University of Pennsylvania Medical Center. To access OncoLink from America Online, click the *Gopher & WAIS Databases* button in the Internet Center, then go to the *Health* category (you can also access OncoLink simply by gophering to **cancer.med.upenn.edu** or, on the World Wide Web, by connecting to **http://cancer.med.upenn.edu**). In addition, you will find that the Internet's cancer support group mailing lists serve as excellent sources of information.

Finally, to communicate with other cancer patients and their families, check out CompuServe's cancer support forum (**GO CANCER**)—it's the best online support group of its kind.

By Judy Heim

Judy Heim is a contributing editor for PC World *and author of* The Needlecrafter's Computer Companion *(No Starch Press, Daly City, California, 1995).* Online *welcomes your questions and pays $50 for published items. See page 12 for contact information.*

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486DX2/50	4MB	420MB	1379
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Processor	Display	Hard Drive	Price
486DX2/40	9.5" Dual Scan	170MB	$2739
486DX2/40	8.4" Active	170MB	3199
486DX2/40	8.4" Active	340MB	3689
486DX2/50	9.5" Active	340MB	4499
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486DX4/100	10.4" Active	340MB	6049
486DX4/100	10.4" Active	540MB	6429
486DX4/100	10.4" Active	810MB	6959
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486SL/33	9.5" Dual Scan	340MB	2659
486SL/33	8.4" Active	170MB	2489+
486SL/33	8.4" Active	340MB	2779
486DX2/50	9.5" Dual Scan	340MB	2889
486DX2/50	9.5" Dual Scan	540MB	3259
486DX2/50	8.4" Active	340MB	3299
486DX2/50	8.4" Active	540MB	3639

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LaserJet Printers

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486DX2/50	10.3" Dual Scan	340MB	$3349
486DX2/50	10.3" Dual Scan	520MB	3729
486DX2/50	10.4" Active	520MB	4839
486DX4/100	10.3" Dual Scan	340MB	4069
486DX4/100	10.3" Dual Scan	520MB	4449
486DX4/100	10.4" Active	340MB	5179
486DX4/100	10.4" Active	520MB	5559

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486DX2/66	4MB	540MB
486DX2/66	8MB	540MB
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4/50 Model 343W	9.5" Active	340MB	3629
4/75 Model 343W	10.3" Dual Scan	340MB	3219
4/75 Model 513W	10.4" Active	510MB	4999

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T1910	486SX/33	9.5" Dual Scan	200MB	1779
T1960	486DX2/50	9.5" Dual Scan	200MB	2159
T1960	486DX2/50	9.5" Dual Scan	320MB	2329
T1960	486DX2/50	8.4" Active	200MB	2749
T1960	486DX2/50	8.4" Active	320MB	2919
T2400	486DX2/50	9.5" Dual Scan	250MB	2749
T2400	486DX2/50	9.5" Dual Scan	320MB	2879
T2400	486DX2/50	8.4" Active	250MB	3299
T2400	486DX2/50	8.4" Active	320MB	3419
T2450CT	486DX4/75	9.5" Active	320MB	4239
T2450CT	486DX4/75	9.5" Active	500MB	4529

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PUBLISHING & PRESENTATIONS MAKEOVER

Pick a Card, Any Card

Your business card is your professional identity captured on a 3.5-by-2-inch piece of paper. So it pays to take the same care with its design that you would with your letterhead, newsletter, or any other professional publication.

There are three ways to get your card designed. You could have the local print shop do it, but your choice of fonts and graphic elements would probably be limited. You could hire a professional designer, but that would likely cost a fortune.

The third option: Design the card yourself. You have your choice of fonts and images and you'll save some money to boot. Many companies sell add-on templates for the major word processors that make designing business cards (as well as letterhead and envelopes) a snap.

Stacking the Deck

This month we asked graphic designer Daniel Will-Harris to show us a few card tricks using Microsoft Word for Windows 6.0. Our brave volunteer for the redesign was San Francisco chiropractor Dale N. Mortenson. Mortenson's original business card was, to put it kindly, a little bare-bones.

We asked Will-Harris to flesh out two new designs—one sober and professional, the other playful. After all, Mortenson might need one card to pass around at medical conferences and a second, more engaging version to hand out to potential clients. We also asked Will-Harris to apply his designs to letterhead and envelopes, completing the identity makeover.

The first task was to create a basic layout. For the "serious" card we chose landscape orientation—the most common design and the easiest to read when the card's in a Rolodex. We used WinWord's drawing tools to create a 2-by-3.5-inch box, then drew text boxes inside that for the practice's name, the doctor's name, and the address. Such boxes make it easier to mix text with graphics and to move the text around.

With the boxes in place, we then filled them in. The original card's Univers font was cold and foreboding. We opted instead for Bitstream's Copperplate Gothic Bold, a small-capitals font that's respectable without being too stodgy. We set the name of the clinic in 14-point, Mortenson's name in 12-point, and the address in 10.5-point.

Then, to emphasize the doctor's profession, we added a graphic—in this case, a group of black and white triangles suggesting a spine—created with WinWord's drawing tools. Finally, we aligned the text so the clinic is flush left, the doctor's name is justified, and the address is flush right. All the text is in perfect alignment—but what else would you expect from a chiropractor?

Wild Cards

The sober card done, we moved on to the whimsical version. First, we turned common wisdom—and the card—on its head by using portrait orientation. Then, once again, we used text boxes to arrange the text elements. The font is Letraset's Willow, an Arts & Crafts–style typeface that reinforces the lighter mood. We set the name of the practice and doctor in 12-point type, the address in 10-point.

Because a fanciful card demands a memorable image, we decided to add a graphic: Our dancing skeleton comes from the People collection, a clip art package from Art Parts. We lightened the image slightly so it wouldn't drown out other elements of the card.

- **People** $49.50; Art Parts; 714/771-6754
  Reader service no. 789

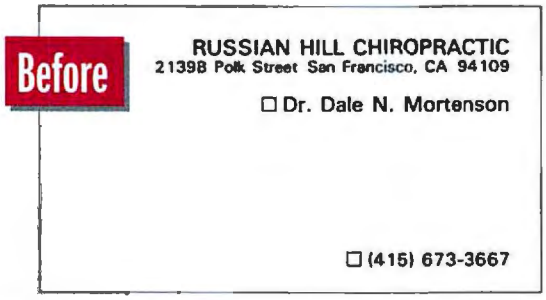
Finally, we aligned the address and practice name flush left and used WinWord's WordArt utility to turn the doctor's name 90 degrees.

The Envelopes, Please

Extending these designs to the doctor's stationery was a simple matter of resizing and moving elements from the cards to fit their new formats. On the whimsical envelope, for example, we resized Mr. Bones so he frames the return address and enlarged the name of the clinic and doctor to 24-point and 18-point, respectively. We saved both sets of cards, envelopes, and letterhead as separate WinWord templates, so we could reuse them easily and update the information as needed.

Once you've designed your cards, you still have to get them printed. If you need only a handful of cards at a time, you can print them yourself with acceptable quality on a 600-dpi laser printer; Avery and other print suppliers sell a heavy, perforated stock designed for this purpose. For large quantities, your best bet is to print the document to disk as a PostScript file, then bring a printout of your design and a copy of the file to a commercial print shop.

By Valerie Singer and Daniel Will-Harris



Daniel Will-Harris is a designer and author based in Point Reyes, California (E-mail address: danielwh@nbn.com). Valerie Singer is an editorial intern for PC World. Publishing & Presentations *welcomes your questions and makeover candidates and pays $50 for published questions, $200 for redesigned items.* *See page 12 for more contact information.*

After

RUSSIAN HILL CHIROPRACTIC

DR. DALE N. MORTENSON

December 15, 1994

Dear Mrs. Penderghast:

As much as I would love to help you with your dog, I must tell you that I am only qualified to work on human patients.

It would be unethical of me to realign your dog, or any other animal not of the species Homo sapiens.

...derstand and that you'll continue to come to ... bodywork.

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RUSSIAN HILL CHIROPRACTIC

DR. DALE N. MORTENSON

2139-B POLK ST.
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415•673•3667

Adding two vertical rules turns the spine logo into a frame for holding text. We used a box in the second design to achieve a similar framing effect.

When translating your new business card design to letterhead, create a balanced look by spreading design elements to each quadrant of the page.

2139-B

Choose fonts that reflect the mood you want to convey. Bitstream's Copperplate Gothic (on formal card) is serious but not stuffy; Letraset's Willow (second card) is more playful.

To create the first card's spinelike logo, we drew two triangles, filled one with black, then copied and pasted them. The dancing skeleton on the lighter card is imported clip art.

RUSSIAN HILL CHIROPRACTIC

DR. DALE N. MORTENSON

December 15, 1994

Dear Mrs. Penderghast:

As much as I would love to help you with your dog, I must tell you that I am only qualified to work on human patients.

It would be unethical of me to realign your dog, or any other animal not of the species Homo sapiens.

I do hope you understand and that you'll continue to come to me for your own bodywork.

Dr. Mortenson

2139 POLK ST.
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HARDWARE Q&A

A Picky Video Card?

Q I have a big problem with my graphics card. With cheaper monitors, the picture is spotty, as if there were a faint chessboard pattern in the background. With expensive monitors, the card works fine. What's wrong?
Valdo Toost, Tallinn, Estonia

A If your graphics card is running in standard VGA mode, any monitor manufactured in the last five or six years (even a "cheap" one) should work just fine. However, your graphics card may be running at a resolution higher than standard VGA supports—too high for your monitor to handle. Or it may be running at too high a refresh rate, which is the number of complete screens your monitor produces per second; higher rates are easier on the eyes but put a similar strain on less expensive monitors. Either way, you could damage a monitor by pushing it beyond what it's designed to do.

Graphics cards come with software that enables you to adjust the resolution and refresh rate. And fortunately a single monitor specification—the horizontal scan rate, also known as the horizontal scanning frequency—tells you how much of either your monitor can handle. To determine whether your current monitor meets your needs, I've put together a handy chart (see **FIGURE 1**). Choose the resolution and refresh rate you want, and see if your monitor is up to the task. If not, get a monitor with a sufficiently high horizontal scan rate. You should run your monitor at a refresh rate of 70 Hz or higher to avoid eyestrain.

Resolution	Refresh rate	Horizontal scan rate
640 by 480	60 Hz	31.5 kHz
640 by 480	70 Hz	38 kHz
640 by 480	72 Hz	39.4 kHz
800 by 600	60 Hz	38 kHz
800 by 600	70 Hz	45 kHz
800 by 600	72 Hz	48 kHz
1024 by 768	60 Hz	48 kHz
1024 by 768	70 Hz	57 kHz
1024 by 768	72 Hz	60 kHz
1280 by 1024	60 Hz	64 kHz
1280 by 1024	70 Hz	74.5 kHz
1280 by 1024	72 Hz	76 kHz

FIGURE 1: HOW TO CHOOSE A MONITOR. Pick a resolution, then select a refresh rate of at least 70 Hz. Shop for the corresponding horizontal scan rate.

In rare cases, monitors and video cards more than four years old but with all the right specs simply refuse to work with each other at resolutions beyond 640 by 480 and with refresh rates above 60 Hz. Solving this problem requires trial and error with other (preferably newer) hardware.

Enhanced IDE: Myths and Realities

Q I'm getting conflicting messages about IDE CD-ROM drives. According to some reports, you can install these drives only in a system that has Enhanced IDE built into the motherboard. What's the truth?
Ian Anderson, Brossard, Quebec, Canada

A That's the second Enhanced IDE rumor I've heard—the other is that you need a local bus system to take advantage of Enhanced IDE. Both rumors are false. To explain why, I need to bend your ear with some background on what Enhanced IDE is and what it does.

Enhanced IDE is a Western Digital standard that offers three potential advantages over ordinary IDE: increased drive performance, support for hard drives over 528MB, and the ability to install four IDE hard disks (or two IDE hard disks and two IDE CD-ROM drives) in one system. Enhanced IDE is a backward-compatible standard, which means that you can connect an Enhanced IDE drive to an old IDE interface (or vice versa). To get *any* of Enhanced IDE's benefits, you must have an Enhanced IDE interface. And to get the *speed* enhancements, you'll also need an Enhanced IDE drive.

On your motherboard or an I/O board, you'll find an IDE connector into which you can plug two IDE drives. But only Enhanced IDE motherboards and I/O boards—which didn't start appearing in systems until last year—have two IDE connectors (thus the support for four drives).

You can use the second connector for your IDE CD-ROM drive. Sure, you could plug a CD-ROM drive into the same interface as your hard disk—it's your only option on standard IDE connections. But IDE can transfer data only as fast as the slowest device allows, and your CD-ROM drive is much slower than your hard disk. The second connector on the motherboard allows you to add a CD-ROM drive without slowing down your system.

You can still install an IDE CD-ROM drive in an older system, however. Simply add an expansion board containing an IDE interface board. Just remember that if you already have two IDE drives in your system, an *ordinary* IDE interface board won't do because the system BIOS in older PCs usually limits the number of IDE devices to two. A company called GSI (800/486-7800) sells a complete line of boards that fool an older BIOS into accepting more than two IDE drives.

If your hard drive and interface are both Enhanced IDE, the speed you can expect depends primarily on your application and the type of bus in your system. The fun starts when your system has a VL or PCI bus and both the Enhanced IDE drive and interface support Programmable I/O Mode 3 (which handles transfer rates three to four times as fast as standard IDE). But even then, you'll probably notice the speed increases only when your hard

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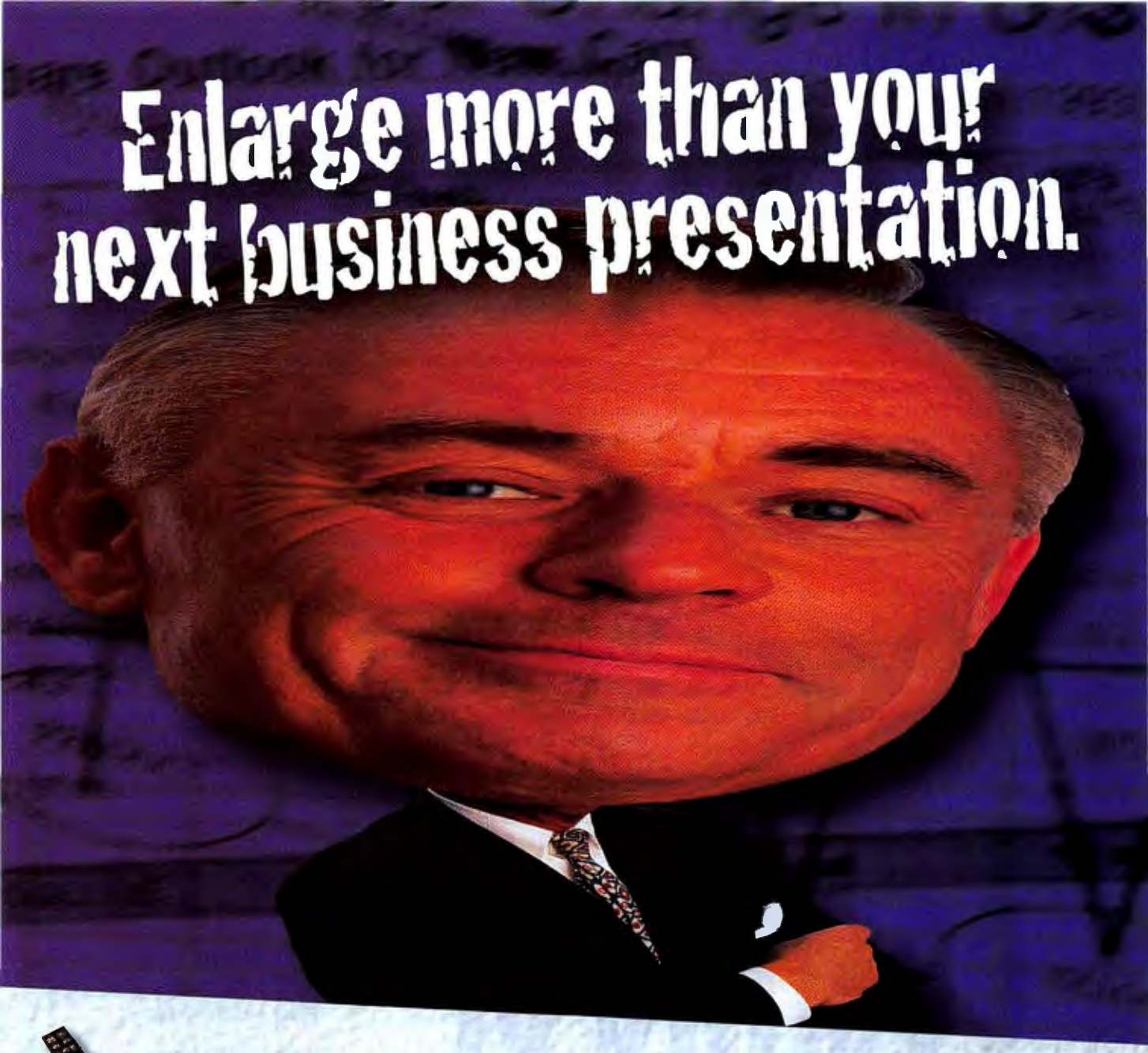

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disk transfers large blocks of data—multimedia sound and video should get a substantial boost, for example.

Last but not least, make sure your CD-ROM drive is truly an IDE or Enhanced IDE device before you buy. Several vendors sell so-called IDE-based CD-ROM drives, which can mean they work only with an interface board from the same manufacturer. To be certain you're really getting an IDE device, make sure it's ATAPI compatible. If it is, you can hook it to any IDE interface.

Making Two Hard Disks Get Along

Q When I decided to upgrade my hard disk, I discovered I had an old-fashioned ESDI drive. I looked for a replacement, only to find the selection of ESDI drives limited and prices high. So I resolved instead to add an IDE drive, which has its own interface card. When I installed it, the computer wouldn't boot. Do I need a new BIOS? Or should I upgrade my motherboard?

Peter Rausch, Linden, New Jersey

A You're probably experiencing a classic interrupt conflict. Nearly all expansion boards in your system require their own interrupt request (IRQ) line, a kind of hot line to the CPU. When two devices try to use the same IRQ line, the system locks up. Most hard disk interface cards take IRQ 14; during setup, see if you can configure one for IRQ 15, the usual alternate. If neither board offers this—that is, if both are hardwired for IRQ 14—your best bet is to buy a new IDE interface card. Fortunately, they're usually less than $50.

Because two like devices (two hard disk interfaces, two graphics cards, and so on) tend to grab the same resources, you may also be having an I/O address conflict, in which both boards vie for the same area in memory. Again, you may or may not be able to change the I/O address on either interface card to resolve the problem. Check both boards' documentation to make sure the settings aren't stepping on each other. Also check to see whether there's a ROM BIOS on either card; if both have a ROM BIOS and want the same memory location, you may have another unresolvable conflict.

If you clear all these hurdles, you can install your new IDE drive. Many hard disks come with installation software that makes this a simple task. Otherwise, you'll have to fire up your system's installation software and enter your drive's parameters using the user-definable drive type in your system BIOS's drive table (see "A Hard Disk That's Missing Something" in September's *Hardware* for more details). Or if your system lacks a user-definable drive type, try upgrading your system BIOS. Failing that, Micro House's EZ-Drive (800/926-8299) or Ontrack's Disk Manager (800/752-1333) should get the new drive talking to your PC in a hurry.

By Eric Knorr

Eric Knorr is a contributing editor for PC World *and editor and principal author of* The PC Bible *(Peachpit Press, Berkeley, California, 1995).* Hardware *welcomes your questions and pays $50 for published items.* *See page 12 for contact information.* ■

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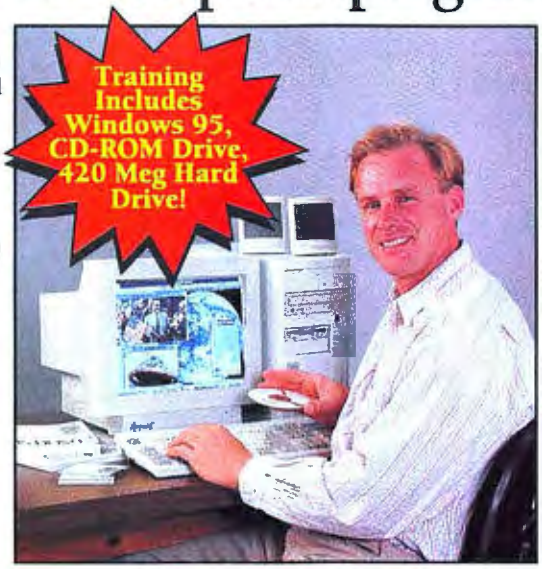

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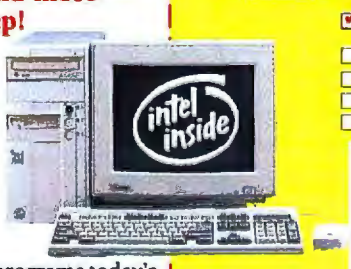

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STAR-DOT-STAR TIPS

Clean Up Windows Litter

When Windows programs install themselves, they often litter your main Windows directory with new files—and replace or edit some of the old ones without asking. Many programs also take liberties with AUTOEXEC.BAT and CONFIG.SYS.

These practices may make it a pain in the neck to remove an application you no longer want. What's more, if you want to move some of a program's files to more appropriate places, you won't know exactly what to move. (The DIR /O:D command lists the most recently changed files last, but since many files are copied over with their older dates intact, it won't show you all the files that have been added.)

But if you know which files have been added, you can move many of them to a different directory, or delete those you know are superfluous. Windows' installation program, for example, dumps fonts into the WINDOWS\SYSTEM directory. You can move them to a separate, easier-to-manage WINDOWS\FONTS directory as long as you edit WIN.INI to reflect the new location.

Here's a simple technique that shows you right away what a Windows application has done to your system during installation. Run BEFORE.BAT **[FIGURE 1]** before installing a new Windows program, and AFTER.BAT **[FIGURE 2]** afterward. When you run AFTER.BAT, all the differences in your WINDOWS and WINDOWS\SYSTEM directories, along with any changes to SYSTEM.INI and WIN.INI, show up on the screen.

Betty deCarlo,
Bound Brook, New Jersey

Editor's note: These batch files make it easy to see what changes a Windows app has made to your system. AFTER.BAT uses DOS's FC (File Compare) command to compare the before and after versions of your SYSTEM.INI and WIN.INI files and your WINDOWS and WINDOWS\SYSTEM directories. The output of each comparison is sent to the screen, but you can send the results directly to the printer by pressing **<Ctrl>-P** before running AFTER.BAT, then pressing **<Ctrl>-P** again when it's done. To send the output to a file, use the modified version of AFTER.BAT shown in **FIGURE 3.**

```
@ECHO OFF
ECHO SAVING WINDOWS INFORMATION....
COPY C:\WINDOWS\SYSTEM.INI C:\SYSBEF.TXT
COPY C:\WINDOWS\WIN.INI C:\WINBEF.TXT
DIR C:\WINDOWS /B > C:\WINDIRB.TXT
DIR C:\WINDOWS\SYSTEM /B > C:\SYSDIRB.TXT
```

FIGURE 1: TRACK CONFIGURATION FILE CHANGES by running this batch file before installing a Windows program.

```
@ECHO OFF
ECHO CHANGES (IF ANY) TO SYSTEM.INI:
FC /L C:\SYSBEF.TXT C:\WINDOWS\SYSTEM.INI | MORE
PAUSE
ECHO CHANGES (IF ANY) TO WIN.INI:
FC /L C:\WINBEF.TXT C:\WINDOWS\WIN.INI | MORE
PAUSE
ECHO CHANGES (IF ANY) TO WINDOWS DIRECTORY:
DIR C:\WINDOWS /B > C:\WINDIRA.TXT
FC /L C:\WINDIRB.TXT C:\WINDIRA.TXT | MORE
PAUSE
ECHO CHANGES (IF ANY) TO WINDOWS\SYSTEM DIRECTORY:
DIR C:\WINDOWS\SYSTEM /B > C:\SYSDIRA.TXT
FC /L C:\SYSDIRB.TXT C:\SYSDIRA.TXT | MORE
```

FIGURE 2: VIEW CHANGES TO SYSTEM.INI, WIN.INI, and Windows' directories on screen with this version of AFTER.BAT.

The Terminal Screen

In my native Venezuela, most bulletin boards make use of the upper portion of the IBM PC character set to display Spanish characters such as ñ, á, é, and í. However, my terminal emulation program, COMit for Windows, didn't seem able to display the accented or graphics characters properly. I tried loading the ANSI.SYS driver in CONFIG.SYS, but to no avail; it turns out ANSI.SYS doesn't do a thing for Windows programs. Finally, I hit on a solution: I selected Terminal, a typeface included with Windows, as COMit's default display font. Now I can see all the characters and graphics.

Guillermo Costa, Caracas, Venezuela

Editor's note: Windows' Terminal font is the correct one to use when calling most bulletin board services, because it uses the IBM ANSI character set. Most other Windows fonts use the Windows ANSI character set, which lacks the IBM ANSI line draw characters and assigns different ASCII codes to foreign language characters. To add Terminal to your system's list of fonts, open Control Panel's Fonts applet, click *Add*, browse the WINDOWS\SYSTEM directory for the font, and double-click on it.

Unfortunately, because Terminal is a bit-mapped screen font, some programs may refuse to use it. Also, Terminal comes in fixed font sizes, limiting what you can do with it. So if Costa's solution doesn't do the trick, try getting a TrueType font with the same special characters. One good source is E A Behl Technologies, which sells Video Terminal Screen, a $12 set of shareware terminal fonts ($15 via CompuServe) that comes in both TrueType and PostScript formats. These are available as VTS33T.ZIP (TrueType) and VTS33P.ZIP (PostScript) on PC World Online (see page 12 for more information).

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```
@ECHO OFF
ECHO CHANGES (IF ANY) TO SYSTEM.INI:
FC /L C:\SYSBEF.TXT C:\WINDOWS\SYSTEM.INI > C:\SYSINI.CHG
ECHO CHANGES (IF ANY) TO WIN.INI:
FC /L C:\WINBEF.TXT C:\WINDOWS\WIN.INI > C:\WININI.CHG
ECHO CHANGES (IF ANY) TO WINDOWS DIRECTORY:
DIR C:\WINDOWS /B > C:\WINDIRA.TXT
FC /L C:\WINDIRB.TXT C:\WINDIRA.TXT > C:\WINDIR.CHG
ECHO CHANGES (IF ANY) TO WINDOWS\SYSTEM DIRECTORY:
DIR C:\WINDOWS\SYSTEM /B > C:\SYSDIRA.TXT
FC /L C:\SYSDIRB.TXT C:\SYSDIRA.TXT > C:\SYSDIR.CHG
COPY SYSINI.CHG+WININI.CHG+WINDIR.CHG+SYSDIR.CHG WINCHNG.TXT
```

FIGURE 3: DOCUMENT CHANGES TO YOUR SYSTEM.INI AND WIN.INI FILES and Windows' directories in a text file using this version of AFTER.BAT.

Name That VGA

In order to install drivers for a super-VGA card (or download the latest ones), you need to know who made it. But too many systems come with display adapters that don't bear the manufacturer's name, or have cases that are difficult to open.

Well, fret no more: DOS's DEBUG program can give you a clue to the board's identity with a single command. Just start the utility by entering **DEBUG** at the command prompt, and then enter **d c000:0** at DEBUG's dash prompt; you'll see some text with information about the video chip and board. If it looks like there may be more text there, enter **d** again until you've seen it all. To exit DEBUG, enter **q**.

Dick Peters, Norfolk, Massachusetts

Editor's note: This technique is similar to the one used by system status utilities such as Quarterdeck's Manifest, Microsoft diagnostics (MSD.EXE, included with Windows), and Norton's Sysinfo. All look for text strings at the beginning of the BIOS ROM (which just happens to start at C000:0 on any system that has better-than-CGA video). The only time it will fail is when the video BIOS ROM has been moved to a different address by a memory manager (such as Helix Software's "cloaked" video BIOS). There's no harm done if this is the case—you will just see gibberish.

The text at the beginning of the ROM usually contains the names of several companies besides the video board's manufacturer. You may see the name of the board's graphics chip and its manufacturer (for example, Cirrus Logic or Western Digital) or the name of the board's video BIOS maker (like AMI or Phoenix). While this can be useful information (many generic video drivers will work with any board based on a particular chip, for example), these companies are generally not the ones that made the board and provide driver updates; keep entering **d** until a likely board manufacturer's name shows up.

RAM Saver

I recently created a RAM disk on my computer and decided to use it as the destination for downloaded files (so that background downloads in Windows would not cause the hard disk to thrash). But because I usually perform several tasks at once, I used to lose my RAM drive files whenever I turned off the computer without saving them. To solve this problem, I created a short batch file called WIN.BAT:

```
@ECHO OFF
C:\WINDOWS\WIN.COM
COPY D:\*.* C:\RAMDRIVE
```

I keep WIN.BAT in my root directory; it runs Windows, then copies the contents of the RAM disk to my hard disk when I exit.

Steven M. Boegeman, America Online

Editor's note: To make WIN.BAT work, make sure the path in the second line points to your WINDOWS directory and the paths in the third line match the drive letter of your RAM disk and the directory where you want to store orphan RAM disk files.

You can put WIN.BAT to work on many other tasks as well, either before you enter Windows or after you leave it (the batch files presented in the "Clean Up Windows Litter" tip would work well CALLed from WIN.BAT, for example). WIN.BAT won't run from the WINDOWS directory because DOS executes WIN.COM before WIN.BAT. To avoid this minor problem, you can rename WIN.COM (I use **RUNWIN.COM**), then alter the batch file's second line accordingly.

Eliminate Pesky Warts

Ever notice how a single plug-in transformer (also called a wall wart) can take up two or even three spaces on your power strip? To avoid overcrowding, go to a hardware store and buy a grounded three-outlet extension cord. (Look for one with a rectangular block on the end that has two outlets on one side and one on the other.) Plug the transformers into the extension cord and the extension cord into the power strip. If you plug in two or three wall warts this way, you'll save an entire power strip!

Mildred Wyatt, Toledo

Editor's note: The power strip under my desk had been short on outlets for a while when I read this tip; it was a lifesaver. My significant other did fret a bit, saying that so many devices might cause an overload, but as it turns out this is not a problem. The wattages of most wall-mounted transformers are so low that there's no danger of overloading the extension cord with this trick.

By Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star *welcomes your tips, macros, batch files, and short programs and pays $50 to $200 for published items. See page 12 for contact information.*

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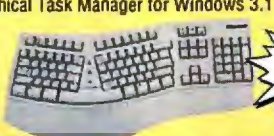

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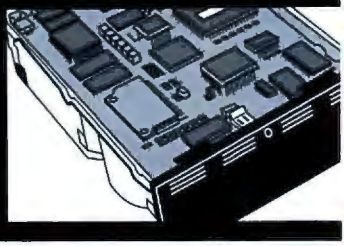

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- 128K Buffer, 612KB/sec Data Transfer
  External $899

DRM-1804X
- 18 Disc Changer, Quad Speed, 300ms, SCSI-2
- 128K buffer, 612KB/sec Data Transfer
  External $1879

DRJ-5004X
- 500 Disc changer. Call for price.

DRMA600
- Extra 6 disc magazines $35 or $23 with drive purchase

CONNER HOT NEW TAPE DRIVE!

SCSI Interface TSM4000
- High capacity, high performance protection for your data.
- Up to 4GB capacity and up to 54MB/minute backup rate.
- Two year warranty! Conner toll free support.
- Backs up data from local or network hard disk drives
  Includes internal tape drive, SCSI data cable, Conner Backup Exec software, manuals, mounting hardware for 3.5" and 5.25" drive bays, and 1 FREE tape.
- Conner backup Exec software is full featured software for DOS or Windows. Allows full or incremental backup of local or networked drives. Allows you to schedule your backups.
- External model also available. Extra tapes QW3080 2-4 $30 5-9 $28 10+ $26

Drive with Dos/Win software and 1 FREE tape
(Requires SCSI controller)

ONLY $539

HARD DRIVES

CONNER			
IDE			
210MB	14ms	CFS210A	$164
420MB	14ms	CFS420A	$194
850MB	10ms	CNR850A	$309
1275MB	9ms	CNR1275A	$475
MAXTOR			
IDE (2yr warranty)			
135MB	12ms	M7135AV	$139
420MB	12ms	M7420AV	$190
540MB	12ms	M7540AV	$220
853MB	12ms	M7850AV	$309
1275MB	12ms	M71260AV	$485
SEAGATE			
IDE (3yr warranty)			
420MB	14ms	ST3491A	$184
545MB	14ms	ST3660A	$219
722MB	12ms	ST3780A	$290
1083MB	12ms	ST31220A	$445
SCSI (5yr warranty, WIDE SCSI available)			
1052MB	9ms	ST31200N	$519
2147MB	8ms	ST32550N	$1119
2148MB	9ms	ST12400N	$950
4290MB	9ms	ST15230N	$1899
4290MB	8ms	ST15150N	$2189
9080MB	11ms	ST410800N	$3339

CD ROM DRIVES

SCSI				
Toshiba	XM3501	4X	155ms	$299
Plextor	PX43CS	4X	170ms	$339
NEC	CDR4X	4X	220ms	$339
NEC	CDR510	3X	195ms	$269
Sanyo	SH93R	2X	280ms	$149
IDE (ATAPI)				
Mitsumi	CRMCFX400	4X	230ms	$219

CD ROM TOWERS

Multiple drives in a single enclosure.

	2 Drive	4 Drive	7 Drive
Sanyo 93R	$359	$779	$1289
NEC 3X	$669	$1399	$2369
Toshiba 3501	$755	$1579	$2679
Plexstor 4X	$819	$1689	$2879
NEC 4X	$819	$1689	$2879

MISCELLANEOUS

Drive Media! WIDE SCSI, Macintosh & Power Mac Drives, Hard Disk Cards, PCMCIA 2 1/2" Drives, Floppy Drives, IBM PS/1, PS/2, and Tandy Drives.

SCSI TAPE DRIVES

Kit includes 16bit card, DOS or Windows software & 1 tape.

			Bare	Kit
250MB	Conner	C2150	$349	$509
525MB	Conner	C2525	$479	$639
750-15Gig	Exabyte	2501	$499	$649
2Gig	Conner	4320	$779	$879
2Gig	HP	35470	$759	$859
4-8Gig	Conner	4324	$849	$949
4-8Gig	HP	35480	$869	$969
4-10Gig	Conner	4326	$959	$1089
4-10Gig	HP	C1533A	$1049	$1169
5-10Gig	Exabyte	8505	$2039	$2209

Call for larger capacities. 20Gig DLT now avail.

Backup Software- NovaStor OS/2 / MacintoshS89 / $99	
Novell NLM 50 user / unlimited / OS/2	$199 / $339
Retrospect for Mac (w/ drive only)	$129
Desktape Mounts 4mm Tape on Mac Desktop	$275
NEW! TAPEDISK treat your SCSI tape drive as a disk drive in DOS or Windows	$249

NOTEBOOK UPGRADES

2.5" Drives			SCSI	IDE
240MB	14ms	Fujitsu	$279	$279
256MB	17ms	Quantum	$269	$274
514MB	17ms	Quantum	$429	$439

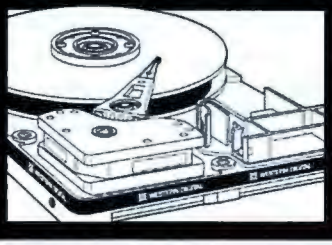
Adaptec PCMCIA to SCSI / Parallel to SCSI $219 / $135

CONTROLLER CARDS

ADAPTEC	Alone	w/Drive
A1522BASIC 16Bit SCSI	$129	$109
A1542CBASIC 16Bit SCSI	$225	$215
A2742 EISA SCSI	$379	$369
A2842 VESA SCSI	$259	$249
A2940Kit PCI SCSI	$299	$289
Future Domain 1680 16Bit SCSI	$134	$119
QLOGIC PCI SCSI & WIDE	$325	$315
TEKRAM CACHING CARDS		
DC600CF 16Bit IDE	$89	$79
DC680C 32Bit Local Bus IDE	$109	$99
DC690C 32Bit PCI IDE	$149	$139
SCSI Controllers include COREL SCSI		
DC800B 16Bit SCSI	$199	$189
DC880B 32Bit Local Bus SCSI	$299	$289
TEKRAM NON-CACHING		
DC300B 16Bit SCSI w/ Corel	$159	$149
DC380B VESA SCSI w/ Corel	$179	$160
DC290N PCI Enhanced IDE	$45	$39
DC200S 16Bit IDE w/ High Speed IO	$55	$45
GSI 16Bit IDE accelerators (enhanced IDE)		
Boost Performance 30 to 80%! VESA coming soon.		
1533-21 2IDE, 4 Floppy	$59	$49
1533-32 2IDE, 4 Floppy, IO	$125	$115
4C 16Bit supports 8 IDE	$139	$129

Many other types of controllers in stock.

1-800-786-1154 Thank you for your business!



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Selling Drives Exclusively Since 1987!

SyQuest

THE LAST DRIVE UPGRADE YOU WILL EVER NEED!

Syquest removable cartridge drives are the #1 storage solution for the 1990's!
Key Features

- Hard disk type performance, much faster than optical drives !
- Low price for additional storage, just add another cartridge.
- Disks are very rugged so you can feel confident when transporting.
- The most widely accepted means of transporting and sharing large files.
- 2 year warranty on drives and 5 year on cartridges.
- The US goverment has standardized on Syquest for data security.
- The only removable mass storge drive that can meet the exacting demands of multimedia.

Perfect for a wide range of storage needs including

- Unlimited upgrade capacity; Just add a disk when more space is needed.
- Transportability; Transport data from work to home, department to department, business to service bureau.
- Organization; Put different types of files or customers on separate disks.
- Security; Put your work in a safe place when your done for the day.
- Data interchange; Syquest is the most widely accepted means of exchanging large files.
- Archiving; Move that seldom used data to inexpensive off line storage. Syquest media is more stable for long term storage than tape.
- Software sharing; Locations with multiple computers can save on software costs by storing infrequently used application software on Syquest disks instead of on each computer. This could also keep you from getting fined for software piracy.
- Fast backup; Hard disk type performace allows you to backup and restore data many, many times faster than tape.

3 1/2" Family

- 3 1/2" x 1" form factor drive mounts in a 3 1/2" or 5 1/4" drive bay.
- The disks are very small, .39" x 3.83" x 3.88", and weigh only 2.9oz.
- The 270MB drive will also read and write to the 105MB disks.
- The 105MB is 14.5ms with 64K buffer, the 270MB is 13.5ms with 128K buffer.

IDE	105MB	270MB
- Bare Drive	$179	$339
- Drive with GSI-18 and 1 disk (will coexist with existing drive)	$269	$439
- Portable external (attaches to printer port. Only 4 1/4" x 1 3/4" x 8") includes 1 disk	$339	$529
SCSI		
- Bare Drive	$229	$369
- Internal w/ 16Bit controller & 1 disk	$349	$519
- External for Macintosh w/software, cable & 1 disk	$339	$489

5 1/4" Family

- 5 1/4" half height form factor. Cartridges are .5" x 5.4" x 5.4", and weigh 7.2oz.
- The 88MB reads 44 & 88MB disks. The 200MB reads 44, 88, or 200MB disks.
- The 88MB is 20ms with 32K buffer, the 200MB is 18ms with 64K buffer.

SCSI	88MB	200MB
- Bare Drive	$249	$369
- Internal w/ 16Bit controller & 1 disk	$369	$499
- External for Macintosh w/ software, cable & 1 disk	$399	$519

SYQUEST Media	2-4	5-9	10+ or w/ Drive Purchase
44MB (SQ400)	$53	$51	$50
88MB (SQ800)	$55	$51	$49
105MB (SQ310)	$56	$54	$53
200MB (SQ5200)	$80	$75	$72
270MB (SQ327)	$65	$62	$59

Quantum™

THE WORLDS TOP SHIPPER OF DISK DRIVES!

Quantum ships more drives than any other company. Why? Because they offer 1 - The right capacities at the right price. 2 - Oustanding quality. 3 - Cutting edge technology and performance. 4 - Fantastic warranty support. You can't go wrong with a Quantum drive from MegaHaus.

Capacity	Speed	Rotation	Buffer	Model	Wty	
IDE						
365MB	11ms	4500rpm	128K	LT365A	2yr	$182
421MB	12ms	3600rpm	128K	TB420A	2yr	$183
540MB	14ms	3600rpm	128K	MV540A	2yr	$225
541MB	11ms	4500rpm	128K	LT540A	2yr	$235
731MB	11ms	4500rpm	128K	LT730A	2yr	$275
SCSI						
365MB	11ms	4500rpm	128K	LT365S	2yr	$189
540MB	14ms	3600rpm	128K	MV540S	2yr	$242
541MB	11ms	4500rpm	128K	LT540S	2yr	$248
731MB	11ms	4500rpm	128K	LT730S	2yr	$290
1075MB	8ms	7200rpm	1024K	XP31070	5yr	$955
1080MB	9.5ms	5400rpm	512K	IMP1080S	5yr	$525
2150MB	8ms	7200rpm	1024K	XP32150	5yr	$1125
2160MB	9.5ms	5400rpm	512K	IMP2160S	5yr	$889
4300MB	8ms	7200rpm	1024K	XP34300	5yr	$2149

MICROPOLIS®

MegaHaus recommends Micropolis drives over any other high capacity drive! The drives are extremely reliable, and are rated at 650,000 MTBF. They are so sure of their drives that they are backed by a five year advanced replacement warranty. If your drive fails within the warranty period they will ship you an advanced replacement. They offer extremely high performance with high rotational speeds, and large read and write buffers.

FAST - Fast SCSI-2, Maximum data transfer rate 10MB/sec.
A/V - Fast SCSI-2 drives fine tuned for audio and video applications.
WIDE - Fast Wide SCSI-2, Maximum data transfer rate 20MB/sec!
WIDE SCSI Controllers (available with drive purchase only)
PCI Bus Adaptec 2940W $369 EISA Bus Adaptec 2742W $399
VESA Bus Aculogic ACWIDEVL $309

					FAST	A/V	WIDE
2050MB	8.5ms	7200rpm	512K	MC4221	$1089	$1179	$1299
4294MB	8ms	7200rpm	512K	MC3243	$2029	$2179	$2199
9100MB	12ms	5400rpm	256K	MC1991	$3199	$3439	$3399

NEW TAPE DRIVES!

Run on floppy controller. 1 FREE tape. Save $10 w/ drive sale.

Capacity	Brand	Warranty	Internal	External
250MB	IOMEGA	5yr	$155	$279
420MB	CONNER	2yr	$195	$339
850MB	CONNER	2yr	$289	$429

NEW!

MegaHaus is proud in introduce a high quality removable hard drive solution. Mount any 3.5" IDE or SCSI drive in the supplied cartridge, and the frame in a 5 1/4" drive bay in your computer and you are ready for transportability. These adapters are extremely high quality, they feature aluminum frame and metal cartridge, gold plated connectors that are rated at 50,000 insertions (Other cheaper models are only rated at 10,000 insertions.) cooling fan, current protection, LED activity lights, and key lock to prevent unwanted removal. SCSI unit has an external SCSI ID select switch on each cartridge. Great for many applications, security, transportability, data interchange, RAID applications, etc.

SCSI 1 $85 2-9 $82 10+ or w/ drive $79 Extra Frame $54 Extra Cartridge $40
IDE 1 $79 2-9 $76 10+ or w/ drive $73 Extra Frame $49 Extra Cartridge $39

MEGA HAUS
HARD DRIVES
2201 Highway 517
Dickinson, Texas 77539

1-800-786-1154

Ad. Code # PW02 Sales Hours (Central Standard Time)
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We sell within the United States, its territories, and Canada (sorry no international orders)
Circle 147 on reader service card

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- Includes Sound Blaster 16-bit sound card
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VERSA S/33C 210MB Active	$2124
VERSA S/50C 260MB Active	$2297
VERSA V/50D 250MB Dual Scan	$2454
VERSA V/50C 340MB Active	$3324
VERSA V/75C 340MB Active	$3787
VERSA M/75D 340MB Active	$3497
VERSA M/75C 540MB Active	$4664
VERSA M/100C 810MB Active	$5497
VERSA M/100HC 810MB Active	$5874
VERSA P/75C 540MB Active	$5324
VERSA P/75C 810MB Active	$6194

ZENITH

Z-STAR EX DX2/50 Mono 200MB	$1687
Z-STAR EX DX2/50 Dual Scan 200MB	$2124
Z-STAR EX DX2/50 Active 340MB	$3057

CANON

NoteJet 486C 4BubbleJet™ printer 120MB /200MB	$2349/$2549
NoteJet II 486C BubbleJet™ printer 260MB	$2613

COMPAQ

AERO 4/25 Mono 170MB	$1099
AERO 4/33C Color Passive 170MB	$1679
AERO 4/33C Color Passive 250MB	$1869

TEXAS INSTRUMENTS

TM4000 M DX2/50 Dual Scan 340MB	$2994
TM4000 M DX2/50 Active color 455MB	$3574
TM4000 M DX4/75 Dual Scan 340MB	$3897
TM4000 M DX4/75 Active Color 340MB	$4897
TM4000 M DX4/75 Active Color 455MB	$5154
TM4000 M DX4/100 Dual Scan 524MB	$5397

TOSHIBA

T1910 Mono. 200MB	$1267
T1910CS 200 MB	$1724
T1960CS 200/320MB	$2087/$2254
T1960CT 200/320MB	$2577/ $2767
T2400CS 250/320MB	$2424/$2597
T2400CT 250/320MB	$2897/$3177
T2450CT 320/500 MB	$4184/$4477
T3400CT 120/250MB	$1964/$2137
T3600CT 250MB	$3357
T4700CT 200 320MB	$3297/$3484
T4800CT 500MB	$4667
T4850CT 500/810MB	$4994/$5324
T4900CT Pentium 810MB	$6144
T6600C CD-ROM ready	$5324
T6600C CD	$5814

EPSON

ActionNote 650 Mono 260MB	$1377
ActionNote 650C Dual Color 260MB	$1837
ActionNote 866C Dual Color 340MB	$2357
ActionNote 880CX Act. Color 340MB	$3967

IBM ThinkPad

510Cs Pas.Color 200MB	$1799
360 Mono 170/340MB	$1899/$2299
360CS Color Dual Scan 170MB	$2349
360CS Color Dual Scan 340MB	$2749
360C Color Active 170MB	$1999
360C Color Active 340MB	$2399
755CS Color Dual Scan 170MB	$3899
340/540MB	$4399/$4799
755C Color Active 170MB	$4549
340/540MB	$5049/$5449
755CE Color Active 340MB	$6249
540/810MB	$6649/$7199
755CSE Color Active 340MB	$4899
540/810MB	$5299/$5849
755CD Color Active/CD ROM 540/810MB	$7599/$8149

AT&T Globalyst 200

486 SX/33 Dual Scan 170MB	$2224
486 SX/33 Active Matrix 250MB	$3294
486 DX2/50 Dual Scan 170MB	$2457
486 DX2/50 Active Matrix 250MB	$3634

Modems/PCMCIA

MAVES

PCMCIA OPTIMA 14.4+FAX14.4	$199
ACCURA 144+FAX144 Int/ext	$92/$112
ACCURA 288V.FC+FAX int/ext	$189/$229
OPTIMA 144+FAX144 int/ext	$269/$369
OPTIMA 288 V.FC+FAX int/ext	$379/$439

US ROBOTICS

Sportster 14.4 Fax int/ext	$99/$115
Sportster 14.4 PCMCIA	$179
Sportster V.34 int/ext	$219/$239
Sportster V.34 PCMCIA	$349
Courier Dual Standard 14.4 PCMCIA	$349
Courier V.34 int/ext	$379/$419
Courier Dual Std 28.8 PCMCIA	$399

MOTOROLA

LIFESTYLE SERIES	
28.8/14.4 Fax external	$225
PCMCIA 14.4/14.4	$175
POWER SERIES	
28.8/14.4 Fax external	$259
PCMCIA Cellular 14.4/14.4	$229

ASPEN

Internal BPS Data 96/48	$25
14.4 Data/Fax Internal/external	$59/$75
V.34 28,800 Data Fax Modem Int/ext	$169/$189

MEGAHERTZ

PCMCIA X-JACK 14.4/14.4	$179
PCMCIA 14.4/14.4	$179
PCMCIA Gold Series X-JACK 14.4/14.4	$199
PCMCIA Gold Series 14.4/14.4	$199
PCMCIA 28.8/14.4	$419
Ethernet/Modem Combo 10Base-T/14.4	$419

BOCA

14.4 w/FAX Internal/external	$89/$115
14.4/14.4 Multimedia	$119
Sound Expression 14.4/16bit Sound	$159
14.4 Pocket w/FAX	$169
V.34 28,800 bps Modem Int./ext.	$185/$225

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Ethernet LAN 10Base2-10Base-T Combo	$159
New Media 14.4 Data/Fax Modem	$145
Wave Jammer 16-bit Stereo Sound	$234
Bus Toaster SCSI-2 Adapter Card	$209
PCMCIA 16-bit Stereo & SCSI II	$419

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14.4 14.4/14.4 Data/Fax int/ext	$89/$109
PCMCIA 14.4/14.4 w/std DAA	$169
PCMCIA 14.4/14.4 w/EZ Port	$179
PCMCIA 28.8/14.4 Data/Fax	$339
PCMCIA 28.8/14.4 w/EZ Port	$349

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15" MultiSync XV15	$427*
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21" MultiSync XE21	$1917
15" MultiSync XP15	$627
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* Includes free Tax Cut software with mail-in coupon.

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14" 6439ES	$199
14"1451ES	$245
14"1451GM	$255
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14" 1462GM	$289
15" 1562GM	$319
15" 1565GM	$339
17" 1785GM	$639
17" 1785GM	$699

NEW

EPSON

15" SVGA .28	$345
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PANASONIC

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Stealth 64 4MB PCI	$459
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*Includes Corel Draw 3.0

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Dynamite Power 2MB PCI	$209
Stingray VL 1MB VLB	$109
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Graphite 64 1MB VLB/PCI	$135
Graphite 64 2MB VLB/PCI	$175
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NEC

MultiSpin 2Vi	$169
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MultiSpin 3Xi Plus Kit	$449
MultiSpin 4Xi	$368
MultiSpin 4Xe	$458
MultiSpin 4Xi kit	$449
MultiSpin 4Xe kit	$549

CHINON

CDS-535	$209
CDS-535PC Int/ext	$269/$349

TOSHIBA

XM3501 Int Quad Speed	$298
XM3501 Ext Quad Speed	$458

MICROSOLUTIONS

Back Pack Portable 2X	$324
Back Pack Portable 4X	$354

SONY

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I/F Kit	$29

TEAC

CD-55A (Quad Speed)	$298

CREATIVE LABS

OmniCD	$179
OmniCD 3X SCSI	$345
OmniCD 4X SCSI	$395
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Edutainment CD 16 Int'ext	$449/$549
GameBlaster CD 16	$379
Digital Schoolhouse	Special Price CALL $299
Sound Blaster 16 Value Edition	$99
Sound Blaster Value Edition	$49
Sound Blaster Pro Value Edition	$69
Sound Blaster 16 SCSI-2	$179
Sound Blaster 16 SCSI-2 w/ASP	$199
Sound Blaster 16 MultiCD	$149
Sound Blaster 16 MultiCD w/ASP	$179
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Sound Blaster AWE32 Value Edition	$229
Wave Blaster II	$145
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ORCHID

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Tropez	$195
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AI TECH

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ProC/TV Plus	$145
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Wireless Bandit Game Control	$49

ALTEC LANSING

ACS50	$75

JENSEN/POWER PARTNERS

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JPS45	$119
AR22	$99
AR42	$155
AR570	$279
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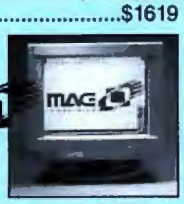

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1Meg×4	–	49.00	39.00	38.00	–
1Meg×4 (Zip Pk)	–	24.00	22.00	21.00	–
256x4(Page Dip)	–	7.25	6.75	6.50	5.95
256 4(Static Dip)	–	–	9.95	–	–
256x4(Page Zip)	–	9.25	9.00	8.85	–
256x4(Video Zip)	–	–	12.95	11.85	9.95
256x8(SOJ)	–	29.00	24.00	–	–
256 x1	–	3.25	2.95	2.75	2.25
64x4	–	–	–	3.75	–
64x1	–	–	–	–	2.00
256x16 SOJ	–	–	39.00	–	–
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8087	39.00
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80387-DX (Does All)	74.00
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4 x 36 16 mg	–	569.00	539.00	539.00	–
8 x 36 32 mg	–	1149.00	1098.00	–	–
16 x 36 64 mg	–	–	2349.00	–	–
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	16Meg		500987-004		619.00
	32Meg		500987-005		1399.00
Premium 486/25, 25E, 33, 33E					
Premium 386/33TE, 486/25TE, 33TE					
Prem Serv., Prem II 386SX/20, 25					
Prem. II 386/25, 386/33, 486/33, 486SX/20	8Meg		500780-001		398.00
Premium 386/33T, Prem. 386SX/16		64 pin			
Prem. II 386SX/20, 25	4Meg		500780-004		189.00
Premium 386/25, 33, 386/33T, 386SX/16,	1Meg		500780-003		59.00
Premia 4/33S, 4/33, 4/50D, 4/66D	8Meg		501159-002		379.00
Premia	16Meg		501159-003		789.00
Premia	32Meg		501159-004		1469.00
Premia	64Meg		501159-005		3111.00
AST Cupid 8d	0–32Meg		500818-001		179.00

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MODEL	AMT. UPGRADED	AST PART #	PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3800ME	59.00
Z386/33, 25, 20, 33E, 486/25E	4Meg	ZA3800MK	180.00
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6450379 (2Meg)	80-111, 311-121, 321, 081, 161	84.00
6451080 (4Meg)	80-A21, A-61, 80-A31, 80-111, 80-311	189.00
6450604/92G7196 (2Meg)	70-061, 121, 50Z, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX 35LS, 40SX	99.00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX, Val Pt. 325T	90.00
78X8955 (128K)	25	35.00
34F2933 (4Meg)	35SX, 40SX, 55SX, 65SX, 65LS 65LS	175.00
87F9977/92G7199 (4Meg)	55SX, 55LS, 65SX, 40SX, 35SX, 35LS	175.00
1057035 (512K)	P/S1-286	49.00
92F9935 (2Meg)	P/S1 & P/S1/386SX-2121	109.00
92F9694 (4Meg)	P/S1 & P/S1/386SX, Model-2121	189.00
9207200 (4Meg)	PSI Expert, Consultant, Willow	175.00
92G7201, 73G3131 (4Meg)	Value Point Performance, PC Server 4/66	175.00
73G3132/92G7203 (8Meg)	Value Point Performance, PC Server 4/66	339.00
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6450902 (2Meg)	56, 57, 57SX, 90, 95, P-75, 57SLC	90.00
6450128/92G7200 (4Meg)	Value Point 77 486DX2, 486SX, SVR 85 57SX, 90, 95, P-75, 57SLC, 56, 56SLC, P/S1, 386SX, Mod-2121, 2133, 2155, Val Pt 77, 486DX2, 486SX, SVR85 Value Point 77 486DX2, 486SX, SVR 85	175.00
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79F1001 (8Meg)	LX40, N33SX, PS Note	349.00
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	8Meg Module	116561-001	399.00
	32Meg Module	116568-001	1399.00
DeskPro 386/33L, 486/33L	(Exp 3d)	116569-001	279.00
DeskPro 386/25, 386/20	1Meg Module	114131-001	79.00
	4Meg Module	114132-001	199.00
DeskPro 386S-16MHz	1Meg Exp Bd	113633-001	149.00
	4Meg Exp Bd	113634-001	279.00
	1Meg Module	113646-001	79.00
	4Meg Module	112534-001	199.00
DeskPro 386/20E	1Meg Exp Bd	113644-001	149.00
DeskPro 386/25E	4Meg Exp Bd	113645-001	279.00
	1Meg Module	114131-001	79.00
	4Meg Module	114132-001	199.00
DeskPro 286N, 386N, 386SX20, all "M" series, sytem LT series, all "I" series	2Meg Module	116588-001	59.00
	8Meg Module	116688-001	89.00
	4Meg Module	116690-001	169.00
	8Meg Module	116877-001	339.00
M Series Exp Bd	0-64Meg	129160-001	169.00
DeskPro 386/16	1Meg Kit	130071-001	99.00
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	1-2Meg Exp Bd	129069-001	239.00
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DeskPro 286	512K Kit	113012-001	49.00
DeskPro 5/60, 5/66M, 5/66M ALL OF THESE MACHINES USE THESE MODULES	6Meg Kit	149911-001	389.00
Prosignia 5/60	16Meg Kit	149948-001	699.00
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Proliant 2000 4/30, 5/66	64Meg Kit	149913-001	2516.00
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Prolinea 386 3/25S, 3/25ZS	2Meg	141738-001	90.00
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Enhanced Prolinea, Prosario series	4Meg	141684-001	175.00
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LTE/386/20	4Meg Module	121125-002	209.00
LTE LITE/20, 25, 25C	4Meg Module	129769-002	209.00
LTE LITE/20, 25, 25C	8Meg Module	129769-003	389.00
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LTE LITE 425C/33C/25E/25L	8Meg Module	142337-003	329.00
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T2000SX/T1000LE	2Meg	PC-PA2000U	89.00
T2000SXE/2200SX/T1600, 1850, C	2Meg	PC-PA2001U	189.00
T2000SXE/2200SX/T1600, 1850, C	4Meg	PC-PA2002U	359.00
T4400SX, SXC T6400, T6600	4Meg	PC-PA2004U	189.00
T4400SX, SXC T6400, T6600	8Meg	PC-PA2005U	359.00
T4400SX, SXC T6400, T6600	16Meg	PC-PA2010U	689.00
T4500, C 14400, T4700, T1900, C, T1910, T1950 (3.3 v)	4Meg	PC-PA2012U	199.00
T4500, C 14400, T4700, T1900, C, T1910, T1950 (3.3 v)	8Meg	PC-PA2013U	389.00
T4500, C 14400, T4700, T1900, C, T1910, T1950 (3.3 v)	16Meg	PC-PA2014U	769.00
T3300SL	8Meg	PC-PA2008U	268.00
T3300SL	16Meg	PC-PA2009U	699.00
T3400CT, T2400, T3600	4Meg	PC-PA2019U	184.00
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T3400CT, T2400, T3600	16Meg	PC-PA2021U	707.00
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T3100e	2Meg	PC9-PA8340U	109.00
T3100SX	2Meg	PC15-PA8308U	109.00
T3100SX	4Meg	PC15-PA8310U	189.00
T3200	3Meg	PC6-PA7137U	185.00
T3200SX	2Meg	PC12-PA8307U	119.00
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ALR Venture	4Meg	12407980	249.00
Altima Barrage 2	4Meg/8Meg/16Meg		199/379/649
AST Ascentia 900N, 800N	4Meg/8Meg/16Meg		199/379/679
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AST Notebook Prem Exec 386SX/20/25/25L	4Meg	501114-001	189.00
AST Power Exec 3/25C, 425EL, 425SL	4Meg/16Meg	501166-001 -003	199/699
AST Power Exec 4/33SL	4Meg/16Meg	501318-001 -003	191/769
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Bondwell B310 Plus	1Meg	23050-09100	109.00
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Canon Innova 486-10	4Meg/8Meg		209/449
Canon Notejet 486	4Meg/8 Meg		156/289
Dell Latitude	4Meg/8Meg		159/749
Epson Action Note 700	4Meg/16Meg		199/699
Epson NB3	4Meg	AR08511	169.00
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Gateway 2000 Colorbook 4/33	4Meg/16Meg		189/679
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Goldstar GS320 386SX/16	2Meg	3306-4M	139.00
Grid 1720, 1750, 1755	1Meg		59.00
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HP Omnibook 4000	4Meg/8Meg/16Meg		199/379/649
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Magnavox Memphis	1Meg/4Meg	286, 386SX	109/199
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NEC Prospeed 286, 386SX-16, 386SX-20	1Meg	PC21-21, PC21-22	79.00
NEC Prospeed 286, 386SX-16, 386SX-20	4Meg		199.00
NEC Ultralite Versa, E, V	4 Meg/8Meg/16Meg	OP4104	183/359/739/1319
NEC Versa Removable Hard Drive	340Meg-524Meg/710Meg		749/899/1049
NEC Versa S	(Exp 3d)		209/399/799
Packard Bell 386SX, 286	1Meg, 4Meg	286, 386SX	99/199
Packard Bell Statesman	2Meg/8Meg		119/369
Panasonic CF170, CF270, CF370	1Meg	CF-BA165	59.00
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Panasonic CF-V21P, CF-580	4Meg/16Meg		219/819
Sanyo 17/18 NB	2Meg	MBC-NBMEM2	109.00
Sharp 6781, 6381, 6785, 6700, 6800, 6741	2Meg/4Meg		109/179
Sharp 6150, 6650, 8650, 7700, 7760	4Meg/16Meg		199/679
Sharp 8700 & 8900	4Meg/8Meg/16Meg		199/379/549
Sharp PC-5220		CE 6218	79.00
Jaadon PC Brand, Datreworld	2Meg/8Meg	NB386SX-20	119/349
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Canon LBP 430	–	–	69	–	–	–	169	–	–	–	–	–
Canon LBP 800	–	–	–	99	–	–	179	–	–	349	899	1249
Canon LBP4, 4Lite, 4plus	–	159	219	219	–	–	–	–	–	–	–	–
Epson 6000, Action Laser	–	–	129	–	–	–	229	–	–	–	–	–
Epson Action Laser 1100, 1600	–	–	99	99	–	–	189	–	–	379	599	–
Epson Action Laser II	–	–	89	–	209	–	–	327	–	–	*IN STOCK	
Epson 8000	–	–	89	–	209	–	–	327	–	–	*IN STOCK	
Epson 1000, 1500, 5000, 5200	–	–	*116*	–	–	–	*238*	–	–	*Call*	–	–
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HP 3, 3D, 3P, 2P 2P+	–	–	99	–	–	–	169	–	–	–	–	–
HP 4, 4M, 4Si, 4SiMX, 4P, 4MP	–	–	89	–	–	–	169	–	–	349	–	–
HP 4L	–	59	–	–	–	–	–	–	–	–	–	–
HP 3Si	–	69	–	–	–	–	169	–	–	349	–	–
HP 4Si	–	–	89	–	–	–	179	–	–	349	–	–
HP DeskJet 600, 650	–	–	–	–	–	–	175	–	–	349	–	–
HP DeskJet 500, 500C, 510, 550,560	–	55	–	–	–	–	–	–	–	–	–	–
HP DeskJet 1200C, 1200C/P	–	–	89	–	–	–	175	–	–	349	–	–
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IBM Laser 4029, 4037	–	–	–	–	–	–	169	–	–	–	–	–
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Okidata 400	–	–	–	89	–	–	–	–	–	–	–	–
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Oki 830, 840	–	–	–	109	–	–	–	–	–	–	–	–
Packard Bell PB 9500	–	–	–	159	–	–	227	–	–	–	–	–
Packard Bell 9815	–	–	–	159	–	–	249	–	–	–	–	–
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Panasonic 4410/4430	–	–	109	149	–	–	249	–	–	–	–	–
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Sharp 9500	–	–	94	–	–	–	269	–	–	–	–	–
Sharp 9600, E, H, 9700	–	–	109	–	–	–	279	–	–	–	–	–
TI XL/PS17/PS35	–	–	55	–	–	–	–	–	–	–	–	–
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83D87DX-25 25MHZ	50	83S87SX	50
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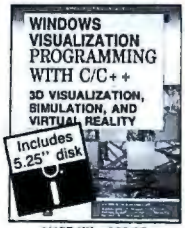

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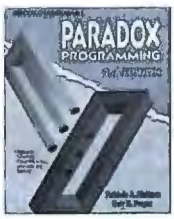

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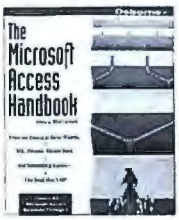

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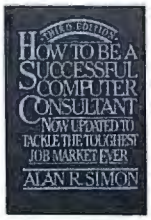

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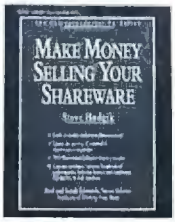

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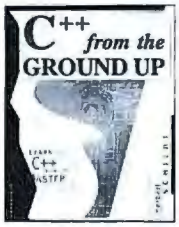

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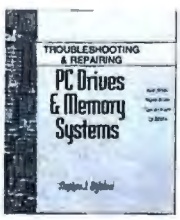

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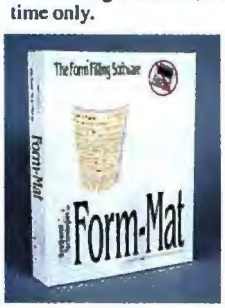

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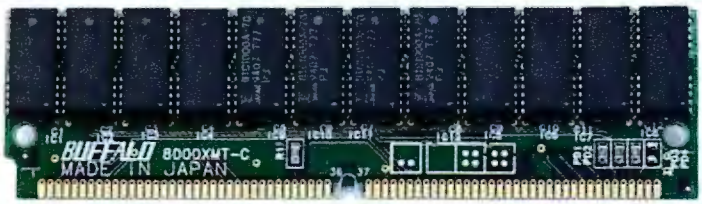

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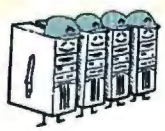

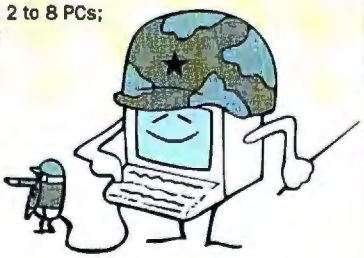

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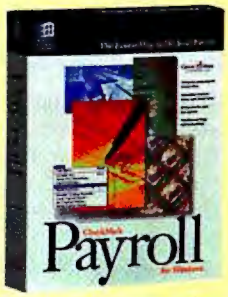

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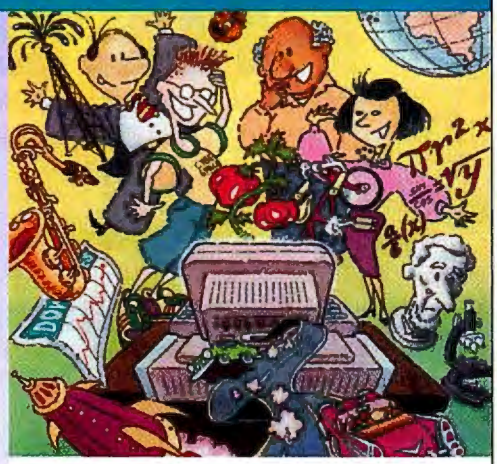

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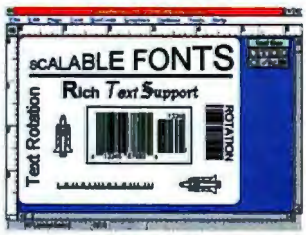

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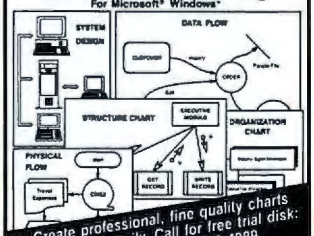

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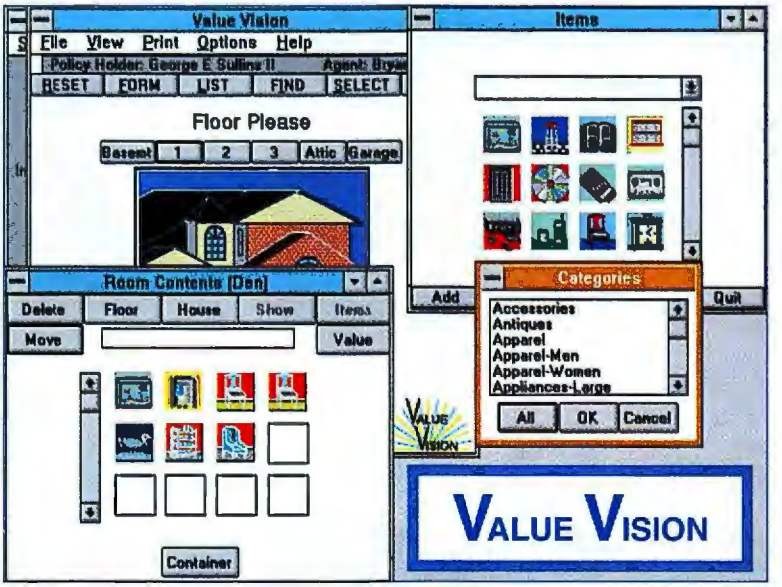

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Living in the State of Digital Encyclopedia

Not long ago, I read a glowing article in the *New York Times* celebrating CD-ROM encyclopedias and their multimegabytes of data. I found it surprisingly naive.

Sure, these products have megabytes of *something*, but much of it is bells, whistles, smoke, and mirrors. An encyclopedia should be *encyclopedic:* "embracing all branches of learning, very full of information, comprehensive."

Last year, I compared Microsoft Encarta 94 and Grolier's Multimedia Encyclopedia by putting each to a random information test—and found both to be weak. For instance, Encarta 94 failed to provide any information on steel drums (the only acoustic instrument invented in the 20th century), writer Thomas Pynchon, *Star Trek* creator Gene Roddenberry, novelist Paule Marshall, and calypsonian Mighty Sparrow—far from "comprehensive."

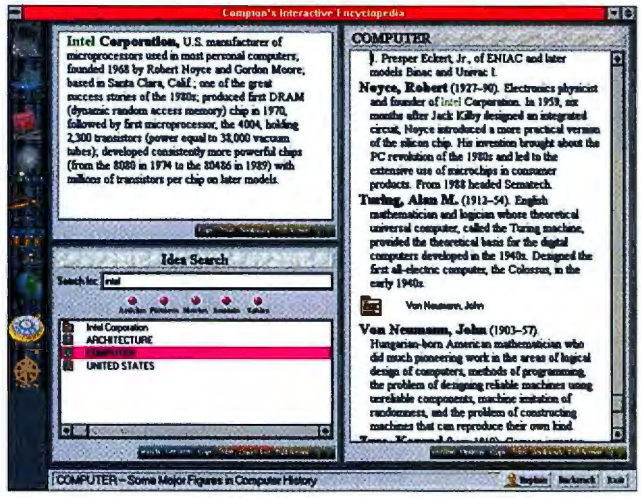
And This Year's Winners...

This year, I widened the comparison, and things have improved.

The 1995 Compton's Interactive Encyclopedia includes an article on Pynchon and a few paragraphs on steel drums, but neither Roddenberry, Marshall, nor Sparrow is covered.

Unfortunately, I found the multimedia aspects of Compton's problematic. On my 50-MHz 486 system (with plenty of RAM and a triple-spin CD-ROM) it took almost 90 seconds to load the program, and moving from module to module was equally slow. Worse yet, sounds and images stuttered badly, despite a tiny 1½-by-2-inch video window.

Also, Compton's has made some very bad choices about what kinds of multimedia to include. In Encarta, when you look up saxophone great Charlie Parker you get to hear Bird blowing a chorus. But when you check out jazz master Duke Ellington in Compton's, all you get is a MIDI file that claims to be "in the style of Duke Ellington"—but actually sounds more like the Yellowjackets, a jazz-fusion band popular in the seventies.



Ask the Info Pilot in Compton's Interactive Encyclopedia about Intel, and it will also provide related material, like this listing of computer industry pioneers.

On the plus side, Compton's provides several clever features for threading your way through its material: Idea Search scans the full text of the database; Info Pilot reveals cross-connections between material; and there's a decent atlas.

The Timeline feature, which I particularly liked, gives you a long view of history from the Big Bang all the way up to OJ's murder trial—and encourages you to examine important historical events in year-by-year close-up.

Dollar Wine and the Ten Commandments

Microsoft has done a bang-up job of fixing Encarta 94. The 1995 edition has a few weak spots, but it's come a long way. Not only have the editors added a good article on Thomas Pynchon, it includes a fact even I (a Pynchon junkie) didn't know: that before he published *V,* he worked for Boeing for two years. And while you have to use the Word Search feature to combine *steel* and *drum*, you will find a short reference in the paragraph on calypso music—and a driving steel band performance of Colin Lucas's soca hit "Dollar Wine."

Still missing: Gene Roddenberry, Paule Marshall (though she does rate a mention in an article on blacks in the arts), and Mighty Sparrow.

The multimedia components of Encarta 95 are impeccable, whether it's a Charlie Parker solo, a steel drum recording, or the Rembrandt painting that illustrates an essay on Moses destroying the Ten Commandments. All the listings include a table of related articles. A time line lets you scan the centuries.

Grolier's 95 edition wasn't available for this review, but I'll check it out in an upcoming column. Encarta 95, though, is good enough to use. I'm not unloading my printed *Britannica* yet, but this is a digital encyclopedia with enough information to be worthy of the name.

- **Compton's Interactive Encyclopedia** $70 to $90; Compton's NewMedia; 800/862-2206
  Reader service no. 790
- **Microsoft Encarta 95** $99.95; Microsoft; 800/426-9400
  Reader service no. 791

Michael Goodwin is a contributing editor for PC World.

By Michael Goodwin

Swap Meet Purgatory and Paradise

It's become a ritual: Once a month I pack a lunch, grab a clipboard, and head for a magic land with computers piled to the ceiling, hard drives and sound cards aplenty, and a trillion programs waiting to entice me. And the prices? About the lowest you'll find anywhere.

I'm talking about computer swap meets—feeding frenzies that hit regularly in many large cities, in some every other weekend. If your town doesn't have one yet, there's a good chance it will pretty soon. (Check out your local newspaper or computer rag for ads.)

If you play your cards right, you can make out like a bandit at the swaps. Last October I checked out 1.7GB Micropolis 2217AV SCSI drives (these are no longer manufactured), and listen to these prices: Full retail (which, granted, *nobody* pays) was $1590. A discounter's ad in *PC World* sold it for $1021. At the swaps? As low as $865.

Ah, but there's a catch, folks, a big one. You've just got to understand the danger before you walk in the door.

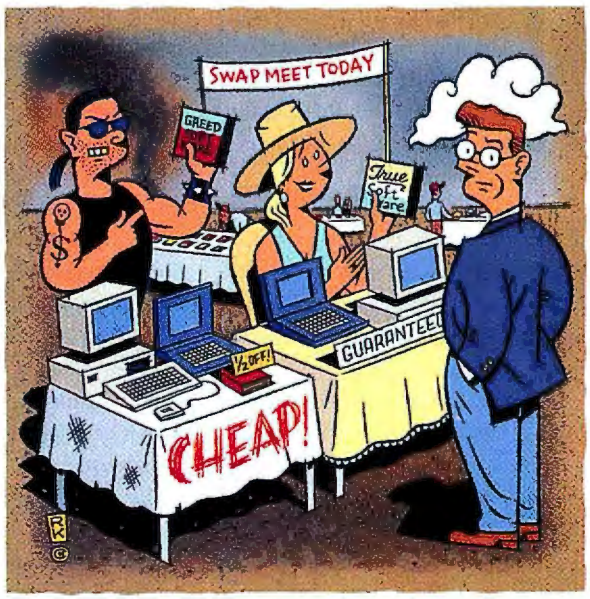
Shades of Gray

You see, some of the stuff sold at the swaps is what's called *gray market*—meaning the manufacturer hasn't authorized that particular dealer to sell its wares. It's perfectly legal, but the manufacturer may be reluctant to recognize the dealer's customers, leaving you up the creek without a warranty.

Listen, don't get me wrong; I'm not trying to steer you away from the swaps. Despite the gray-market shenanigans, most of the retailers are on the up and up, and many are blessed by the manufacturers. But you've got to find out who's legit *before* you buy, making educated, informed decisions at home, miles away from the meet.

Careful What You Wish For

Whether you're buying a CD-ROM drive or a complete system, do your homework first. If you're looking for an individual component, in addition to the model, revision dates, and specifications, grab some prices from the magazines for comparison. Call the manufacturer beforehand and get its warranty policy. Or call between swap meets with a list of the dealers you're considering, and see who the vendor approves of. I've generally found manufacturers cooperative when I've done this (and yes, I was calling anonymously), although after you've named about six dealers they'll begin to get antsy.



At the meets, try to get information from the dealers themselves. If they seem reluctant to talk, head for the next booth.

When you're considering a hardware component, get the dealer to open the box. Check to see if it's a new unit and all the parts are there, open the manual, and double-check the specifications. Look for a sticker with a manufacturer's serial number. And don't trust what the dealer tells you about the product. I asked four dealers for the random access speed and revolution-per-minute rates on a specific drive, and got four different answers.

Be sure software is shrink-wrapped, contains a registration card, and doesn't carry a "not for resale" sticker. And for goodness' sake, know what the current version is. When you get the software home, play it safe by running an antivirus program on each disk.

Here are my other shopping secrets: I talk with lots of shoppers for recommendations and discover their good—and bad—experiences at swaps. I hang around a booth, eavesdropping on conversations. I try to follow the *5-and-15* rule, buying from a retailer who's been in business at least 5 years and whose store is located within 15 miles of my home. (Probably half the vendors there are local and use the swap to increase cash flow and move stock that's getting stale.)

Before you buy, ask to see the dealer's and manufacturer's support policies—including rules about on-site service, warranties, and money-back guarantees—and make sure to get a copy with your purchase. If the price is just too good to be true, be wary. You may be getting used or—even worse—stolen equipment.

So if you're ever at one of the computer swaps in southern California, it's easy to recognize me. I'm the guy with a clipboard in my hand and an ear tuned to your conversation.

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for more information).

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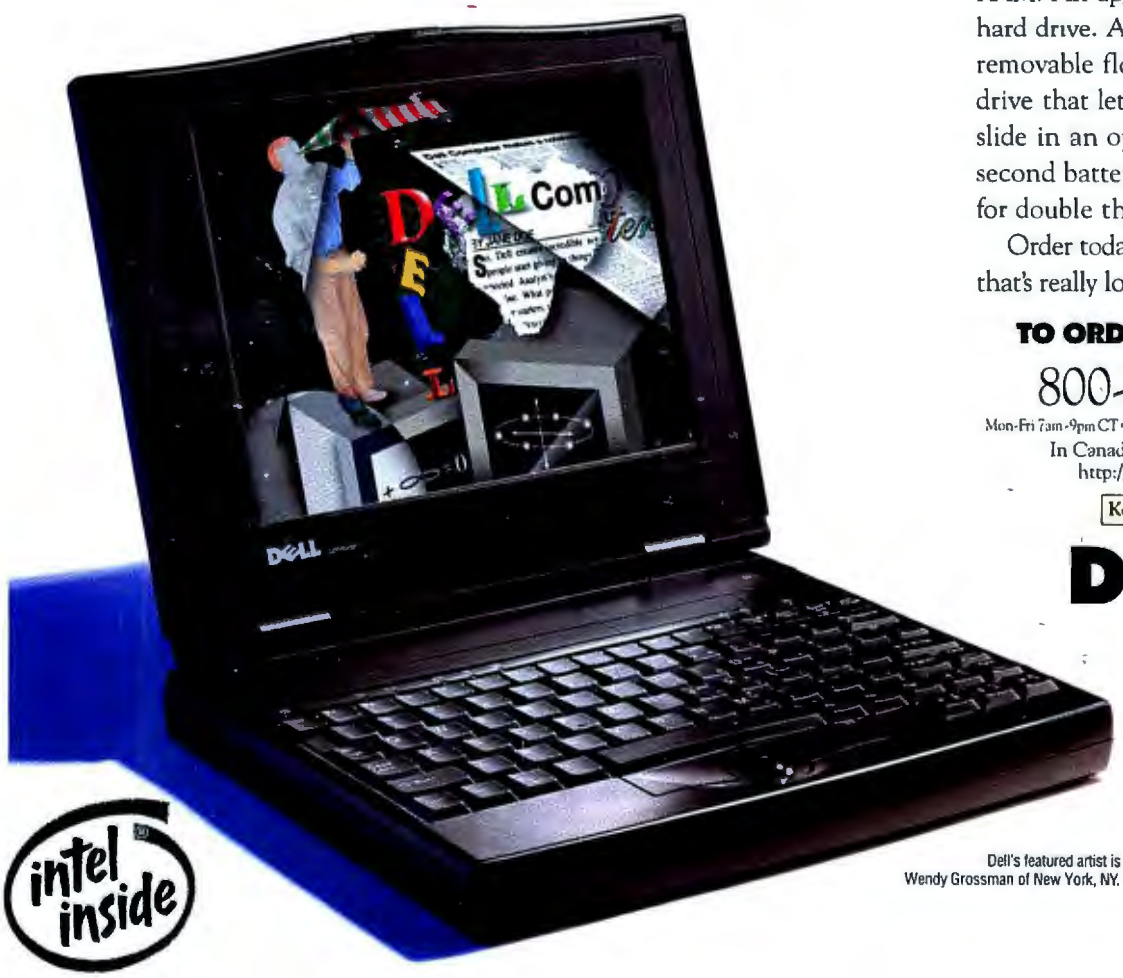

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