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LATEST TOP 20 DESKTOP AND MOBILE PCs

PC WORLD

June 1994

Reliability and Service:

The Best & Worst

PLUS 42 Big Hard Drives With 300MB+

4 Memory Managers vs. DOS 6

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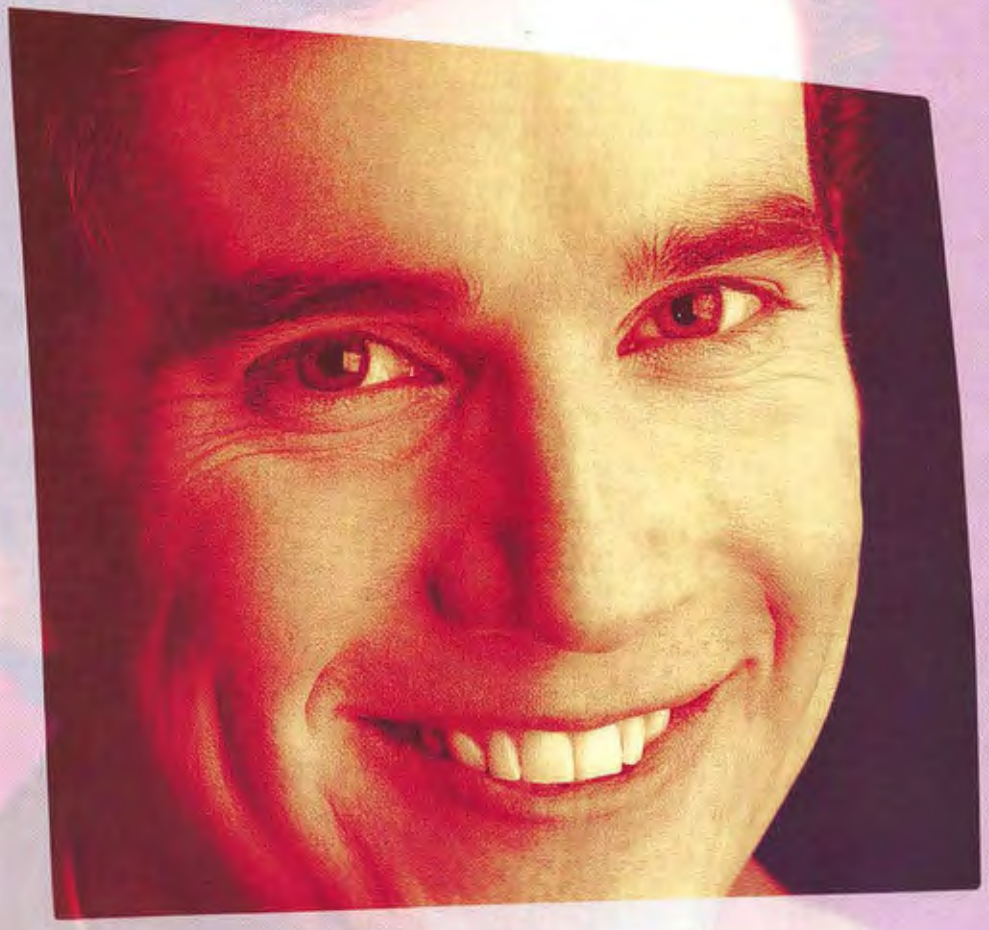

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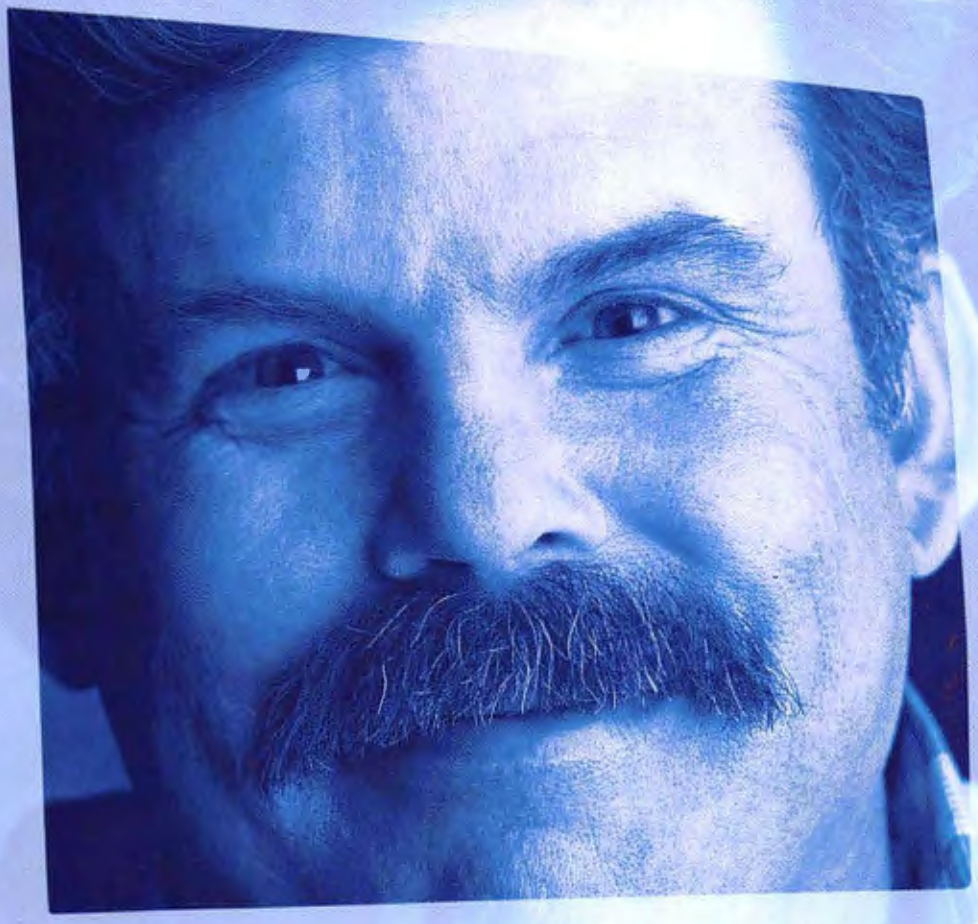
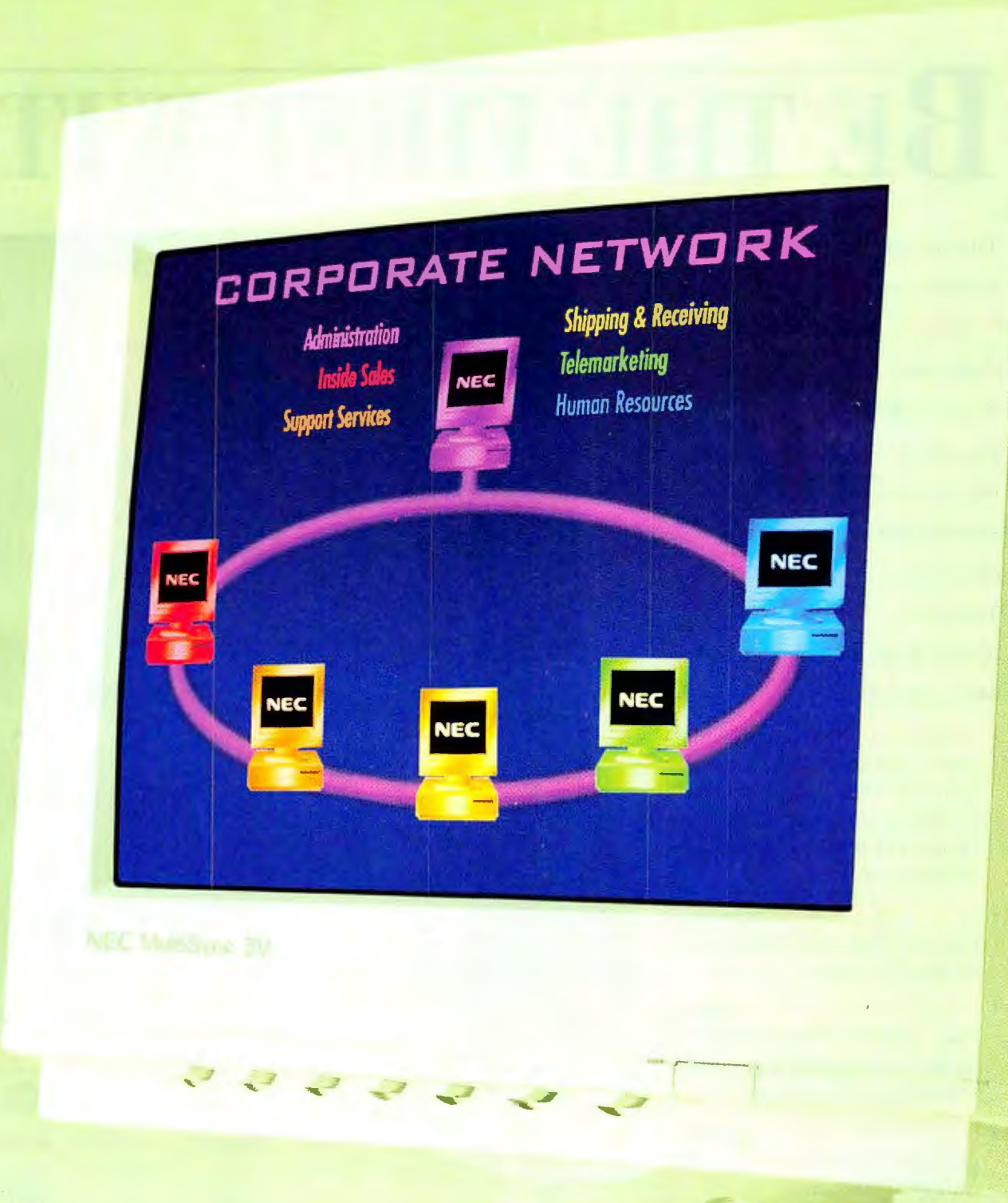
Sixty-five overnight packages. Tonight.



Ten hours per day.
One hundred and thirty words per minute.



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*15" CRT yields 13.8" viewable screen area. Optional cable adapter, required for Macintosh connection, available free from NEC. MultiSync is a registered trademark of NEC Technologies, Inc. The Energy Star emblem does not represent EPA endorsement of any product or service. © 1994 NEC Technologies, Inc.

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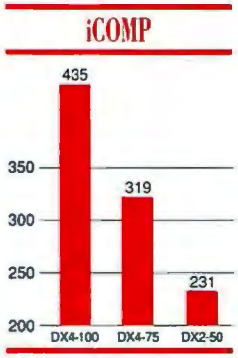

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Memory	4MB*	8MB	8MB

* Additional 4MB memory, $249. **Manufacturer's suggested price, 4/94. Actual prices may vary.

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$5,299

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- DX4, 75 MHz
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- 4MB RAM, max: 20MB
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- Slip case
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- 16MB memory
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  - Ethernet
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- 1 PCMCIA slot, Type III
- 86-key keyboard
- Integrated 16mm trackball
- Ports: parallel, serial, external VGA, keyboard, docking station
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- Slip case
- 6.6 lbs, including battery

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PC WORLD

Cover Story/Reliability and Service

118 Your New PC: DOA or Destined for Glory?
45,000 readers told us where they bought their PCs, whether the PCs worked right out of the box, and how vendors treated them. Our in-depth special report tells you which PCs are most and least reliable, and which companies are best at handling problems when they do occur.

119 Most Likely to Succeed...or Fail
Nearly one-quarter of all PCs sold to readers in our survey had a hardware problem. *PC World* visited major manufacturers to look at quality control and find out what makes one PC more reliable than another.

130 At a Glance: Quick Takes on Reliability and Service

133 Help Is on the Way...But When?
If your computer fails, you need help fast. But when it comes to repairs and technical support, all PC makers are not alike. Here's how the top vendors stack up against each other.

Cover photography by Robert Cardin, digital composition by TX Unlimited/San Francisco

Systems

142 Top 20 PCs: Power Struggles
With Pentium-66s and DX4-100s entering the fray, power plays mix up our Top 20 charts this month. Out of 25 new contenders, including the fastest desktop and notebook yet, 7 make it into the Best Buy ranks. At the top of the charts: the Zeos Pantera 66, Polywell Poly 486-40DX, Toshiba T4700CT 486 Notebook, and Compaq Concerto 4/33 Model 250.

Graphics Boards

175 Top 10 Windows Accelerators: Diamond Steals No. 1 Spot
What's new in our update of the graphics accelerator boards Top 10? Dramatic gains in performance as PCI and 64-bit boards hit the street.

Management

179 Where Have All the Profits Gone?
Every office has some degree of the problem: bureaucratic logjam. We found a real business with this very real problem and asked three management experts how they would use PCs to break the logjam, boost efficiency, and build profits.

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60 SX2-50: Dell's Entree to 486 Power
Test-driving the first 50-MHz 486SX2 PCs.

64 Where to Find Bargains on Brand Names
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70 Vote on the Future of the Information Highway
How do *you* think the infobahn should be built? Make your vote count.

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Memory Managers

191 Solving the Memory Shortage
Should you settle for DOS's built-in memory manager? We look at four packages that promise more from your PC.

Storage

202 Big Hard Drives: 300MB and Counting
Remember when 200MB was all the hard disk space you'd ever need? With multimegabyte Windows apps proliferating, it's time to expand. Our buyers' guide lists 42 drives, from $260 on up.

Reliability and Service Monitor

172 Win a DX4-100 PC
How satisfied are you with your PC? Have you had problems? Or is your PC trouble-free? Tell us about it! Fill out and fax in this month's survey for a chance to win a Micron 4100PCI Magnum, a Best Buy DX4-100 PC from this month's Top 20 charts.

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From high rise to home: how to set up a small office that works.

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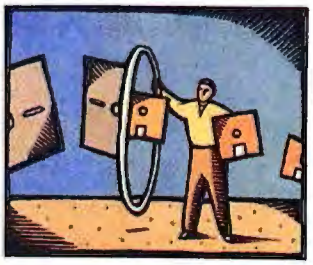

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The ZEOS® Pantera™ "achieved premier status."

–*PC Magazine* Editors' Choice, April 12, 1994

PC MAGAZINE EDITORS' CHOICE
April 12, 1994

PC Computing BEST

NOW YOU CAN TOO!

Top computer experts at three leading publications all agree that the ZEOS Pantera is the best Pentium-processor based system available.

The ZEOS Pantera-66 earned *PC Magazine*'s Editors' Choice (April 12, 1994), *PC/Computing*'s BEST award (May 1994) and *Computer Shopper*'s "top choice" (April 1994). These prestigious awards all add up to one thing–ZEOS computers are your #1 choice.

Don't settle for less. The ZEOS Pantera has it all. *PC/Computing* concurs: "Hot performance, room for expandability, and a low price make this system our top choice."

PENTIUM & 486 PANTERAS

Even better, we now incorporate the latest award-winning Pantera technology (including PCI) to our 486 PCs. The new 486 Panteras are the 486 answer to both the value-minded and power-hungry user. There's a package right for you, or we'll custom configure one to your exact needs!

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yes It runs with NetWare

PURE PERFORMANCE

PC Magazine said: "ZEOS Pantera-66 combines quality features, good price, and high performance.... A consistently above-average performer on all our benchmark tests...."

PC/Computing agrees: "Rocket-fast performance and a great price make this our favorite Pentium of the lot."

The ZEOS Pantera received the highest marks on the important Graphics WinMark and Disk WinMark tests run by *PC Magazine*. In fact, its Disk WinMark surpassed the next closest competitor by 35 percent!

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ZEOS offers you all this and more. It's easy to see why the Pantera is an award-winning system. It's the Editors' Choice. Make it your choice. As *PC/Computing* said, "there's no doubt which machine you should choose: ZEOS's Pantera...this is a deal you simply can't pass up." Call your ZEOS Systems Consultant now at 800-554-5220.

PROCESSORS	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
486SX-33	**$1495** Lease $63/mo.	**$1795** Lease $65/mo.	**$2195** Lease $71/mo.	**$2795** Lease $101/mo.
486DX-33	**$1645** Lease $60/mo.	**$1945** Lease $70/mo.	**$2345** Lease $85/mo.	**$2945** Lease $107/mo.
486DX2-66	**$1795** Lease $65/mo.	**$2095** Lease $76/mo.	**$2495** Lease $90/mo.	**$3095** Lease $102/mo.
DX4-100	**$2095** Lease $76/mo.	**$2395** Lease $87/mo.	**$2795** Lease $101/mo.	**$3395** Lease $112/mo.
PENTIUM-66	**$2395** Lease $87/mo.	**$2695** Lease $98/mo.	**$3095** Lease $102/mo.	**$3695** Lease $122/mo.
PENTIUM-90	**$2595** Lease $94/mo.	**$2895** Lease $105/mo.	**$3295** Lease $109/mo.	**$3895** Lease $129/mo.
More processors available. Call for details.	■ 4MB RAM	■ 8MB RAM	■ 16MB RAM	■ 24MB RAM
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■ Genuine Intel Processor. ■ PCI local bus color graphics card upgradable to 2MB.	■ 3.5" 1.44MB floppy drive	■ 2X CD-ROM drive, 3.5" 1.44MB floppy	■ 2X CD-ROM drive, 3.5" 1.44MB floppy	■ 2X CD-ROM drive, 3.5" 1.44MB floppy
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■ ZEOS 101-key space-saving keyboard.				
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■ 4MB RAM	■ 4MB RAM	■ 8MB RAM
■ 120MB IDE hard drive	■ 180MB IDE hard drive	■ 260MB IDE hard drive
■ MS-DOS 6.2	■ Custom carrying case	■ Internal 96/24 send/ receive fax modem
	■ MS-DOS 6.2	■ Custom carrying case
	■ Microsoft Windows for Workgroups 3.11	■ Extra battery
		■ External charging stand
		■ MS-DOS 6.2
		■ Microsoft Windows for Workgroups 3.11

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- 256K (386SL) or 512K (486SL) video RAM.
- 486SL version includes 3.3V technology for added battery life, PI local bus for video acceleration, high-speed floppy drive controller, and built-in math coprocessor.
- Supports simultaneous display with an external SVGA color monitor.
- Replaceable, rechargeable NiMH battery.
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- Serial, parallel and video ports, plus ports for internal fax modem and external floppy drive.
- AC adapter with full range from AC110-240V to DC.
- Fully-featured power management.
- 9.7" x 6.1"; 3.9 lbs.
- EPA Energy Star compliant.
- FCC Certified Class B; UL Listed.
- Complete ZEOS Customer Satisfaction Package.

PACKAGE 1	PACKAGE 2	PACKAGE 3
386SL Contenda: $995 Lease $42/month ■ 2MB RAM ■ 80MB IDE hard drive	**386SL Contenda: $1295** Lease $55/month **486SL Contenda: $1695** Lease $61/month ■ 4MB RAM ■ 80MB IDE hard drive ■ External 3.5" floppy drive ■ MS-DOS 6.2 ■ Windows for Workgroups 3.11, Lotus Organizer	**386SL Contenda: $1595** Lease $58/month **486SL Contenda: $1995** Lease $72/month ■ 4MB RAM (386SL); 8MB RAM (486SL) ■ 80MB IDE hard drive (386SL); 120MB IDE hard drive (486SL) ■ External 3.5" floppy drive ■ Custom carrying case ■ Extra battery ■ Internal fax modem ■ MS-DOS 6.2 ■ Windows for Workgroups 3.11, Lotus Organizer
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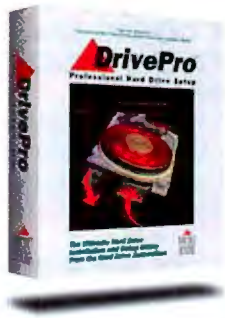

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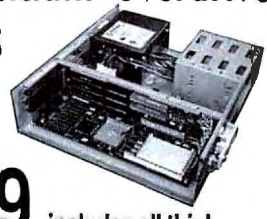

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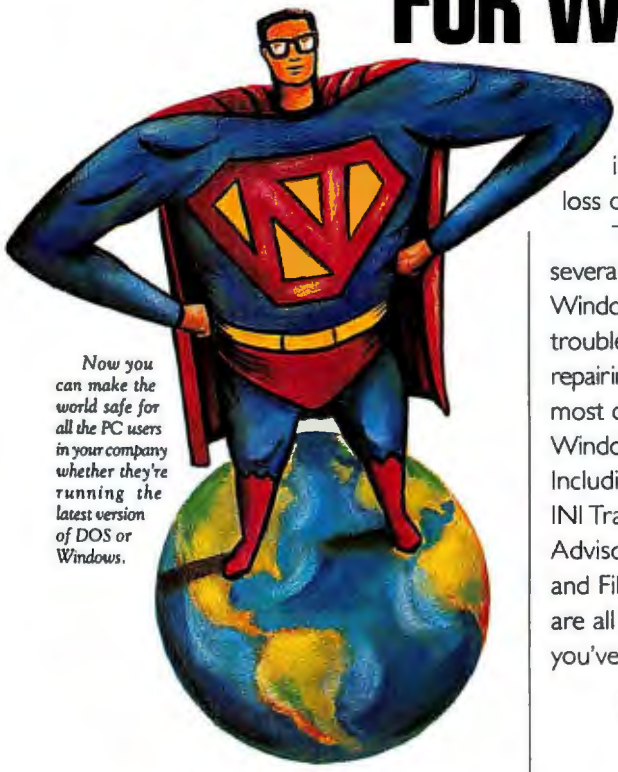

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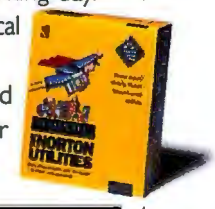

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Reliability, Service, and Support: The Value Equation

MICHELE CLEMENT

When PCs fail, whether in the office or the home, jobs and home work get harder, and entertainment is confined to noninteractive media. Is it any wonder *PC World* readers list reliability as the single most important attribute of a PC, with service and support rivaling performance and price for second place?

Since October 1993 you've been filling out the fax survey known as the Reliability and Service Monitor. This month's special report on reliability and service, written by Daniel Tynan, Christina Wood, and Anita Amirrezvani, presents an analysis of 45,000 reader responses as well as a report on our visits to several major PC vendors to observe their reliability testing operations. Naturally, we checked to see whether the testing efforts we observed at vendor sites correlate with the results of our reader survey.

We think the report makes fascinating reading. It identifies the leaders in reliability and, separately, the leaders in service and support—and finds they're not always the same. Moreover, the survey results show that there's more than one way to satisfy the overall value equation—or to fail to do so. Some companies produce reliable machines yet bungle service when failures do occur. Other companies experience a relatively high incidence of system failures yet fix problems so effectively that customers end up happy and loyal. A few companies excel at providing both reliability and service—and yes, some companies flunk in both categories but still hope to sell you a PC in today's ultracompetitive market.

Our special report generates a combined rating of reliability, service, and support that is, we believe, an excellent indicator of the companies that do the best overall job of keeping their computers working with minimal hassle to their customers.

Other highlights of this special report:

- The investment in reliability testing yields PCs that are more reliable.
- Buyers of the most reliable PCs are not necessarily the most satisfied customers or the ones most likely to buy from the same vendor again.
- Some companies achieve strong overall customer satisfaction and willingness to buy again despite their low reliability ratings.
- The average turnaround time on system repairs is far longer than we expected given the central part PCs play in our businesses.
- On-site service may play a significant role in marketing, but it's a rare occurrence in the real world.

Timeliest Ratings Anywhere

Besides the advantage of incomparable breadth, our Reliability and Service Monitor provides the timeliest information on these issues available. The fax-back form in every issue of *PC World* gives you the chance to report another month of satisfaction with your system or the occurrence of a problem and its solution. (Sending in a filled-out form enters you in a drawing for a dazzling new PC; check out this month's form on page 172.) As a result of this constant collection of fresh data, we can note and report improvements and deteriorations in a company's service far more quickly than anyone else, keeping *PC World* readers the best informed in the world on a critical buying decision. *PC World* will soon introduce a monthly update on the latest trends in reliability, service, and support.

Reliability, Service in the PC World Top 20

PC World's monthly reviews of PCs, the Top 20, now fully take into account the data gathered through the Reliability and Service Monitor. In rating every PC, we weight reliability as one factor and service and support as another. Note, however, that the reliability and service-and-support ratings used in ranking the Top 20 do adjust for policy changes by PC vendors. For example, if a company with a credible record in service and support extends its warranty from one year to three, we boost the service-and-support rating used to rank its PC. Historical performance as reported by our readers is still the dominant factor in service-and-support ratings.

Our report shows that a few companies excel at both reliability and service—and yes, some companies flunk both.

You'll see further proof of the Top 20's timeliness in this issue. Note the DX4 systems mingling with Pentiums and DX2s—and the comprehensive comparisons of overall value. Several Pentium-90s have arrived in the PC World Test Center and will likely find places in the Top 20 in our next issues.

The SX2-50s covered in *Top of the News* this month will also be competing for places in the Budget Desktops Top 20 in coming months.

Upgrade Your PC and Software

If the disk capacity of your current PC is cramping your style, be sure to read the buyers' guide to hard disks, "Big Hard Drives: 300MB and Counting." If you still can't fit your favorite programs into available RAM, read the comparison of MS-DOS 6.2's memory management with alternatives offered by third-party programs and other DOSes.

Phil Lemmons

Phil Lemmons, Editor in Chief

Mike, Eaton Town, NJ

Lisa, New York, NY

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was 30 minutes.
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Sharon, Poway, CA

Dan, Buffalo, NY

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Circle 42 on reader service card

Support Fallout, Platform Partisans, CDs With the Right Stuff

Domino Effect

Your article "The End of Free Support" [March] tells only part of the story. Since the major software makers charge for tech support, why should users go to them when they can go to any number of third-party helpers and get the same answers for lower fees?

As software gobbles up more and more RAM and programs become increasingly complex, the decision of software makers to charge for support will spawn a whole new industry of third-party software advisers. Many won't know or care if the caller is a registered user, so a new wave of piracy will flourish. This will result in decreased earnings for the major companies, who will be forced to raise prices to compensate for their wrong decision, which in turn will lead to a lower volume of sales because of the artificially boosted prices. It's a classic case of corporate stupidity.
Edward E. Davis,
Owings Mills, Maryland

Function Over Form

With regard to "The End of Free Support," I'll concede tech support is costly for manufacturers. However, it's costly for consumers to purchase a flawed, immature product. We've already paid for the product; now we're supposed to field-test it to find bugs that the maker considers "acceptable."

I'm tired of packaging and advertising that make wildly optimistic claims regarding system requirements and ease of use. I'm also tired of programs that need twice as much RAM as indicated to operate adequately.

Let's make a deal: Customers will pay for support after 30 days if companies let us return products directly to them within 30 days if we're not completely satisfied. For a full refund, that is, including tax, shipping, and handling.

We want function, not form; reliability, not icons. PC users are a lot more sophisticated than we used to be. We do read the manuals. Get it right, or we'll find a manufacturer who does.
Ken Cavaliere-Klick, Astoria, New York

A Better Band-Aid

This is the first time I have written to any magazine about anything. However, I must respond to the letter from Richard B. Greenfield ["OS/2 Redemption," April].

Though Windows is a Band-Aid for the antique DOS, it is better than OS/2. OS/2 has had seven years to prove itself, and it has failed miserably. I recently purchased OS/2 for Windows, installed it, and immediately started experiencing problems. I have a 486 with 9MB of RAM (which should be fast enough), yet OS/2 took forever to boot—when it booted at all. I experienced numerous abortive starts because the desktop failed to appear.

After several long waits while I attempted to secure help from IBM, I decided to delete OS/2 from my computer and went back—fat, dumb, and happy—to DOS and Windows.
Tony Jackson,
Cherryville, North Carolina

IBM Comeback

Unlike Alan Warren ["Playing by the Rules," *Letters*, March], I applaud heartily when "someone in the computer press jumps on the IBM-Apple bandwagon." It's about time. IBM has suffered enough undeserved bad press in the past several years, and I find it refreshing to read accolades for Big Blue.

IBM's high prices were necessary to support the huge overhead that it carried. When you bought an IBM system, you bought the system engineers, the research and development, and the vast resources that IBM had at its disposal.

Had IBM not wanted to play by the free-market rules, it could have made its PC technology proprietary—and the PC world would be drastically different.

The IBM-Apple alliance is not an act of desperation but instead demonstrates good business sense. IBM is finally listening to the market forces, and we, the customers, will ultimately benefit.
David J. Mecozzi,
Rancho Cucamonga, California

The Windy Operating System

Microsoft expects to ship its long-awaited Chicago operating system, a successor to Windows 3.1, by the end of 1994 ["Building the Future of Windows," *Top of the News*, March].

The company has also announced that even familiar operations, such as activating programs by clicking on a symbol twice with a mouse, appear to be beyond many consumers. Microsoft therefore plans to introduce a much simpler interface for Windows that will use a single mouse click to activate programs. Computers targeting first-time users will default to this interface. For users upgrading from Windows 3.1, Chicago can be set to offer the familiar configuration of features.

What all this means is that we'll have

two distinct levels of computer users, those who use the system standard in offices across the country, and those who use a cartoon-based interface—to put it bluntly, Windows for morons.

Microsoft says this approach will increase its penetration of the home PC market. It seems to me that by offering the public the choice of the lowest common denominator, software companies are creating a group of haves and have-nots—those who will be able to go out and operate a computer in a normal corporate environment and those who will be left behind in kiddieland.

Gerry House-Peters,
San Juan Capistrano, California

Get a Mac

I wonder why anyone would tolerate the dinosaur that is DOS, or the clunky Windows Band-Aid on top of it. After all, in March's *Letters*, Alan Warren concedes that if Apple had licensed its OS for Intel platforms, Windows would not even exist. Having tried both, I couldn't agree more: Apple's OS is simpler, and it's more elegant, intuitive, and sensible. When Malcolm H. Battles says he is stuck with DOS and Windows ["Flimsy Support," *Letters*, March], I wonder how much happier and more productive he might be if he used a Mac.

As for Warren's complaint that Apple, IBM, and Motorola have kept prices artificially high, I see no real basis for that deduction. A better product can command a higher price. In 1993, Apple sold 2,086,000 units—more than any other vendor. More than IBM. More than Compaq. More than Dell. The simple fact is that Apple is reducing prices because it has traditionally been underpriced by lesser companies.

Apple, IBM, and Motorola have thrown down the gauntlet, and Intel will find out the hard way that the PowerPC will outperform the Pentium and be priced more competitively. Now that the shoe is on the other foot, Intel and its legion of CISC-based dependents will become desperate.

Tom Reynolds, Alpena, Michigan

Building a Good CD

Cathryn Baskin asks for readers' opinions about whether and how *PC World* should take to CD ROM [*In This Issue*, March].

I suggest *PC World* be published quarterly on CD and be reasonably priced so it's worth buying in addition to the printed version. A yearly CD release would be great for searching and archiving the past year's issues. *PC World* on CD should contain all the text and code of the paper version and include a sophisticated search-and-query capability. Multimedia enhancements would be welcome when appropriate. Also, provide an uninstall utility to remove software demos the CD installed on the hard disk.

Whatever you do, please don't let the CD version eat up too much hard drive space. The biggest turnoff is when CDs crowd my Windows directory and INI files with junk that I don't want to keep around.

Ivan M. Olarte, PC World Online

CD Price Point

One useful feature of *PC World* on CD ROM would be hypertext for data retrieval. Hypertext would greatly speed searches and enhance research capabilities.

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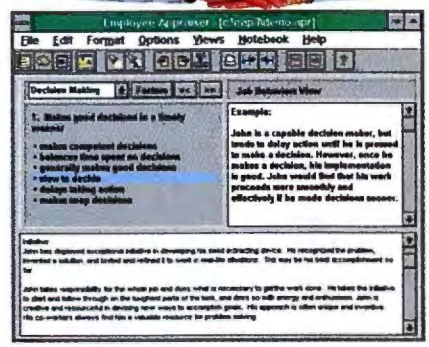

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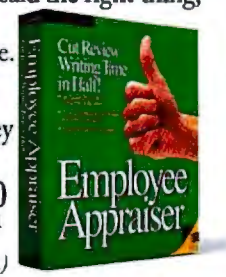

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Generally, I find CD software demos so lacking in capabilities that they are really nothing more than ads. On the other hand, demos of tips and techniques from *Here's How* columns would be a good addition.

The question is, How much would all this cost? If the CD cost a little more than a regular subscription, it would be acceptable. Otherwise, I doubt you'll have general users like me clamoring for the new media.

One additional thought: What consideration is being given to recycling used or obsolete disks in the interest of living a slightly greener life?

Randy Nordhagen, PC World Online

Editor response: We received a number of thoughtful responses from our readers on this topic. Your valuable input will help us shape the forthcoming CD ROM edition of *PC World*. Thanks for your assistance, and look for the inaugural issue this fall. *—Russell Glitman*

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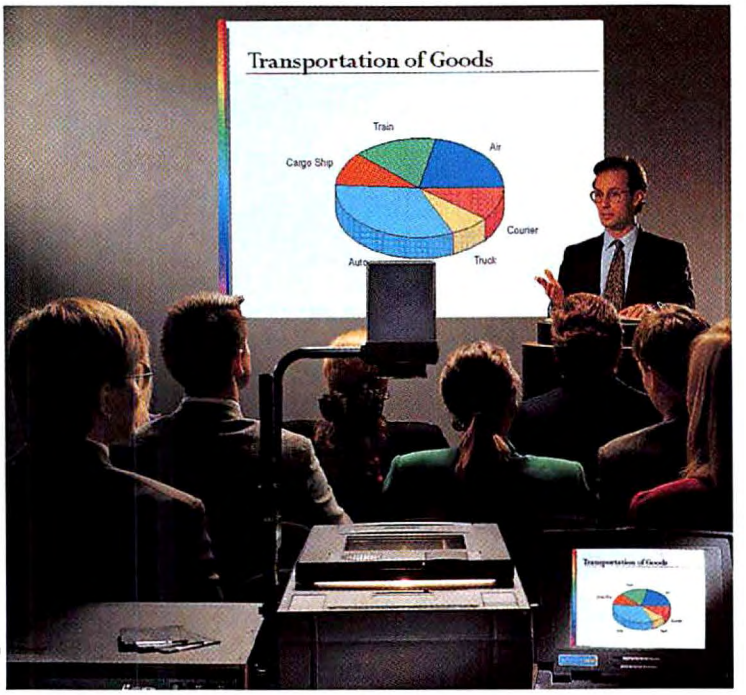

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Circle 176 on reader service card

Beta Tester's Two Cents

I enjoyed "Are You Being Used to Test Software?" [*Top of the News*, February]. I agree that too many upgrades use customers as guinea pigs. I do, however, have to defend some corporations that go to great lengths to ensure customer satisfaction.

One such company, My Software, was very interested in my observations about the beta of its product and corrected the bugs I found. I participated in America Online's test of My Software's WAOL 1.1; AOL excelled in support during the tests and responded quickly to my concerns. I just beta-tested a tape backup unit under nondisclosure, and again was impressed with the company's efforts to resolve and document conflicts I encountered.

While some companies push products out the door too soon, they're still the exception rather than the rule.

Ross Pfaff, PC World Online

What Do Laptop Users Really Want?

PC manufacturers are making a mistake when they concentrate all their efforts on making the smallest portable computer possible. Yes, it is convenient to have a laptop that weighs less than 4 pounds and fits in a briefcase, but many consumers want larger portables with full-size keyboards, dual disk drives, big hard disks, larger power supplies, more expansion slots and drive bays, and Pentiums—something similar to the 20-pound lunch-box designs of ten years ago.

These consumers would opt for large portables over less expensive desktop computers because their office space is limited, they want some portability, and they do not want to sit inches away from the radiation emitted from cathode-ray-tube screens.

Edward L. Grieger III, Richmond, Indiana

Bundle Those Tutorials

Am I the only one who thinks it peculiar that Microsoft, a company responsible for some of the most popular software on the market, also has a division that publishes tutorials for its programs as well as for those of many of its competitors?

Why aren't these tutorials included with the programs in the first place? There is no question in my mind that millions of Windows users barely understand the rudiments of the environment.

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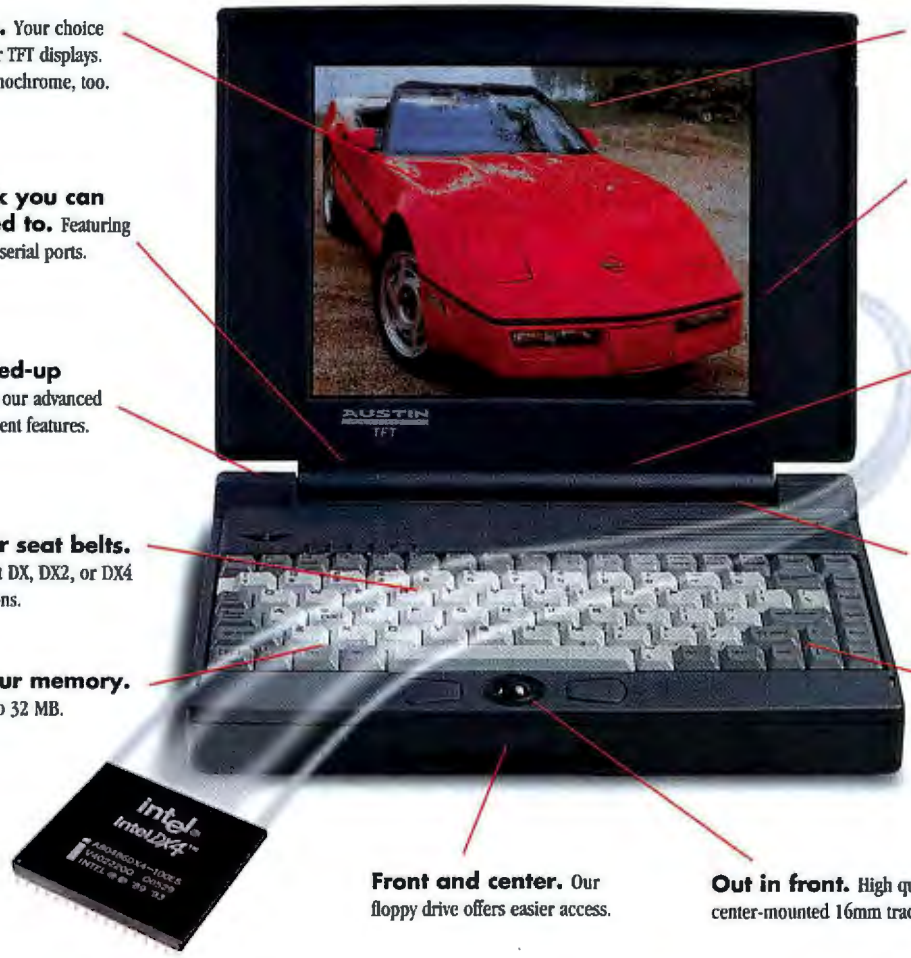

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tence depends on the failure of software companies to go beyond barely adequate documentation. Cybex, Que, and Peachpit Press have all been smart enough to capitalize on the inadequacy of the documentation that's offered by the major software makers.

Why does this trend bother me? First, it forces millions of PC owners to spend $20 or $30 to get the information they need in a usable form—information that, when included in a program's manuals, is frequently incomprehensible to new and even to experienced users. Second, it encourages software piracy. If you can get hold of a software package's disks, all you need to do is pick up a tutorial at a bookstore.

What's the answer? It's easy. Software publishers could contact the authors of such books and offer to publish them. They could include a copy of the book with every software package, either as a separate tutorial or incorporated into the manual. The author could be paid the same royalty a trade-book publisher would pay. That royalty—$2 or $3 per copy—is a drop in the bucket, considering that many applications sell for hundreds of dollars.

Ray Le Fontaine, South Boston, Virginia

Corrections and Clarifications

"IBM Offers a Better Way to Surf the Net" (*New Products*, March) said that Internet is a network of UNIX networks. In fact, Internet links many other types of networks as well, including VMS, CMS, and Apple.

April's *Communications* stated that Prodigy users cannot send or receive E-mail via Internet. This was true when *PC World* went to press, but since then Prodigy has linked up with Internet. You can now send E-mail to Prodigy users by using the syntax *Prodigy user ID*@prodigy.com on Internet.

Due to an editing error in April's *Hardware*, the item "Floppies Fast and Loose" both misstated reader Ed Bartkus's question and gave an incorrect answer. Mr. Bartkus originally asked whether there was a way to get a standard 1.44MB floppy drive to read a 3½-inch 720K disk that has been formatted to 1.44MB by a PS/2, other than punching an extra hole in the disk's plastic sheath. The answer, unfortunately, is no.

PC World regrets the errors.

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

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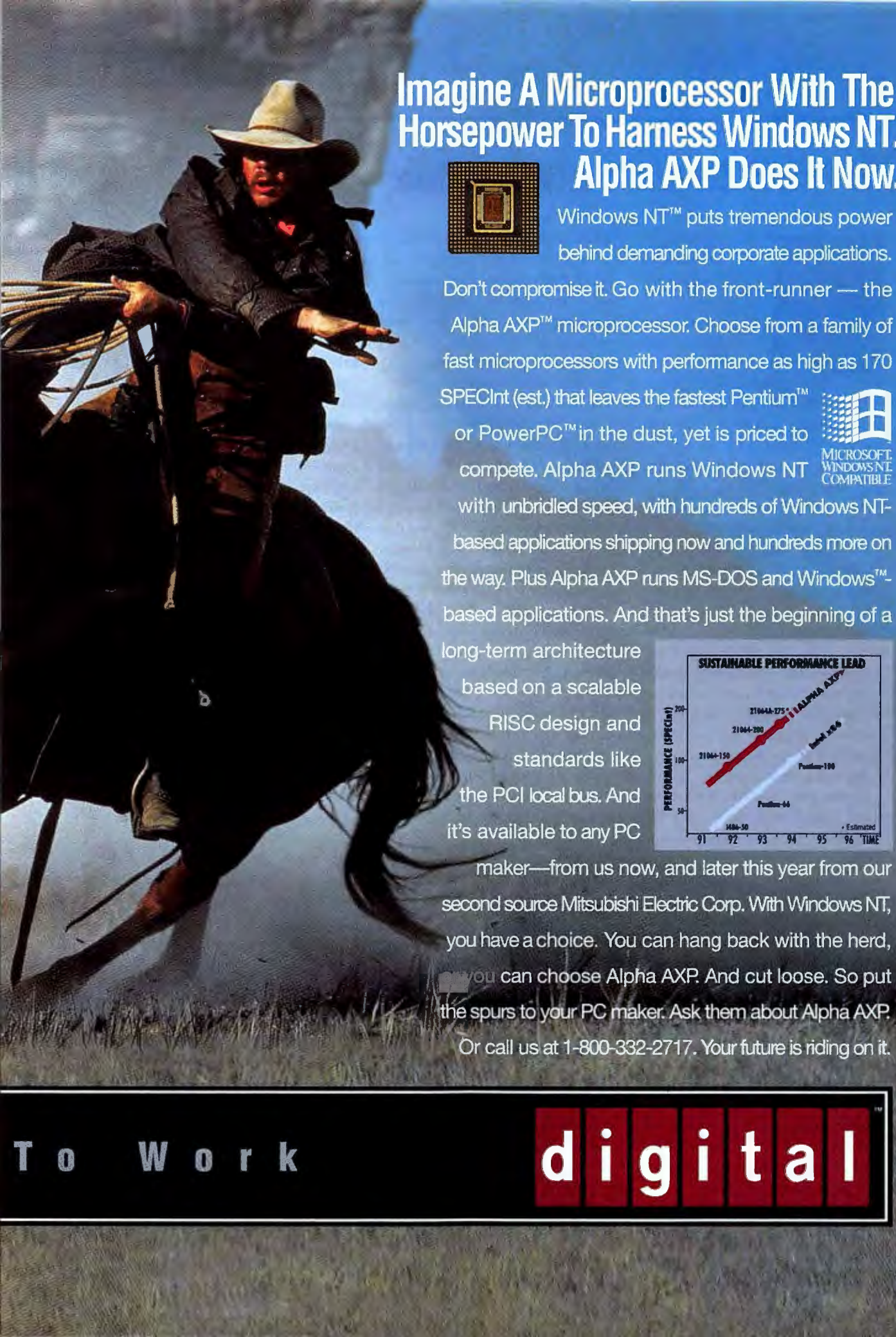

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The Personal Computer's Rocky Road Home

Larry Shapiro is like thousands of other consumers captivated by the idea of owning a personal computer. A sales manager in Coral Springs, Florida, and father of four, Shapiro had been toying with the idea of buying a PC for months. Then last December he decided to take the plunge.

Shapiro describes himself as "the typical person buying a PC for the first time: college educated and not too technically savvy." Knowing he was going to shell out a couple thousand dollars for the computer, he spent a few months researching his purchase, then narrowed his choices to IBM or Compaq, despite the added cost. "I decided to go with a brand name instead of Packard Bell, Acer, Zeos, or Ambra. I figured for a higher price I'd get better service and higher quality."

But Shapiro figured wrong.

He first bought an IBM PS/1 Expert, which turned out to have a bad CD ROM drive. No problem, he thought; he took it back to CompUSA and got a new unit. But the second system had a similar problem. "I called IBM and was on the phone with a tech in five minutes," says Shapiro (he has nothing but praise for IBM's tech support department). Diagnostic tests confirmed it was another CD ROM failure. "The tech said he could tell me how to take the thing apart, but I said no way," recalls Shapiro, who packed the unit up and headed back to CompUSA.

So much for IBM.

After explaining the problem to the CompUSA staff (and declining a third IBM unit), Shapiro took the store manager up on an offer to trade in his PS/1 Expert for a Compaq Presario 833 CDS, a CD ROM–equipped 486SX-33. "It was $300 more, but they ate the difference, had the new computer delivered to my house the next day, and even threw in Compton's Multimedia Encyclopedia," says Shapiro, who gives the CompUSA staff high marks.

But Shapiro's troubles had just begun. "The problems started the day I set up the computer," he recalls. "I was trying to install Compton's CD and I ran into problems." Neither the PC's nor the encyclopedia's installation instructions were any help, so he called Compaq's tech support—or tried to. During that first call, he sat on hold for 40 minutes, then hung up in disgust. Over the next four days he logged nearly 85 phone calls to Compaq but never reached anyone in the department. Finally, in frustration, he called Compaq's executive offices and got through to a receptionist, who helped him figure out how to get the CD working. The next day someone from tech support called back.

A few days later Shapiro ran into another problem and was again unable to get through to Compaq's tech support. In desperation he called the CompUSA tech department, but the staff was unable to help and suggested he call Compaq's area sales representative. He did—six times—and never got a call back.

Return to Sender

Again, he packed up his new PC and returned it to CompUSA; this time he got his money back. That was two months ago, and Shapiro still hasn't bought another PC. He's doing more homework, focusing this time on who's got the best service. So far, he's called the Zeos, AT&T, Acer, and Hewlett-Packard tech support lines. "I'm going to see how long it takes to get through *before* I make a purchase," he explains.

Compaq is well aware of its tech support delays—which are due in large part to the phenomenal success of the Presario (the company's best-selling PC ever). Compaq has been adding staff for months. But the company's phone system doesn't help matters—callers can't leave a message or find out how long they'll wait before their call will be answered. Instead, they sit on hold, with an occasional message that says the

By Roberta Furger

ROBERT HOLMGREN

KEEPING UP

Looking for more information about computer-related health and safety issues, from repetitive strain injuries to eye problems? Two new resources will answer many of your questions and provide valuable reference material. The first is *A Guide to Healthy Computing*, a 16-page booklet from *PC World* that focuses on eyestrain and ergonomic issues, and includes tips for setting up a workstation and establishing good work habits. The cost is $1.95 including shipping and handling. Volume discounts are available. The booklet is available through *PC World*'s Exec Direct on CompuServe (type GO PWOSHOP). If you don't have access to CompuServe, you can obtain copies by sending a check or money order to *PC World* Circulation Department, attention: Healthy Computing Guide, 501 Second St. #600, San Francisco, CA 94107 (no calls, please)... *Zap! How Your Computer Can Hurt You—and What You Can Do About It*, a new book by Don Seller, offers a wealth of information and advice on a number of computer-related health and safety issues. This informative volume also contains a very useful resource chapter. *Zap* is published by Peachpit Press of Berkeley, California (800/283-9444), and sells for $12.95.

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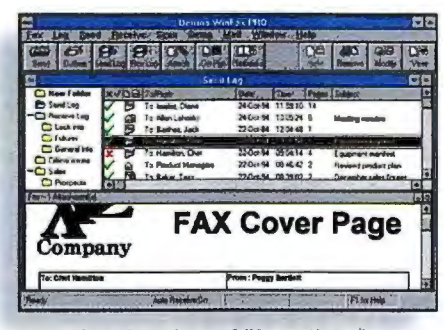

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- CHIP Magazine, Germany, March, 1994

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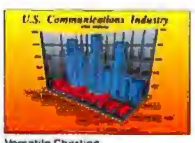

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BUG WATCH

WordPerfect 6.0 for Windows

WordPerfect 6.0 for Windows may give you a puzzling message when you print if you work with custom paper sizes. The problem occurs when you use a Windows printer driver and switch from a custom paper size back to standard size. WordPerfect may prompt you to manually feed the paper even though the standard page form should feed automatically.

As a work-around, WordPerfect Corporation suggests using a WordPerfect printer driver (select *File • Select Printer • Add Printer • WordPerfect*) or resetting the default page form to letter size.

To reset the page form, select *Layout • Document • Initial Codes Style;* in the Styles Editor dialog box, choose *Layout • Page • Paper Size;* in the Paper Size dialog box, select *Letter* from the Paper Definitions list and click *Select;* then click *OK* to close the Styles Editor dialog box.

WordPerfect will fix the problem in an interim release due out by the time you read this. Licensed WordPerfect 6.0 for Windows users can obtain the release by calling WordPerfect's order line.
WordPerfect Corp.
800/321-4566

Microsoft Excel 4.0 and 5.0

A little Microsoft humor? In Excel 4.0 or 5.0, if you name any file STARTREK.XLS and store it in the main Excel program directory, it will open automatically every time you launch Excel (just as if it were in the XLSTART directory). While entertaining for "Star Trek" fans, this could be frustrating if you don't want the file to open every time you use Excel.

–Shane Rau

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.

Shane Rau is assistant technical editor for PC World.

delay is the result of high sales volume.

"Twenty-four-hour tech support sounded great," says Shapiro, "but they're advertising a service they can't perform."

Compaq isn't the only PC company struggling to meet the needs of first-time buyers. So far, none of the companies leading the charge into the consumer market have managed to find the right mix of hardware that's simple to set up and use, and tech support that's accessible and responsive.

The problem is largely one of false expectations. Contrary to marketing claims, PCs still aren't intuitive or easy to use. Certainly, the installation materials packed with many PCs have simplified setup—Shapiro says that's one area both IBM and Compaq got right: "It only took me 15 minutes to set up my new computers." But when it comes to installing software or CDs, or troubleshooting problems, first-time owners are often left scratching their heads and waiting for a return phone call from their PC company.

The result is a lot of frustrated and angry consumers, not all of whom are as determined as Shapiro to keep at it until they find a PC that meets their needs.

In fact, when it comes to service, Shapiro thinks PC companies trying to sell to first-time buyers are in for a rude awakening. "There's going to be a major consumer backlash on this thing," he says. "Wait until all these tens of thousands of consumers find out what's in store for them; they are going to return their PCs discouraged and take themselves right out of the market."

Is anyone out there listening?

Shop Talk

Laptop Ate My Paycheck

In May 1993 I bought a notebook computer and accessories, totaling nearly $5200, by mail from U.S. Systems and Technologies in Irvine, California. When I placed my order, I was told that if I wasn't satisfied with the unit, I could return it within ten days. I sent the computer back within the allotted time frame. But more than six months later, despite many phone calls, U.S. Systems still refuses to send me a refund. The company won't even return my phone calls.

Tom Lent, San Francisco

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Editor's note: Bob Bearden, president of U.S. Systems and Technologies, told us he'll issue a refund—as long as Lent pays a 10 percent restocking fee and all shipping charges. Lent learned the expensive way (paying over $500 for ten days' use of a laptop) that so-called money-back guarantees aren't always what they seem—particularly if the equipment that you're returning is not defective.

When U.S. Systems shipped Lent the computer, the unit included a Warranty and Guarantee of Excellence that explains the restocking fee. Unfortunately, that was too late—he already had the computer.

If you're purchasing through the mail, ask whether there's a restocking fee and who pays the shipping charges (these can get quite expensive for computer equipment). Many firms offer money-back guarantees to take the fear out of buying your PC through the mail—some even pay for the shipping charges both ways.

Used by the Professor?

Despite the best efforts of magazines like *PC World*, major retailers continue to resell used software.

I recently purchased the Stacker 4.0 upgrade from Egghead Software in Silver Spring, Maryland. Since I started reading this column I've been careful, but the shrink wrap on the package matched that of the other ten on the shelf. While reading the manual, I noticed that the software envelope was open. But I just thought I'd forgotten I opened it.

I installed the software on my computer, only to discover that it was previously registered to "Professor Egghead." This is the name used for software on the demo computer in the store.

Jim Schmidt, College Park, Maryland

Editor's note: In our March 1993 article "Is Your New Software Secondhand?" we found that many retailers regularly rewrap and resell returned software. But Egghead stores fared well in our investigation. In fact, according to Mike Durbin, Egghead's manager of support services, Egghead has a strong company policy against rewrapping software. "There's no monetary advantage to rewrapping because we get the money back from our publishers. It would only cheat the customer."

Tom O'Donnell, manager of the Silver Spring store, says he "can't imagine" how Schmidt bought rewrapped goods. "I just take the software that comes back, put a 'defective' sticker on it, and return it to the manufacturer," he explains.

Currently, Egghead's policy is to accept unopened software packages for return or exchange within 30 days, with a receipt. But if you open the package and want to return it because you feel it's defective, you can only exchange it for the same title, and you have to include the entire package: box, contents, and registration card.

Good Service Under Chapter 11

I purchased a Wang computer after the company filed for Chapter 11. As many people know, Wang no longer makes PCs but has shifted to selling network and integration software [the company has since emerged from Chapter 11]. Although my Wang PC isn't state of the art, it has been a wonderful computer.

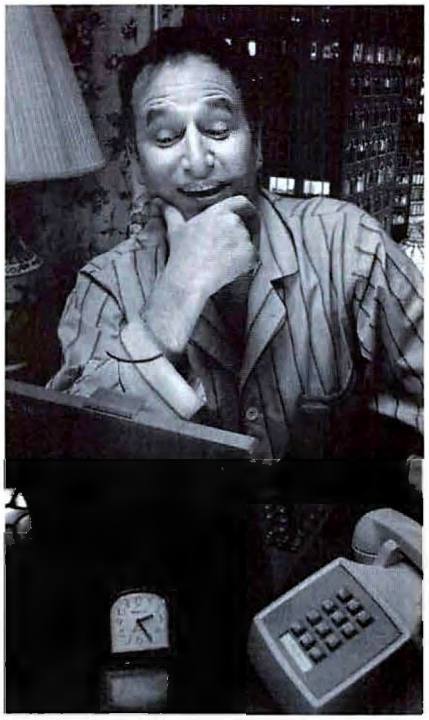
What impresses me, though, is that Wang has never let down its commitment to customer service. I have yet to wait more than a couple of minutes when I call the company's toll-free number for help. On one occasion, no customer service technician was available. However, in less than a minute someone was on the line getting my name and number. The next morning a technician returned my call.

Just recently I purchased a sound card that conflicted with my scanner. After calling the sound card company and waiting upward of 15 minutes (a toll call), I called Wang's toll-free number. The service technician worked with me for about 20 minutes to resolve a problem that wasn't even Wang's fault. Boy, was I ever impressed. The other guys? A week has passed, and I still haven't heard from them.

When it comes time to purchase my next computer, I wish it could be a Wang. If I were in charge of setting up my company's network, I'd give Wang a call.

Thomas R. Steele, Haworth, Oklahoma

Shop Talk is written and researched by PC World *assistant editor Christina Wood. Think you've gotten a raw deal—or a great one?* Consumer Watch *wants to hear the details. We'll investigate complaints and publish letters with the broadest interest (see page 12 for contact information).*



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Circle 37 on reader service card

Why Paradox is the #1 PC database for the entire corporation

From marketing to R & D, from finance to sales, and from the executive suite to the warehouse . . . more users get more productivity out of Paradox® than any other PC database. It has become the #1 choice for a corporate standard because it works for people at every skill level, to accomplish any task with speed, flexibility and ease of use.

Paradox is the best Windows database

	Paradox	Access
Visual data modeling for forms and reports	Yes	No
Object-oriented development environment	Yes	No
Supports SQL pass-through	Yes	No
Built-in workgroup support	Yes	No
Complete Paradox and dBASE file support	Yes	No

Upsize to client/server with instant SQL connectivity

Paradox provides immediate connections to popular SQL servers like Borland InterBase,® Sybase/MS,® and Oracle, easily allowing you to "upsize" your PC and PC network applications to a more secure, higher performance client/server environment. So no matter how much your information grows, you'll never outgrow Paradox.

Total information access

Paradox for Windows gives you the easiest transition to the Windows environment. You get seamless access to all the most popular database formats—Paradox for DOS, dBASE,® and even FoxPro. You can use all the data available, even on a network combining DOS and Windows users. And with graphical Query By Example, getting just the information you want is quick and easy.

So whether you're keeping track of customer mailings, or managing vast worldwide inventories, Paradox makes it easier to access, manage, and present information for users at every level, on every project.

Discover the database that has corporations everywhere on the *grow*. Get Paradox for Windows today.

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Paradox for Windows May 11, 1993

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Circle 63 on reader service card

A Win-Win Strategy

As computers become ubiquitous, employees who know how to use them become increasingly valuable. But what do you do if employees are hesitant to learn new technology? This month Bob Cerny, manager of Client Services at Elkay Manufacturing Company, a manufacturer of kitchen equipment in Oak Brook, Illinois, describes how his company's computer purchasing program gives workers a real incentive to hone their on-the-job skills. —*Ed.*

The Need for Training

To most readers of this magazine, working with a PC is old hat. But to an assembly-line worker with no technical knowledge, a shiny new 486 can be a frightening harbinger of a pink slip. Even when an employee's job isn't threatened by the computer, a worker can still be resistant to learning a complicated, unfamiliar tool.

In our firm, the majority of our 2400 employees never touch a computer. But we do have several hundred plant managers, office administrators, and others who have PCs on their desks and are familiar with applications such as 1-2-3, Excel, or WordPerfect, in addition to a mainframe emulation program.

Many of our office workers get befuddled when making a backup, don't have the foggiest notion how a hard drive works, and are stumped by Windows' File Manager. This lack of knowledge about hardware and software affects productivity and costs us roughly $200,000 a year for technical support.

Although a minority of our employees currently use PCs, our company believes computer skills will become increasingly important for all segments of our work force. An assembly-line worker who knows how to use a PC is ultimately more valuable to the company than an employee without that skill.

Employees, too, are aware of the growing importance of computer skills; nearly a quarter of them have expressed an interest in owning a PC. Not only would they be able to work from home when necessary, other family members would find the PC a valuable tool.

Confronting the Issue

In 1992, our management decided to offer an incentive program that would help employees buy a PC of their own and increase their computer skills. We thought that if they had a computer at home, they would have an incentive to learn, making them more of an asset to the company.

We had a few concerns: We didn't want to establish a program that would increase the burden on the technical support department or add a lot of accounting paperwork. And we wanted to ensure that employees would purchase the kind of hardware and software that would support their on-the-job skills without hurting their pocketbooks.

We also needed to address the issue of standards. It would have been a bad idea to sell employees outdated 286s—we didn't want them learning DOS at home while the company shifted to Windows. We wanted to encourage them to buy the same up-to-date 486 PCs equipped with Windows that were standard in our company.

While we were undergoing these deliberations, we discovered that our primary PC vendors, Dell and Hewlett-Packard, had employee purchase programs that offered the same corporate discounts to individual employees as they offered employers. These programs also included technical support—through a toll-free number—work or home delivery, and free on-site service. And here was the best part: Participation in these programs cost us nothing.

Bob Cerny is manager of Client Services at Elkay Manufacturing Company in Oak Brook, Illinois.

How It Works

Financing the program is simple. We offer employees an interest-free loan to buy a new Dell or Hewlett-Packard PC. To give them impetus to learn how to use the PC, we ask them to put 25 percent down at the outset. We pay the computer manufacturer on delivery and collect a monthly payment from the employee for a period of up to 24 months. For example, a computer that costs $1300 requires a minimum down payment of $325 and a monthly payment of $46. (The program works the same way as our other equipment-purchase programs, so the extra work for our accounts receivable department is minimal.) Employees who are interested in the program are encouraged to consult the technical support depart-

ILENE EHRLICH

ment for advice on what to buy.

Of course, the program also comes with a set of compliance rules, which we stipulate in a formal document distributed to all employees. The rules tell employees that the program supports only hardware and software purchased through Dell or Hewlett-Packard, and employees are to call the vendor directly for technical support. If a problem arises that the vendor can't solve, we'll help, but support is primarily the vendor's responsibility.

Another rule covers termination: If employees leave the company, they agree to pay for the equipment in full before their final day of work. Anyone who wants to return a computer has 30 days from the date of delivery to do so. We also require that participants have worked for the company for at least 60 days.

Good for Everyone

Nearly two dozen employees have taken advantage of the program since its inception in mid-1992, and more are expressing interest all the time. The program has made it easier for some to work at home, which pays off in productivity when employees need to be away.

Some workers have significantly improved their skills by computing at home, just as the program intended. A plant employee who'd never touched a PC before bought a computer and learned 1-2-3 at home. In other cases, employees for whom the PC was just a piece of dust-gathering iron underwent a big change in attitude. Data administrators who had used only the mainframe previously—even though they had PCs on their desks—are no longer afraid to use the PC. Many of them learned to use Word for Windows at home and are now old hands at loading software, reading manuals, and working with Word for Windows.

Finally, our employee computer purchase program demonstrates our interest and concern for employees, and in turn strengthens their loyalty to the company. Best of all, it's a relatively easy way to foster goodwill.

Edited by Bronwyn Fryer

If you use PCs to manage people and other resources in a business environment, we want to hear from you. See page 12 for contact information.

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PC World and Multimedia World online

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Download the latest **shareware**, read the latest **electronic news**, receive **expert advice** on technical questions, search **back issues** of ***PC World*** and ***Multimedia World*** magazines or use a key word to locate specific **product reviews**, and try out ten **hot new software** picks each month.

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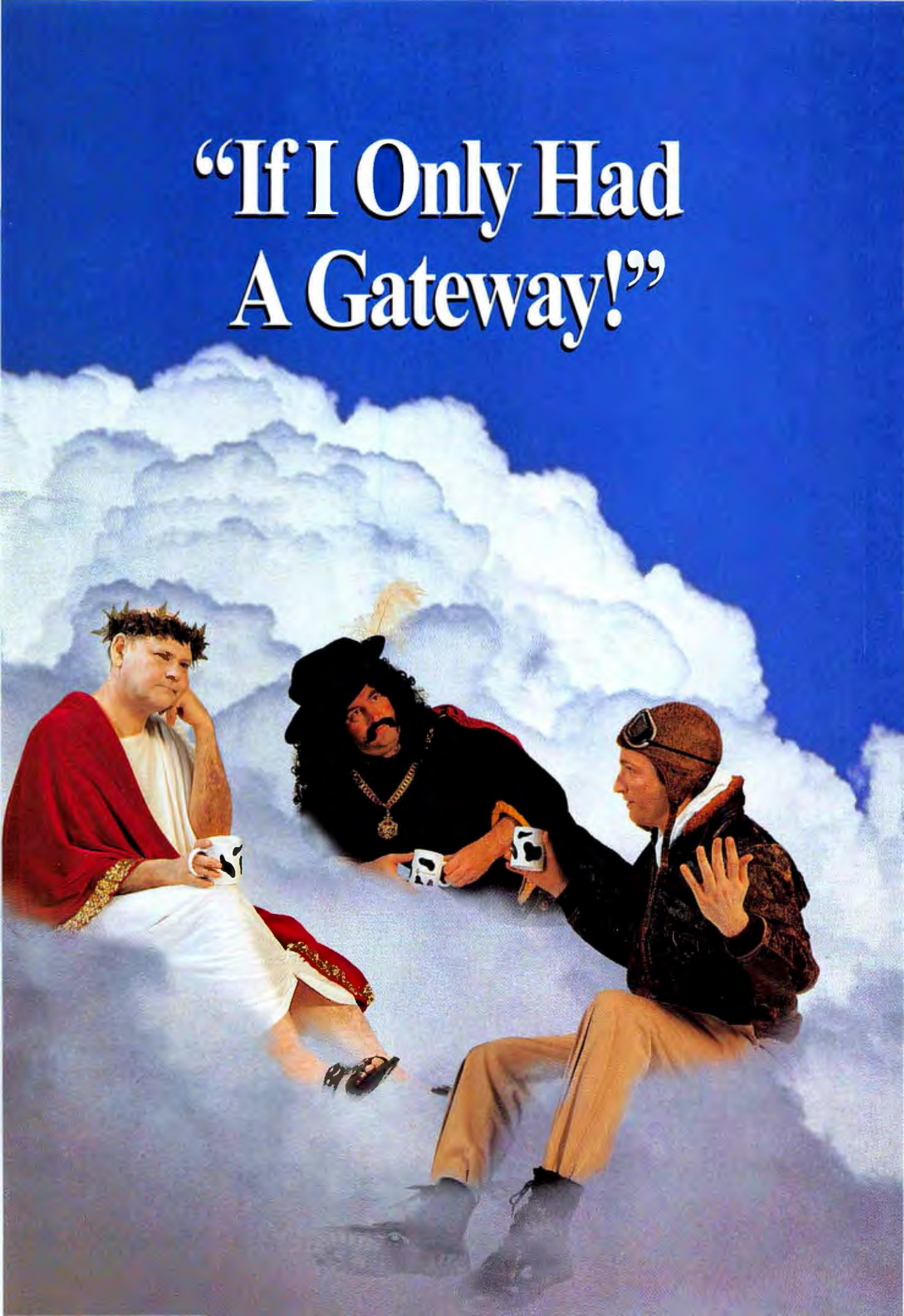
Circle 155 on reader service card

"If I Only Had A Gateway!"



There I was, eating Mama's spaghetti, when Guido and the boys come over, 'Yo Bonanno! Your tower, it'sa leanin.'

Mama-mia! What'sa matta me! That'sa last time I buy a kit from the Towers-R-Us catalog. Never get enough cement mix. So, I used my mother-in-law's linguine sauce as extra cement. Oh boya, I no like how that turned out. And that'sa last time I tell the workers we eat only after the foundation is laid!

I guess they tried to tell me the soil was bad. I thought they said the 'royal' was bad. And they were right – that King Antonio waza pretty nasty.

If I had a Gateway P5-90, I coulda designed my own tower. And it woulda been magnifico! The best tower the world ever saw.

Looka me. I coulda done so much better. It'sa too late for me and my tower. Don't you be offa plumb, and be saying like me, 'Gee, I wish I woulda had a Gateway.'

Bonanno Pisano was the chief engineer of the Tower of Pisa. Soft soil and only 10 feet of foundation caused the tower sta in 1174, to begin leaning almost immediately. Over the year efforts to halt the leaning have been futile. Bonanno was no Gateway user.

"Gateway's Pentium Architecture Would've Set Me Straight" ...Bonanno Pisano, engineer, 1174

"If I only had a Gateway!" — the anguished, rueful cry of a non-Gateway user. The lesson: Don't leave the success of *your* landmark projects to an archaic system. Get a Gateway 2000® PC and you'll have the latest technology in a high-quality PC, built to stand the tests of time. You get straightforward service and support from Gateway's knowledgeable employees. And best of all ... no regrets coming back to haunt you!

Gateway's Superstructures

Look at it from this angle. You just gotta have the most powerful PC architecture available today, right? But there's no way you want to pay skyscraper prices, true? Your solution? Gateway 2000's P5 systems! These Pentium™-based machines are designed to give you all-around monumental performance — they're some of the fastest PCs you can find today! Capice?

Based on Intel®'s Pentium processor, all P5 models include a PCI local bus and an enhanced PCI/IDE controller allowing your hard drive to transfer data *up to twice as fast* as non-enhanced IDE systems. Gateway's P5-60 and P5-66 models, and our three power-packed **90MHz** models (*starting at just $2,995*), give you a value that towers over the competition!

Gateway's P5-90 machines use Intel's super 90MHz processor for foundation-shaking power. You get a rare combination of colossal power and performance, *and* a great price. Ah, magnifico! Just look at these features: performance-boosting 540MB hard drives, 8MB or 16MB RAM, double-speed CD-ROMs, high-end graphics controllers and your choice of application software. Two 90MHz systems also include 16-bit sound cards and Yamaha speakers. Go ahead and compare. You'll see that these value-packed PCs stand unmatched.

Get all the tools to create lasting impressions with any Gateway P5 system. Mama mia — starting from only $2,495, our Pentium values are out of this world!

Classic Attractions

Our 486 PCI machines are Gateway 2000 classics built on a solid foundation of performance and value. Our new **100MHz DX4** machine, priced at $2,495, is based on the fastest 486 processor available! With the same PCI local bus as in our P5 line, all 486 PCIs will give you a great power boost. They include 8MB RAM, 540MB hard drive and a double-speed CD-ROM drive. These 33MHz, 66MHz and 100MHz systems are all upgradable to Pentium technology so you can expand in the future.

Portable Sidekick
Special Offer!

A perfect sidekick for your Gateway desktop system is the HandBook® 486 portable PC. It's just like having an extension to your desktop system! Call about our special desktop/HandBook combo today, available only at the time of desktop purchase. Having all the information you rely on, everywhere you go, has never been so easy.

Gateway's P5-90 and P5-90 Tower systems rise above the competition!

intel inside
pentium PROCESSOR

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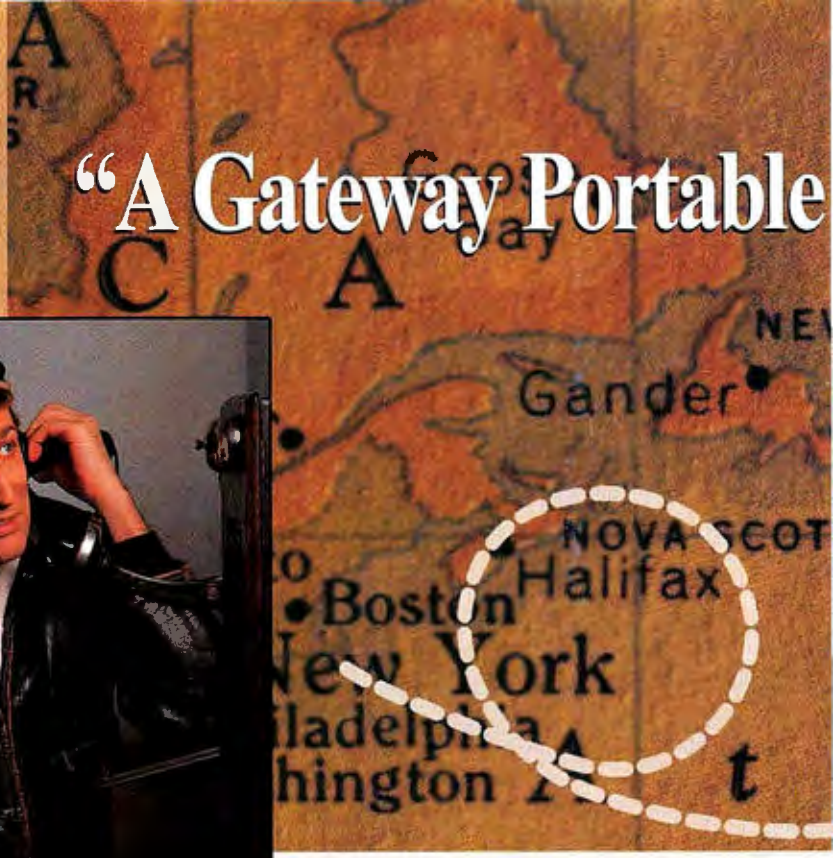


"A Gateway Portable

Heading out on another worldly expedition? Whether it's transcontinental or transatlantic, a Gateway portable PC puts you at the controls, steers you in the right direction and sends you flying!

GATEWAY2000
COLORBOOK™

Flying Machines

How can you go wrong? You can't! A Gateway 2000® ColorBook is just what you need for high-in-the-sky performance.

A portable PC with the supersonic performance of a desktop is yours with the power-packed **DX4-75MHz** ColorBook. With a 75MHz processor, you'll never want to leave the ground without it. And look, over there! No, your eyes aren't deceiving you — that's a **10.3-inch, dual-scan screen**, now on *three* ColorBook models. You won't find a screen this big, this affordable, anywhere else. It blows the competition out of the water!

All ColorBook models are based on the Intel® SL Enhanced 486 DX2 or DX4 processor and have the power and memory to run all your Windows applications. Weighing in at less than 5.7 pounds, measuring 1.77-inches thin, these portables start at $1,995 and include 120MB or 250MB hard drive, support for simultaneous video, built-in trackball,

Do you know the way to San Jose?
New York 1938. I readied my $900 airplane for the flight to California. Everyone has a hobby, right? Little did I know my obsession with refrigerator magnets would bring a dark cloud of humility down upon me.

I placed my collection of magnets all around me. Mr. Piggy on the throttle, the Morton Salt ad by the altimeter and my favorite, the Titanic, right by the compass — hundreds of magnets all over the cramped cockpit.

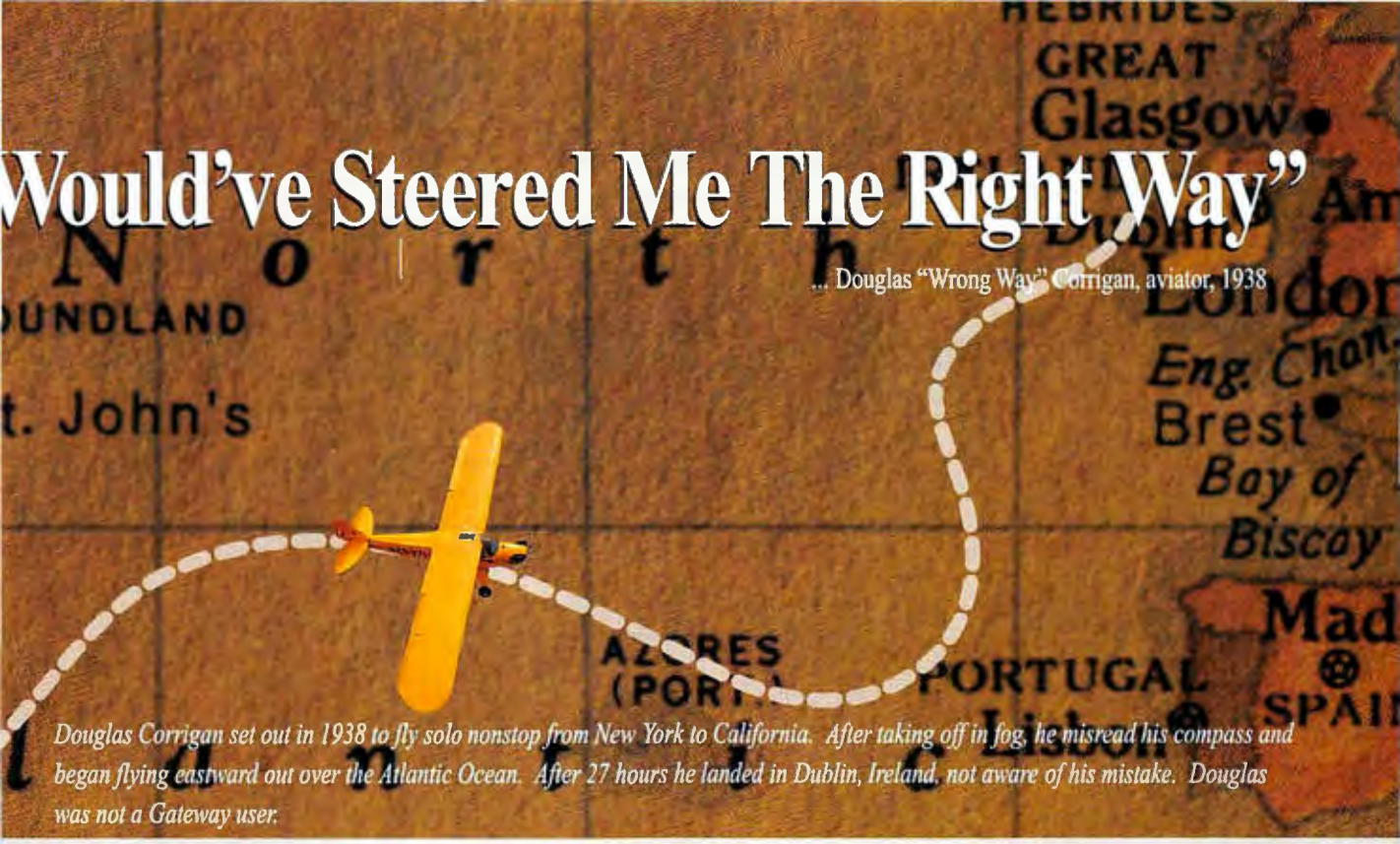
As I took off into the wild blue yonder, did I hear someone say, "Hey, Douglas, you're going the wrong way!" No, they must've said, "Have a nice day."

I'd been flying awhile when I looked down and thought – I know they're called the Great Lakes, but this is ridiculous!

Is this compass right? I whacked it a few times, some of my dashboard magnets fell on the floor. My compass went crazy until I put them back in place. Go figure. I continued on. Hey! What was that? A whale in Lake Superior?

Land greeted me after 27 hours. Where's the sun, the beaches? I only see redheads and Lucky Charms?!

Damn those refrigerator magnets! Boy was the wife steamed, "Hello, honey? Um... I'll be a little late for dinner." I wish I would've had a Gateway portable to keep me on course.



two PCMCIA Type II or one Type III slots, 256 colors running in VGA mode, excellent battery life, and a great suspend/resume feature.

You'll know you're headed in the right direction for top-flight performance when you get a Gateway ColorBook.

GATEWAY2000 4 HANDBOOK® 486

Take Flight!

It's so lightweight, you'll soar! So powerful, you'll be in awe! That's the HandBook 486 from Gateway 2000. Take flight with this compact little PC no matter where you go. Taking the world by storm with a footprint of just 9.75 inches by 5.9 inches, the HandBook 486 weighs in at (*are you sitting down?*) under three pounds! That's lighter than any Intel 486-based portable available today.

Still up in the air about the combination of portability and power? Head this way, because the HandBook 486 is a real PC and the only DX2 subnotebook found on any continent. No compromises here.

You'll get an IDE hard drive with up to 130MB, standard 4MB or 8MB RAM upgradable to 20MB, a backlit VGA screen, 78-key keyboard, EZ Point™ integrated pointer, and that terrific suspend/resume feature.

Whether you're a world traveler or an urban commuter, the Gateway 2000 ColorBook and HandBook offer you all the perks you deserve. So don't pick up the phone and go the "wrong way." Call Gateway 2000 straight-away!

intel inside

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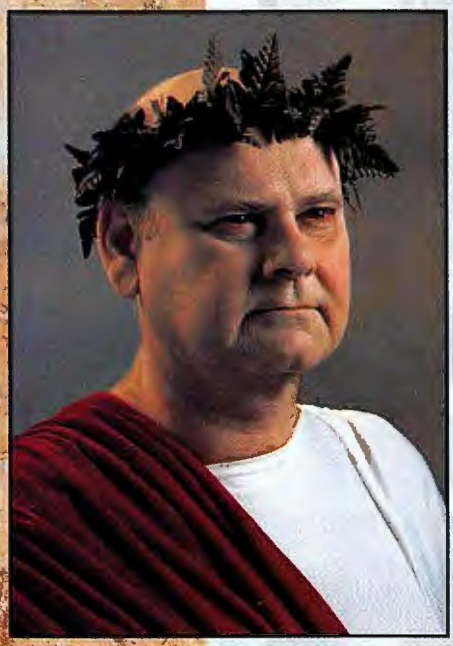
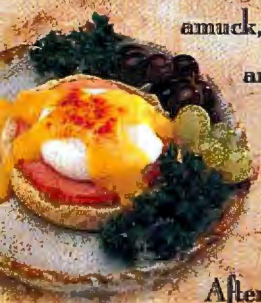
"If I Only

Ever have one of those days? I was eating my Eggs Benedict when the wife looked up and snarled, 'You're not going to hang out with those friends of yours today, are you?' What did she mean by that? These were guys in togas, they didn't have much to hide.



But even the oracle told me not to go to work, 'You shall regret the company you keep.' What did that mean? After years of running amuck, conquering empires, and going on Roman holidays together, I felt I knew these guys.



After making a stop at the V and X cent store for eucalyptus lip balm, I continued on to the Senate house. Second mistake of the day. The first was getting out of bed.

Even as my last breath passed my lips, I wondered, 'WHY?' Death at the hands of my closest friends, then a salad and one of the hottest months of the year named after me. Hardly a fitting end for a man of my stature. Just goes to show no matter how much time you spend with guys in togas, you never really know them.

Man, I wish I would've had friends in the business.

Sometimes it's hard to know who to trust, especially in the competitive PC arena. You'll find our honest, hard-working employees to be allies, supporting villages and empires alike — wherever Gateway 2000® computers are found. Our loyal customers have helped us to become a Fortune 500 company, but we're not resting on these laurels. Every Gateway 2000 employee is committed to our philosophy of providing customers with a quality product at an unbeatable value, along with the best service in the land. You have our word on it.

Service Allies

As a Gateway 2000 customer, you receive toll-free technical support for the life of your system. And with the purchase of a Gateway modem you'll get Triton's CoSession™ Host at no additional charge. CoSession Host, a remote diagnostic software,

Photo courtesy of Motion Picture & Television Photo Archive

PORTABLES

HANDBOOK® 486

- Weight: 2.94 Lbs.
- Dimensions: 9.75" x 5.9" x 1.6"
- SL Enhanced Intel® 486 or DX2 Processor
- 4MB or 8MB RAM (expands to 20MB)
- 80 to 130MB IDE Hard Drive
- 7.9" Backlit VGA Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- EZ Point™ Integrated Pointer
- 78-Key Keyboard
- Parallel, Serial & PS/2® Ports
- MS Works for Windows™ 3.0
- MS-DOS® 6.2, WFW™ 3.11 & Serial Transfer Cable

HANDBOOK 486SX-25
With 25MHz 486SX CPU, 4MB RAM and 80MB Hard Drive
$1495

HANDBOOK 486SX-25
With 25MHz 486SX CPU, 4MB RAM and 130MB Hard Drive
$1595

HANDBOOK DX2-40
With 40MHz DX2 CPU, 8MB RAM, 130MB Hard Drive, Extra NiMH Battery and Leather Carrying Case
$2295

HANDBOOK 486SX-25
With 25MHz 486SX CPU, 8MB RAM, 130MB Hard Drive and Leather Carrying Case
$1895

PORTABLE OPTIONS

Peripherals and upgrades available only with purchase of a system.

PCMCIA Cards:
- TelePath™ 14,400/14,400 fax/modem. **$249**
- 9,600/2,400 fax/modem. **$149**
- Ethernet adapter. **$149**
- Token Ring adapter. **$449**
- HandBook VGA adapter. **$229**

Batteries:
- 2.2Ah NiMH batteries. **$89**

Diskette Drive:
- HandBook external 1.44MB. **$99**

Cases:
- ColorBook **$49**, HandBook **$55**

Extended VIP Warranty:
- We'll ship a replacement within 24 hours during warranty. Point of sale only. **$100**

COLORBOOK™

- Weight: Under 5.7 Lbs.
- Dimensions: 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486, DX2 or DX4 Processors
- 4MB or 8MB RAM (expands to 8, 12 or 20MB)
- 3.5" 1.44MB Diskette Drive
- Removable 120 to 250MB IDE Drive
- 10.3" or 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II or 1 Type III Slots
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial & PS/2 Ports
- External VGA Port
- MS Works for Windows 3.0
- MS-DOS 6.2 & WFW 3.11

COLORBOOK 486SX-33
With 33MHz 486SX CPU, 4MB RAM, 120MB Hard Drive and 9.4" LCD
$1995

COLORBOOK DX2-40
With 40MHz DX2 CPU, 4MB RAM, 250MB Hard Drive and 10.3" LCD
$2495

COLORBOOK DX2-50
With 50MHz DX2 CPU, 8MB RAM, 250MB Hard Drive and 10.3" LCD
$2995

COLORBOOK PACKS

Peripherals and upgrades available only with purchase of a system.

Traveler's Packs:
- Case, extra battery & PCMCIA 9,600/2,400 fax/modem. **$279**
- Case, extra battery & PCMCIA TelePath fax/modem. **$369**

COLORBOOK DX4-75
With 75MHz DX4 CPU, 8MB RAM, 250MB Hard Drive and 10.3" LCD
$3495

SOFTWARE & EXTRAS

If a system comes with "choice of application software," choose one of the following packages:
- Microsoft Excel for Windows™
- Microsoft Word for Windows™
- Microsoft Word and Bookshelf,® CD-ROM Edition
- Microsoft PowerPoint for Windows™
- Microsoft Project for Windows™
- Microsoft Access™ for Windows
- Publisher's Pack (CD-ROM only; includes CorelDRAW 3,™ ArtShow, MS Publisher 2.0 & MS Design Pack)
- The Entrepreneur Pack (Works,™ Publisher,™ Money™ & games)
- Borland Paradox® and Quattro® Pro for Windows spreadsheet
- Borland Paradox® and C++ (CD-ROM only)

With desktop and selected portables you also get the following software and extras at no additional charge:
- MS-DOS 6.2 & Windows for Workgroups 3.11
- CoSession™ Host Remote Diagnostics (with all modems)
- QAPlus Diagnostics
- Gateway Computer Glossary
- Gateway Mouse Pad

Systems with CD-ROM drives also include:
- Gateway System CD
- On-Line User's Guide
- Gateway Mall On-Line Catalog

SERVICE

Every Gateway system is backed by:
- 30-Day Money-Back Guarantee
- One-Year Limited Warranty
- Lifetime Toll-Free Technical Support
- On-Site Service Available To Most Locations For Desktop Systems
- Lifetime BBS Membership
- FaxBack Automated Fax Service

Our money-back guarantee does not include shipping. On-site service is provided at no charge during warranty if our technicians determine it is necessary. If you'd like to read our warranty and guarantee policies, please call for a free copy.

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The Gateway 2000 Family PC™

Listen and watch legendary figures make speeches, or play interactive games, or get a jump on work from the office — all at home! For all ages, every day of the year, the Family PC from Gateway 2000 fits right into your lifestyle with full multimedia capabilities including sound, pictures, animation *and* video.

Priced from $1,495, our Family PCs are loaded with everything you need for a reference library, entertainment center and home office: double-speed CD-ROM drive, 340MB hard drive, data/fax modem, sound card, speakers, and joystick. You also get your choice of one great software bundle from our Family PC software bundles. When you choose our Microsoft® bundle, you'll get MS Encarta, Golf, Money, and Works Multimedia Edition 3.0.

Encarta gives you the complete text of the 29-volume 1992 Funk & Wagnall's New Encyclopedia. Discover a whole new universe with 25,000 articles, 350 music segments, over 100 readings by authors, and samples of more than 45 languages.

You can hit the links year-round with Microsoft Golf. Play the famous Torrey Pines golf course, pick 14 clubs for every game, and consult a golf pro. Walk over the lush course and hear the swish of your club with photo-realistic scenery and real audio.

Use Microsoft Money to take complete control of your finances quickly and easily. You'll always know where your money is, and where it's going with this complete set of financial tools.

These are just a few of the many possibilities of a Family PC from Gateway 2000. Call today for more information on these incredible systems.

Our Family PC comes with a 14-inch color SVGA monitor, 101-key keyboard, double-speed CD-ROM, sound card, speakers, joystick, fax/modem and mulitmedia software. You choose one software option from our great Family PC multi-title packages.

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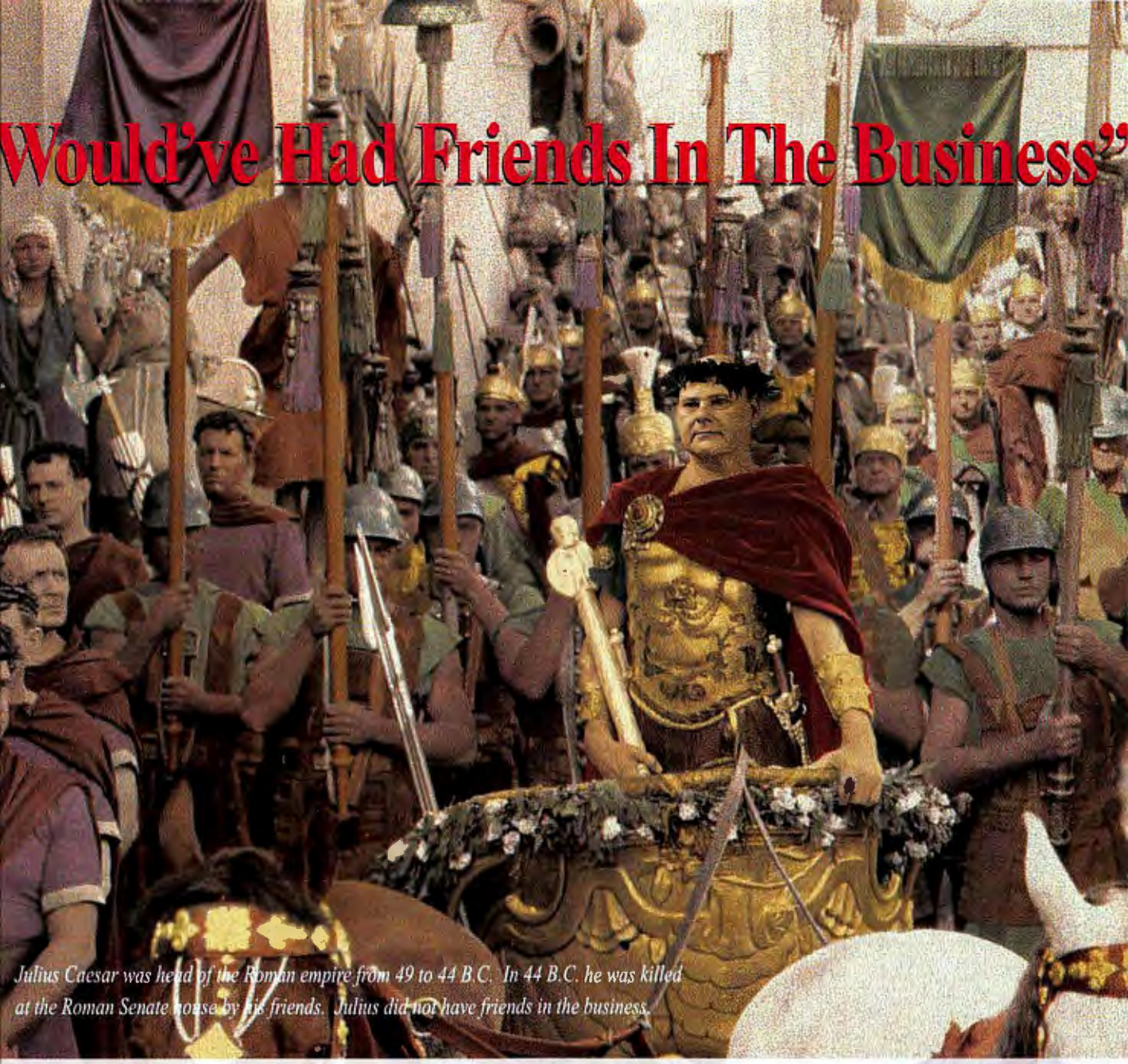

Julius Caesar was head of the Roman empire from 49 to 44 B.C. In 44 B.C. he was killed at the Roman Senate house by his friends. Julius did not have friends in the business.

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Bonanno, "Wrong Way," and Julius all portrayed by Gateway 2000 employees.

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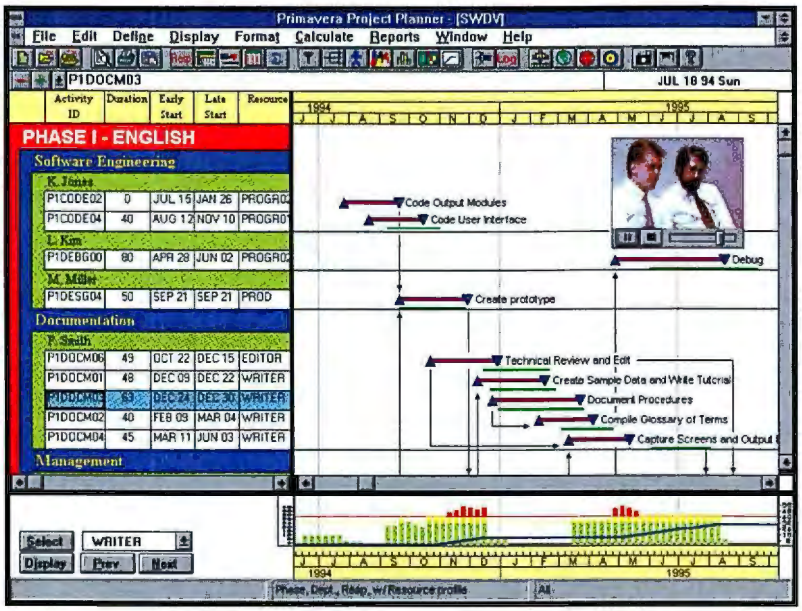

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The Death of the Single User

You have all heard about the Novell-WordPerfect deal. But what you have not heard about is the angry customer who sent a letter complaining that WordPerfect was abandoning single users like him in favor of networks. The customer said that he was perfectly happy working all by himself and that he didn't have any use for a network.

Which is an interesting statement coming from a guy who posted his letter on CompuServe! This is a person who missed the point. I'll try to explain.

It's this simple: Single-user applications are dead. Likewise the simple file-and-printer-sharing LAN epitomized by Novell's NetWare. And the clock is winding down on individual users working in isolation. Business has discovered that while there is value in using PCs to get work done, there is *efficiency* in using networks of PCs to share the solutions to common problems.

All Nets Lead to Chicago

For most people, the gate to the future will be Microsoft's Windows 4.0 operating system—aka Chicago—which should arrive late this year. Chicago's big challenge will be networking the world without freaking out its inhabitants. We've seen the first step: improved information sharing between individual programs—a key aspect of the software suites from Microsoft and Lotus. The next stage, which Chicago sets in motion, introduces applications that are built around networks and have a built-in capability to share information. E-mail, for example will be accessible from the tool bar.

In short order, every business application will be constructed with the understanding that it will be used to share information, whether around the office or around the world. In about three years, we will routinely see applications customized to meet the individual user's specific requirements, down to menu commands and the electronic forms that route work.

Customization will replace today's one-network-fits-all approach and blur the lines between messaging and peer-to-peer LANs. Today nets appear much the same to everyone on the LAN—as a collection of drives and files. Tomorrow their appearance will be dictated by the needs of the user. For instance, thanks to support for long file names, we'll be able to use plain English to identify users, files, hard drives, and other devices, which will make the network much easier to navigate.

Among Chicago's many advantages are the ease it brings to corralling a bunch of PCs into a network, and the way it optimizes the operating system for information sharing—a first. Its approach enables direct access to E-mail from within applications. Object Linking and Embedding also will become easier to use and more stable.

Solving Information Glut

Almost everything about Chicago, from built-in peer-to-peer networking to the way it displays directories, is designed with the expectation that users will have access to unprecedented amounts of data. What we need are operating systems and applications that are more adept at solving information glut. Chicago will help by consolidating program manager and file manager in one place. It also builds E-mail in-boxes and out-boxes into the directory file structure, so you can store data and messages pertaining to one topic in the same place.

With Chicago, the sharing and interoperability that people are starting to associate with suites and OLE will begin to extend across the network. In 1995, the Cairo operating system will break the application barriers we've come to accept.

Creating tools that give users control over information, not just access to data, is the challenge for the latter 1990s.

Contributing Editor David Coursey edits P.C. Letter. *He can be reached on PC World Online (see page 12 for contact information).*

By David Coursey

MICHELE CLEMENT

LOOKING AHEAD

Having predicted the Novell-WordPerfect-Borland deal over a year ago, I feel compelled to offer my two cents worth: Novell's new boss, Robert Frankenberg, needs to become a street fighter if he's going to battle Microsoft... Application of the Month: No, it's not reason enough for most people to buy a Newton, even at $599 for the MessagePad 110, but State of the Art's ExpensePlus is a very good expense manager, hampered only by insufficient report formats...Books of the Month: People close to Microsoft are touting David Vaskevitch's *Client/Server Strategies* as the key to understanding where the company is headed; Vaskevitch is director of enterprise computing in Redmond... Tongue-tied on the Internet? *The Elements of E-Mail Style* by David Angell and Brent Heslop may help...Hardware of the Month: PCMCIA Global Positioning System cards from Rockwell, Trimble Navigation, and Socket Communications. They provide easy entry into the latest "where am I?" technology. But it will take advanced artificial intelligence to answer the question, Why am I here?

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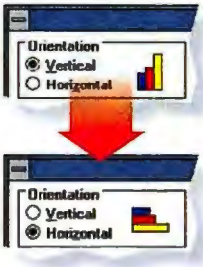

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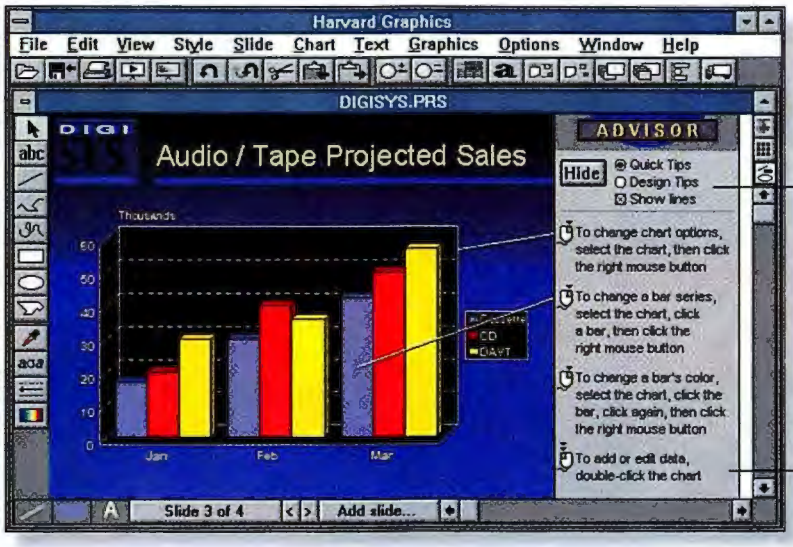

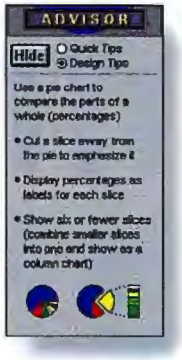

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Novell and WordPerfect:
WHAT LIES AHEAD?

Edited by Russell Glitman

News Monitor

FAST CD ROM DRIVES TAKE PRICE DIVE: TEAC America is expected to break new price ground in the CD ROM market by shipping a quadruple-speed (4X) CD ROM drive for only $399 at the end of June. NEC, one of the few vendors that has offered a 4X drive, charges $995 for its product. The TEAC drive will have the 600-kilobytes-per-second (K/sec) quadruple-speed transfer rate, plus a zippy access time of 195 milliseconds. Double-speed (2X) drives transfer data at 300 K/sec, while triple-speed (3X) drives transfer at 450 K/sec. TEAC is one of several vendors preparing to ship 4X CD ROM drives, says Dataquest analyst Patty Chang. She expects that the 3X standard will die and that consumers will see a wave of 4X products in the fall. Plextor is expected to offer a 4X product in June; at press time, pricing was unavailable.

CYRIX AND IBM TO PRODUCE "PENTIUM" CHIPS: Scrappy Texas chip maker Cyrix Corporation scored what company officials call its greatest victory by signing a cooperative agreement with IBM's Microelectronics Division. IBM, which recently declined rights to manufacture Intel's Pentium chip, signed a five-year agreement to make Cyrix's M1, a chip with Pentium-class performance and compatibility, using IBM's manufacturing techniques and facilities. IBM received rights to manufacture for its use or sale as many chips as it makes for Cyrix, and it also gained access to Cyrix's other X86 chip technologies. Cyrix lacks its own

(continued on page 57)

Some say the union was inevitable. Novell, the dominant player in network operating systems with over 70 percent of the North American market, needed WordPerfect's stable of end-user applications and its workgroup technology to go head-to-head with its $4 billion archrival Microsoft. WordPerfect, despite posting revenues of more than $700 million last year, lacked the financial clout to vie with its larger competitors, Microsoft and Lotus—particularly in today's world of $49 competitive upgrades and $499 application suites.

The merger heralds new products that include networked apps and a Lotus Notes competitor. Meanwhile, WordPerfect customers fear the service they've come to expect will suffer.

The Novell-WordPerfect deal is a three-way pact that includes Borland International. In a stock swap valued at $1.4 billion, Novell will acquire WordPerfect, which becomes a wholly owned Novell subsidiary focusing on user applications. Novell will also purchase Borland's Quattro Pro spreadsheet for $145 million and can sell 1 million copies of Borland's Paradox database as part of its own business-applications suite.

A Suite Merger

While it's a bit melodramatic to say that the premerger Novell and WordPerfect were doomed to become also-rans, there's no doubt their union, which will create a $2 billion company, stands a far better chance of prevailing in what is rapidly becoming a high-stakes business. Combined, the Utah-based companies will have products in practically all the categories that count: word processing, spreadsheets, E-mail, groupware, operating systems, and networking.

Why did Novell want WordPerfect? Although best known for its DOS and Windows word processors, WordPerfect also has a variety of sophisticated work-group products—seen by many industry watchers as The Next Big Thing in personal computing. WordPerfect Office and InForms combine E-mail, calendaring, scheduling, task management, and forms creation and routing. The company's new Envoy, which is similar to but better than Adobe's much-hyped Acrobat, allows you to port graphics-rich documents across platforms. Also, WordPerfect recently acquired SoftSolutions, a document manager.

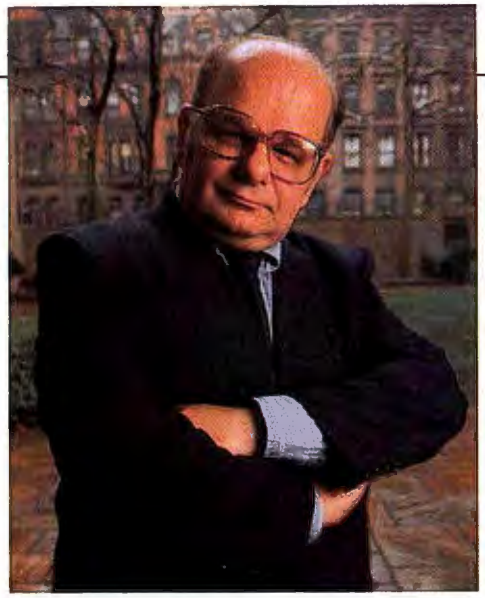
The deal also thrusts Novell into the forefront of the hotly contested office suites market. It now owns two-thirds of the Borland Office suite, a package that consists of Paradox, Quattro Pro, and WordPerfect (the word processor). Suites such as Lotus SmartSuite, Microsoft Office, and Borland Office are gaining popularity among corporate users. Microsoft Office, for instance, was the top-selling software package in 1993, with revenues just under $500 million, according to Dataquest.

Armed with these applications and its substantial base of network users, Novell is better equipped to compete with Microsoft, able to offer a one-stop software purchase for work groups and network applications—everything except Windows.

So far, Novell and WordPerfect officials have been vague on product plans; more information is expected once the deal is complete in June. However, industry watchers expect Novell to quickly introduce a revamped (and renamed) Borland Office with tighter integration among its programs. Look also for limited networking features, E-mail, and calendaring and scheduling features, all gleaned from the current basket of Novell and WordPerfect products.

In the short term, office suites are earning handsome profits for Microsoft, Lotus, and

LEFT: JEFF BERLIN; ABOVE: TIM LEWIS



CONCERNED ABOUT NOVELL'S commitment to standalone apps: Bart Delaney, user group president.

1993 Top-Selling Applications

Note: Figures do not include individual applications' sales as part of suites.

Source: Dataquest December 1993 estimates

Novell-WordPerfect. However, software technologies such as OpenDoc and Microsoft's OLE 2.0 (Object Linking and Embedding) are designed to make suites obsolete by providing a similar degree of software integration across vendor product lines—even across computing platforms. Both OLE and OpenDoc enable Mac and PC users to share compound documents containing editable graphics, text, mail, and database components.

While OLE 2.0 is available today for Windows and Mac users, OpenDoc—a consortium that includes such industry heavyweights (and Microsoft competitors) as Apple, IBM, Novell, Oracle, and WordPerfect—remains on the drawing board. Dataquest analyst Chuck Stegman believes the Novell-WordPerfect merger will help spur development of OpenDoc, a view that naturally is shared by WordPerfect president and CEO Ad Rietveld. "The first pieces are starting to get ready," Rietveld says. "We can bring the two [Novell and WordPerfect] departments together that are working on OpenDoc. We need to start marketing the technology to show what it means for users."

However, Microsoft does not support OpenDoc and doesn't plan to—an obstacle that could seriously impede adoption of the specification. "It's hard to understand the need for OpenDoc when you'll have OLE 2.0 in the Windows operating system doing the same work," says Microsoft Office product manager Robert Bach. OpenDoc advocates counter that OLE leaves a lot of room for improvement. OpenDoc takes the next logical step and assumes that users focus on getting tasks done rather than on whether it would be better to use a spreadsheet or a word processor. If developers follow the OpenDoc paradigm, software tools will reside on the PC desktop, to be taken down as needed to help perform jobs. OpenDoc is also expected to work better over networks and across platforms—the computing environment of the nineties.

Taking On Lotus Notes

While document-sharing technologies such as OLE and OpenDoc may eventually rule, the new Novell-WordPerfect also has plans for the burgeoning information server market—an area currently served by a single product: Lotus Notes. According to WordPerfect vice president of marketing Mark Calkins, the company is working on a Notes competitor that will include E-mail, calendaring and scheduling, work-flow automa-

Only the Big Survive

The Novell-WordPerfect merger is just one of several recent software industry marriages. These mergers include desktop publishing companies Aldus and Adobe, utility vendors Symantec and Central Point Software, and computer game giants Broderbund and Electronic Arts.

For some firms, however, the software price war is already taking its toll. In April, Software Publishing Corporation announced plans to cut 240 workers—50 percent of its staff. And Borland said it would eliminate 200 jobs, even after selling its Quattro Pro spreadsheet business to Novell. "I'm intrigued about what's going to happen to Borland," says Bart Delaney, New York PC Users Group president and chair of its Quattro Pro SIG. "Are they going to survive? It seems to me that in this industry, the little guy's not going to survive anymore."

Is consolidation good for users? If it means lower software prices, certainly. What remains to be seen is whether fewer companies means better software—or just fewer companies.

Software Compression

Consolidation strikes the software market as companies try to attain critical mass to compete with Microsoft, which is expected to reap $4 billion in revenue this year.

JONATHAN LEVINE

tion, document management, and information sharing and conferencing. Essentially, the product will combine the features of WordPerfect's Office, InForms, and SoftSolutions with a Notes-like module to handle the conferencing and information sharing. It's slated for release sometime in 1995. Meanwhile, Microsoft is developing its own Notes competitor—code-named Touchdown—due later this year.

Like Notes, Novell's information server product would allow corporate programmers to build applications quickly for workgroup tasks such as sharing sales reports and holding electronic meetings. But WordPerfect president Rietveld says that his company's product will be easier to use than Lotus Notes. "I don't think that an average user can build an application in Notes," he says. "Our product will make it easier to create a custom workgroup application—and you will be able to do this in 1 or 2 hours, rather than going to a consultant."

E Pluribus Unum

Novell and WordPerfect bring more than word processing and LAN expertise to their merger.

Novell	WordPerfect
Network environments NetWare UnixWare	**Business applications** InfoCentral WordPerfect WordPerfect Presentations
Business applications Paradox (licensed from Borland) Quattro Pro	**Groupware** WordPerfect Office
Operating systems Novell DOS 7 UnixWare	**Forms creation, work-flow automation** WordPerfect InForms
Peer-to-peer LANs Novell DOS 7 Personal NetWare	**Document management** SoftSolutions
Application development AppWare	**Publishing tools** Envoy

Users React

Office suites, work-group software, and portable document technologies are fine for the large corporate sites that have hundreds or even thousand of users. But what will happen to WordPerfect's bread-and-butter customers—the everyday users who have relied on the company's word processor for years? Will they get lost in the shuffle?

"The merger confuses things," says Kendall Callas, a WordPerfect certified instructor and the president of MicroCounsel, a San Francisco WordPerfect consulting firm. "WordPerfect becomes a much vaster corporation with which we will try to maintain our relationship—that's a source of worry." On the plus side, Callas believes the merger will lead to better integration of WordPerfect's word processing and SoftSolutions' document management technologies.

"Novell has a good reputation as far as quality is concerned, so I'm not worried much," says WordPerfect user Linda Leydekkers of Fountain Valley, California. "As long as WordPerfect stays compatible with my machine, I'll be happy."

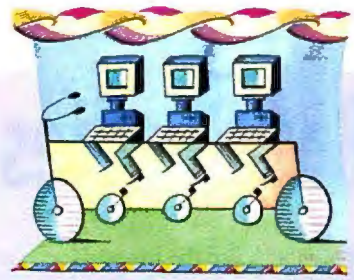
"I like suites, but a number of people I deal with don't want a suite. They want the best of the best—the best word processor, the best spreadsheet," says Bart Delaney, president of the New York PC Users Group. As a WordPerfect and Quattro Pro user, he's worried about Novell's commitment to its stand-alone products. "The suite is important, but the product as a separate entity is important also."

WordPerfect's Rietveld says the company's products will continue "as we know them today." However, he adds, it's still too early to predict how the products will evolve. He also says that software prices will stabilize. "We cannot afford to cut prices any deeper. I think that a $99 price point for business software is very realistic for our industry."

For the millions of Novell and WordPerfect customers, the big question is: What happens next? How well will Novell integrate WordPerfect's eclectic mix of applications with its own network environments and operating systems? Will WordPerfect's top-notch support continue? Time will reveal the answer, and millions of users will be watching.

—Jeff Bertolucci

TIM LEWIS



News Monitor

(continued from page 55)

manufacturing facilities, and previous manufacturing deals did not provide it with the means to fill orders from top-tier computer vendors.

PCMCIA ON THE DESKTOP: AT&T will offer PCMCIA slots as a $250 option on all its desktop PCs starting in June. You can choose two Type I or II slots, or one Type III slot (which also holds two Type II cards). Until now only a few desktop PCs have incorporated PCMCIA. But you can expect most major vendors to introduce it as an option for desktop units starting in late 1994, says Randy Giusto, a senior industry analyst at market researcher BIS Strategic Decisions. This year, BIS predicts, only 2 percent of desktop systems will ship with a PCMCIA slot; that figure should rise to 5 percent next year and to 12 percent in 1996. For now, the chief advantage of having a PCMCIA slot in a desktop PC is convenience for mobile users, who can use it to transfer data easily. In four or five years, desktop PCMCIA slots may be the easiest way to upgrade, says BIS market analyst Bill Ablondi.

UPGRADABLE LOCAL BUS AND 64-BIT VIDEO: Big Blue's latest round of PS/ValuePoint systems will feature 64-bit graphics and a local bus architecture that's upgradable from VESA to PCI, according to IBM officials. Featuring the new 64-bit S3 864 graphics accelerator chip, the ValuePoints will offer 32-bit graphics performance with 1MB of video DRAM, or 64-bit performance with 2MB of DRAM. The Value-

(continued on page 59)

IBM Readies PowerPCs to Challenge Intel

You've heard the hype and seen the TV ads for PowerPC systems, but for most of us—those who don't use Apple systems—getting hold of one has been impossible.

That's about to change. In the second half of this year, IBM will roll out three PowerPC-based product lines: a standard desktop series, a family of ergonomic systems, and a notebook line. The PCs are designed for 32-bit operating systems and for the most demanding users, and they will run PowerPC versions of Windows NT, OS/2 (also known as Workplace OS), and UNIX. Some degree of emulation will be used to run existing 16-bit Windows software with any of these operating systems, and IBM claims that Windows performance should range from that of a 486SX-25 to 486DX2-66 level. Where the PowerPC will really excel is at running applications developed for its native operating systems. These should match or exceed anything available for Pentium PCs but may not be out until this time next year.

The key to the PowerPC's performance advantage is its RISC (Reduced Instruction Set Computer) architecture. By contrast, the Intel-compatible family of X86 processors—which includes the Pentium—incorporates slower, more expensive CISC (Complex Instruction Set Computer) technology. RISC chips are designed to process simpler, more efficient instructions than their CISC counterparts. Though a RISC chip requires more instructions to perform a task, it processes each instruction faster and completes tasks more quickly. RISC chips have a particular advantage with math-intensive processes such as multimedia, 3-D graphics, and CAD.

Analysts are already placing long-term bets on the success of these units. "[PowerPC-based systems] could become a significant portion of the PC market in a few years," says Michael Slater, publisher of the *Microprocessor Report* in Sebastopol, California. Slater suggests PowerPC systems could account for 30 percent of the personal computer market within three to five years. That 30 percent would likely include the 15 percent of the market currently identified as Apple customers, plus another 5 to 15 percent of current PC users.

IBM's three new product lines will conform to a configuration standard known as the PowerPC Reference Platform, which is being promulgated by IBM and Motorola.

A Manifesto for the Information Highway

Last month *PC World* reported that intense lobbying and spending by corporate special interest groups are shaping the information highway in a way that may limit both competitive opportunities and civic participation.

This month we ask for your help in taking the next step—developing a set of well-considered alternatives.

The editors of *PC World* believe, as do many observers, that the information highway should be structured to promote civic activity. In our opinion, schools, libraries, and other public facilities must be upgraded to provide access. We suggest too that public spaces be set aside on the information highway and that a "bit tax" on commercial traffic be enacted to create and maintain these spaces for use by all.

The debate over the infrastructure of the information highway and the role it should play is being sped through Congress by communication industry lobbyists. This is a debate in which the public must be involved. We suggest the government create an information technology board composed of representatives of public interest groups and corporations. The board would be charged with bringing the discussions of these issues into a public forum.

As the information highway takes shape, government must exercise regulatory oversight. It should determine the cost of basic communication services; prohibit owners of the net's conduits from deciding what can be broadcast; protect free speech; police the net to prevent illegal activities; ensure universal access to civic sectors and government data; and protect our privacy.

In the matter of privacy, we believe it is time to turn back efforts by the National Security Agency and the FBI to prohibit the use of powerful encryption technology by all computer users. If encryption technology is restricted, businesses will be vulnerable to eavesdropping by foreign competitors, and the door to government abuse of your privacy will open.

That's our opinion. We invite you to express your opinion by participating in the fax-back poll on page 70. Your response will be forwarded to Congress, whose members will also be asked to participate in the poll. The results will be correlated and analyzed in an upcoming issue of *PC World*.

—Joe Abernathy

ILLUSTRATION: GORDON STUDER; PHOTO: JOHN GREENLEIGH

These systems will not be compatible with the Apple PowerPC products; the two platforms support different operating systems and hardware. They will be based on the PowerPC 601 and 603, running at 66 MHz or 80 MHz. IBM estimates prices will range from $3000 to $5000.

The IBM Standard

Though the exact configurations of the systems and the timing of their introduction are still subject to change, IBM officials offered the following specs: The products will include multimedia features such as a CD ROM drive, sound support integrated into the motherboard, stereo speakers, and a microphone. Other features will include a fax-modem, a PCI bus, an integrated PCI video accelerator, and an integrated PCI SCSI adapter, as well as a SCSI hard drive. The systems will have 16MB of RAM. On the software side, IBM is considering bundling several applications with the products, including voice navigation software that lets the PC respond to spoken commands, dictation software that translates spoken words into text, and document conferencing software.

The standard desktop line will sport 66-MHz and 80-MHz versions of the PowerPC 601 CPU. Systems in the line will probably be upgradable to the faster 604 chip. These models will also include PCI ethernet or token ring network adapters.

The two other products, an energy-efficient desktop and a notebook, will feature the slower, low-power PowerPC 603 chip in 66-MHz and 80-MHz versions. This 3.3-volt CPU can power down unused portions of itself, such as the floating-point processor. Bill Nohilly, IBM vice president of systems development, claims the 603 draws about one-fifth the power of a Pentium chip.

The energy-efficient desktop will be extremely compact (about 10 inches square) as well as very quiet (it has no fan), and it will use very little power.

The notebook is expected to weigh 7 to 8 pounds and offer an optional 10.4-inch active-matrix screen. Easy access to its innards will be possible via a lift-up keyboard. Other features will include a full-size CD ROM drive you can swap with the floppy drive.

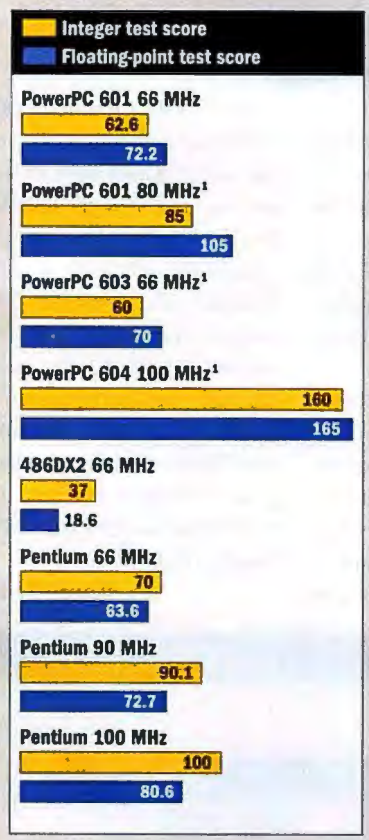
The Future Is Later

For most of us, this round of IBM announcements provides no immediate gratification. However, if IBM can offer competitive prices, and if software vendors choose to develop native Windows PowerPC applications, you may soon find yourself shopping for the PC that offers the best performance at the lowest price—regardless of the CPU inside.

—Randy Ross

The PowerPC Performs

RISC chip outdoes Intel's Pentium at floating-point calculations.



[1] Estimated.

The PowerPC excels at floating-point calculations, used in high-end graphics and math-intensive apps. Many Pentiums excel at integer tests—better performance indicators for business apps such as word processors and databases. Results and estimates are based on the spec fit92 and spec int92 tests.

TIM LEWIS

News Monitor

(continued from page 57)

Point PCs also will be upgradable to Intel's 100-MHz DX4 OverDrive processor when it becomes available in the third quarter. Pricing was unavailable at press time.

SHOPPING ON THE INFORMATION SUPERHIGHWAY: A group of prominent companies that includes Hewlett-Packard, Apple, and Sun Microsystems has invested $6 million to launch CommerceNet, an electronic marketplace for businesses. The service, to be offered in September over the Internet, will provide secure transactions and encryption to the 20 million net users. Close on the heels of the announcement, Xerox and Internet Shopping Network launched the first electronic superstore on the net, a service available with or without CommerceNet.

STACKER WINS: Look for Stac Electronics' Stacker data compression technology in future versions of IBM's PC-DOS, OS/2, and other IBM software, thanks to a licensing deal between the two firms. The agreement solidifies Stacker's position as the de facto data compression standard. Stac Electronics recently won a patent infringement suit against Microsoft, forcing the software giant to remove the DoubleSpace data compression technology from MS-DOS. Compaq Computer also plans to include Stacker with future PC products.

Edited by Randy Ross
Contributors: Joe Abernathy, Jeff Bertolucci, and Laurianne McLaughlin

SX2-50: Dell's Entree to 486 Power

ENTRY-LEVEL PCS: Dell's SX2-50 OptiPlex, front, and Dimension, back.

TEST DRIVE Entry-level computing got a boost this spring from a new Intel processor—the 50-MHz 486SX2.

Dell Computer is among the first vendors to incorporate the chip in systems. The PC World Test Center put two production models—the Dimension 450s/V and the OptiPlex 450s/L—through their paces and found that the OptiPlex ran considerably faster than 486DX-33 systems, and slower overall than mainstream 486DX2-66s.

Better for Windows

However, if you look only at Windows performance, the OptiPlex could almost pass for a DX2-66, scoring just below the average for those systems. The Dimension, which has a less powerful graphics processor, was considerably slower than the OptiPlex, except in the WordPerfect DOS test. Running MemMaker, a memory management utility included with DOS, improved the OptiPlex performance on WordPerfect but had a negative effect on its Windows performance.

The OptiPlex's performance is largely due to the 486SX2-50 CPU—a clock-doubled version of the popular 486SX-25. Like other SX processors, it lacks a math coprocessor, and like other clock-doubled chips, it operates internally at twice the speed of the motherboard bus. Like Intel SX, DX, and DX2 processors, the SX2 includes an 8K cache. (The new high end of the 486 family, the 100-MHz DX4, has a 16K cache.)

The OptiPlex and Dimension PCs we tested each had 8MB of RAM in addition to a 128K secondary cache. A key difference between the units is the quality of their graphics. Both offer integrated VESA local bus (VLB) graphics, but the OptiPlex has a Tseng W32i ET4000 chip with 512K DRAM, upgradable to 1MB. The chip can display 256 colors at 1280 by 1024 resolution. The Dimension uses a Cirrus 5428 that can display 256 colors at 1024 by 768 and also upgrades to 1MB. Another difference: The Dimension comes with two VLB slots, which the OptiPlex offers as a $50 option—a good investment if you want a mainstream graphics upgrade path. Finally, the systems differ in size: The Dimension has five bays, three of which are external, and five slots. The slim-line OptiPlex has three bays, two of them external, and three slots.

The $1649 OptiPlex includes 4MB of RAM, a 210MB hard drive, and a 14-inch color monitor. The $1599 Dimension includes the same features but with 8MB of RAM and a 340MB hard drive. You pay more for the OptiPlex's flash BIOS and embedded diagnostics, and its OptiFrame chassis lets you upgrade to the five-slot, five-bay OptiPlex M series.

You can expect a raft of clock-doubled SX2 systems. The chips are pin compatible with DX and DX2 processors, so it's easy for vendors to step up to this latest standard for entry-level performance. At these prices, it's easy for buyers, too.

• *Dell Computer; 800/289-3355. Reader service no. 781*

—Russell Glitman

TEST REPORT

SX2s: A New Threshold for Computing

System	RAM (MB)	Secondary cache (K)	Application performance in minutes:seconds						
Dell Dimension 450s/V	8	128	2:19	2:08	2:26	2:33	2:54	2:42	3:47
Dell OptiPlex 450s/L	8	128	2:02	1:36	2:02	2:18	2:27	1:55	7:33
Average of 8 486DX-33 PCs	8	0 to 256	2:26	2:16	2:57	3:14	3:42	2:43	5:00
Average of 28 486DX2-66 PCs	8	0 to 256	1:47	1:36	2:01	2:24	2:45	1:54	3:04

Shorter times are better.

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

Source: PC World Test Center application benchmarks

JOHN GREENLEIGH

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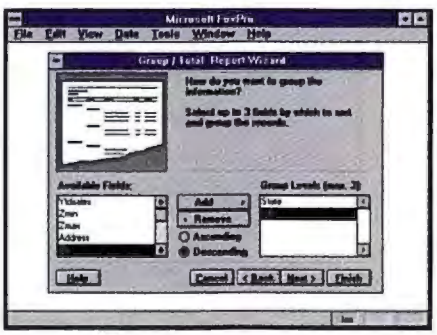

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Where to Find Bargains on Brand Names

Everett Bolte may be the Indiana Jones of PC bargain hunters. By day he's a regional sales manager for an electronics manufacturer. But while in pursuit of a new system, Bolte recently uncovered a deal that many buyers only dream about: a system from a big-name vendor for less than $1000. Earlier this year, Bolte set out to replace his 286 machine. After trekking through local clone companies and warehouse clubs near his home in Raleigh, North Carolina, he discovered the IBM PC Factory Outlet in nearby Morrisville.

A PC Discovery

There he came face-to-screen with a rare PC discovery—the remanufactured computer. In February Bolte bought a refurbished 386SX-25 IBM PS/2 with 8MB RAM and a 120MB hard drive for around $800—about what you'd pay for a refurbished 486SX PC today.

PCs aren't the only hidden bargains you can find in outlet stores. John Durchuck, a realtor at York Properties in Cary, North Carolina, wanted a laser printer for his home office. He shopped local warehouse clubs but couldn't find a printer he liked for under $1000. In February at the IBM outlet, he bought a discontinued but new Lexmark LP4037 laser for $748.

Remanufactured PCs generally are units that have been returned slightly used and had components, such as the hard drive, replaced. They can also be demonstration units or PCs that were purchased, opened, and returned unused. In any of these cases, vendors can't sell the PCs as new. Rather than toss the systems out, they refurbish, retest, and repackage them, then offer them for hundreds of dollars less than comparable new systems.

With such great prices come caveats. First, warranties can be as short as 90 days. Second, you may not get the latest components, such as the fastest graphics cards. Third, you may have to pay more for support. Fourth, inventory is always in flux, so finding the system you want may take some perseverance.

REALTOR JOHN DURCHUCK found the laser printer of his dreams at the IBM PC Factory Outlet in Morrisville, North Carolina.

Deals can be found if these uncertainties don't deter you. During March and April, for example, I found remanufactured 486SX-33 and 486SX-25 systems from Gateway and NEC in the $800-to-$1000 range, monitor included, compared with $1200 and up for new 486SX-25s. You can't always find these products via the vendor's usual channels. Gateway and NEC sell refurbished PCs over the phone. IBM sells by phone and from its Morrisville outlet. If you're in Texas, you can stop by the Dell outlet in Austin and the Compaq outlet in Houston (neither of them takes phone orders). Notebooks, printers, and other products are also sold remanufactured, and many vendors also offer discontinued models.

The Budget Shopper

For small businesses, students, and home users whose every dollar counts, remanufactured systems may be the way to go. On April 1, Gateway quoted me $823 for a remanufactured 486SX-33 system with 4MB RAM, a 170MB hard drive, a 15-inch super-VGA monitor (noninterlaced with .28mm dot pitch), a mouse, DOS, and Windows. Gateway offers a one-year parts-and-labor warranty and a five-day money-back guarantee. You pay phone charges for tech support calls, and systems must be shipped to Gateway's repair depot in Sioux Falls, South Dakota, for service.

NEC Technologies sells like-new machines, many of them "buyer's remorse" returns from retail stores. The systems are sent down NEC's production line and tested, cleaned up, and repaired, if necessary. NEC sells like-new PCs and printers as well as new but discontinued models by phone. On March

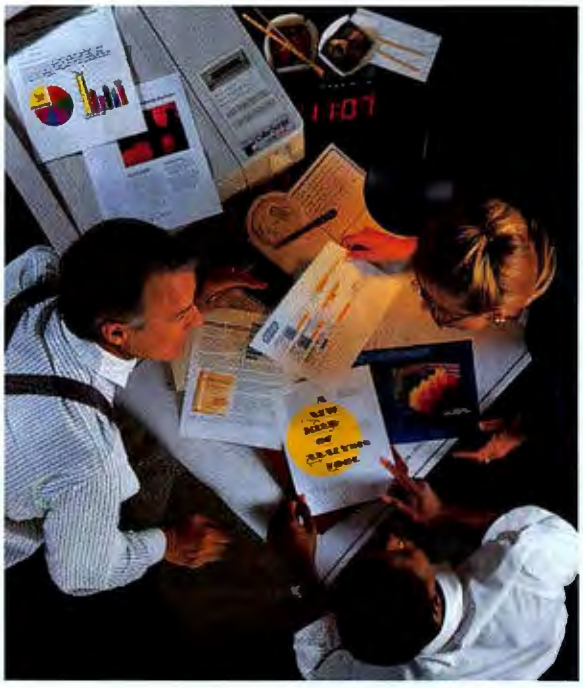
Tips for Shopping the Outlets

1. Do your homework. Before you go to the store, determine the configuration you need, the current retail prices for new machines, and your target price.
2. Check product specifications. Does the machine have the latest components? Are the components refurbished or new?
3. Examine what's included. Will you have to pay extra for a monitor, DOS, or Windows?
4. Shop around to find the most powerful machine for your money.
5. Consider warranty policies carefully. Will the vendor charge you a restocking fee if you return the system?
6. Ask if the store offers a money-back guarantee on the equipment it sells; it's your best safeguard.
7. If you don't find what you want, try again. The product mix of outlet inventory can vary widely from day to day.

LEFT: GORDON STUDER; ABOVE: DONNA BISE

June 14, 1963.
Cindy Smith plays with color.

Thirty years later her business
depends on it.



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4. Are your programs recognized as the best in their category?
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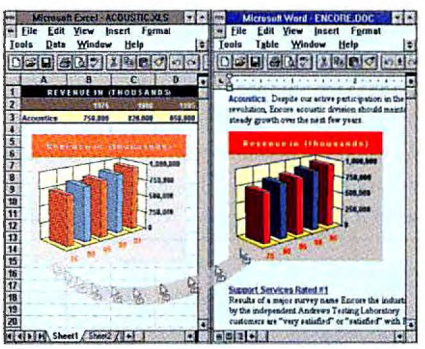

yourself, talk to people who use it, scout around at your nearest reseller. And by all means, call us at (800) 894-6642, Dept. LB9, to find out more. Any questions?

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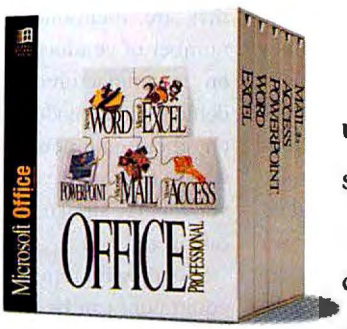

The Microsoft Office Professional includes Microsoft Excel, Word, Microsoft Access, PowerPoint and a Mail workstation license.

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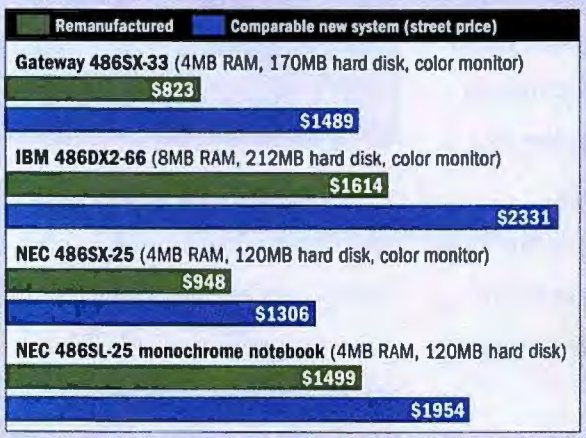
Comparing Prices: Remanufactured vs. New PCs

Prices for remanufactured Gateway, IBM, and NEC systems between March 31 and April 7, 1994.



Sources: remanufactured system prices—Gateway, IBM, and NEC; average street prices for new systems—Computer Intelligence, InfoCorp

Continued from page 64

31, NEC quoted $699 for a like-new 486SX-25 with 4MB RAM and a 120MB hard drive but no monitor. On that date, NEC had no low-end monitors, but on April 7, a refurbished 14-inch super-VGA monitor with .28 dot pitch was available for $249. (Witness the dynamics of inventory.) That same monitor carries a $335 street price. NEC ships within 48 hours. It offers a 90-day warranty on refurbished desktop PCs and printers as well as a one-year warranty on refurbished notebooks and monitors. NEC also provides a toll-free line for tech support, through the warranty period.

Shopping the Outlet Stores

IBM's Morrisville outlet carries refurbished products and overstocked or discontinued new equipment. On March 31, the outlet offered a ValuePoint 486SX-25 with 8MB RAM, an 80MB hard drive, and OS/2 for $829, monitor not included. IBM's refurbished PCs come with the same warranty as new systems (from a year on ValuePoints to three years on ThinkPads) and a 15-day money-back guarantee. IBM provides a toll-free number for warranty issues, but technical support is handled through your sales rep, and you pay for those calls.

Dell's outlet store does walk-in business only. This March, with a budget of $800, I set out to find a PC for my brother in college who needs to run Windows spreadsheet and word processing programs. After local clone vendors laughed at my $800 limit, I found a remanufactured Dell system for $799. The 25-MHz 486SX PC included 4MB RAM, an 80MB hard drive, a mouse, a 14-inch monitor with .28 dot pitch, DOS, and Windows. The risk: The PC had a 90-day warranty. As of mid-April, my brother had encountered no problems.

Compaq sells remanufactured PCs at a walk-in–only outlet in Houston. In March it offered a 25-MHz 486 Presario with 4MB RAM, a 200MB hard drive, and a fax-modem for $999. Compaq has a one-year warranty.

In addition to the companies that are mentioned here, a number of vendors offer deals on remanufactured PCs and demonstration models as well as on other equipment. The best way to find out if your favorite vendor has similar deals is to call up and ask.

Shopping for remanufactured equipment can be tricky. The product mix varies widely over time. Carefully consider the vendor and the warranty. As Everett Bolte advises, "Ask who's going to stand behind it."

—Laurianne McLaughlin

Where to Buy Bargains

- Gateway 800/846-2410
- IBM 800/426-7015
- NEC 800/632-4636

Dell and Compaq outlets are walk-in only. Drop by the next time you're in Austin or Houston, respectively.

Plug and Play Update:

We've been hearing about Plug and Play (PnP) ever since Microsoft broached the idea at last year's Windows Hardware Engineering Conference. Someday, the theory goes, you'll be able to plug new adapter cards into your PC and use them right away. You won't have to worry about IRQs, DMA channels, or other arcana because the system will simply configure itself. One year later, we're still waiting for Plug and Play. In order for PnP to work, three components have to be in place:

—The BIOS. This piece of the PnP puzzle is here now. Vendors including Phoenix, AMI, Award, and SystemSoft have been shipping PnP-compliant BIOS's to desktop and notebook system vendors since January. That's why the first PnP systems should be hitting the market by the time you read this. If your existing system has a flash BIOS, you should be able to upgrade it to PnP capabilities.

—Add-in cards. Some PnP-compatible add-in cards are available now. Cards for the PCI (Peripheral Component Interconnect) bus should already be compliant, as PnP support was built into the PCI spec. Since vendors don't always follow specs to the letter, some PCI cards may not be as plug-and-playable as others. ISA and VESA local bus cards, on the other hand, must be redesigned for Plug and Play. Some ISA and VESA board makers have already released PnP products; others are waiting for PnP systems to arrive before releasing their PnP cards.

—The operating system. This is the biggest missing piece of the Plug and Play puzzle. The next version of Windows, code-named Chicago, will have PnP built in. Until Chicago arrives (street rumors say later this year, perhaps early 1995), users should be able to get most, but not all, PnP functionality by using special Windows 3.1 and DOS drivers with their add-in cards.

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6	○	○	○	○	○
7	○	○	○	○	○
8	○	○	○	○	○
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HOW TO FILL OUT THE FORM: Clearly print your name (use block capital letters), your daytime phone number, and your ZIP code at right; fill the appropriate circle for each digit of your ZIP code. Then fill out the rest of the questionnaire. WHEN FILLING THE CIRCLES, AVOID GOING OUTSIDE THE LINES! One entry per person. Void where prohibited by law.

What should government's role be in regulating the information highway? (Mark all that apply.)

- ○ No involvement at all
- ○ Ensure that illegal activities such as child pornography and drug sales are not conducted on the highway
- ○ Define and protect First Amendment rights
- ○ Ensure that companies that own networks don't also own or control services and content provided on those networks
- ○ Set all fees, including usage rates and access charges
- ○ Set access charges only
- ○ Mandate the creation of free public spaces on the information highway
- ○ Other _____

What mechanism should government install to regulate the information highway? (Mark all that apply.)

- ○ None
- ○ A federal commission, similar to the FCC, to oversee operations
- ○ A set of regulations for participating companies, and an administrator to enforce them
- ○ A committee of corporate and public interest leaders to oversee development
- ○ Other _____

What access should be provided free on the information highway? (Mark all that apply.)

- ○ None—if you can't pay, you don't play
- ○ Access only to public spaces and/or civic services such as voter registration, public discussion, and municipal forums
- ○ Access for nonprofit and educational organizations
- ○ Communication with federal officials and free information retrieval from federal resources, including the Library of Congress and the Government Printing Office
- ○ Communication with local and state officials and free information retrieval from local and state agencies
- ○ Access to all communications services, including those above
- ○ Access to all services, including communications, home shopping, pay-per-view movies, and other entertainment
- ○ Other _____

What is the best way to fund universal access? (Mark all that apply.)

- ○ A "bit tax" on commercial providers based on bandwidth consumed
- ○ A tax on commercial providers' profits
- ○ A user tax on services, similar to sales tax
- ○ Government access subsidies, similar to food stamps, to be funded by all taxpayers
- ○ A tax deduction incentive for commercial providers that make access and space available to the public
- ○ Discount access for low-income users, to be subsidized by raising standard rates for private and commercial users
- ○ Other _____

Should the government mandate that all network providers set aside a portion of their bandwidth for public and civic sector activities?

○ Yes ○ No

Should the government mandate that network providers install wiring for all citizens who want access to network services?

○ Yes ○ No

Should the companies that own network conduits also control the services and material on them, as is the case now with cable television?

○ Yes ○ No

Should the government be allowed to limit the use of encryption on the network?

○ Yes ○ No

How can the NII be designed to ensure that it fairly balances the goals and interests of the government, public interest groups, commercial information providers, and ordinary citizens?

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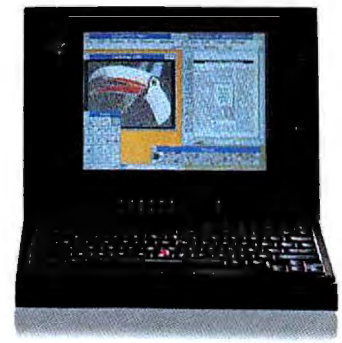

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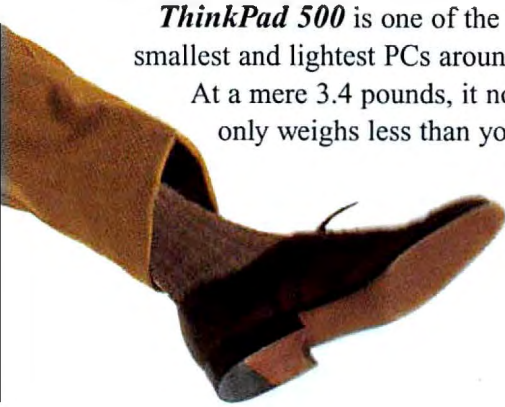

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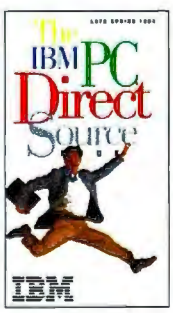

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Apple's Quadra 610: A Mac That Does Windows—More or Less

While Apple's new PowerPC Macintosh can run Windows and DOS programs using software emulation, the new Macintosh Quadra 610 DOS Compatible goes one step further. Featuring an integrated Intel 486SX processor, the Quadra 610 is literally two computers in one—a Mac and a PC. But while Apple claims the Quadra 610 offers the best of both worlds, experienced PC users would likely disagree.

At first glance, the Quadra 610 DOS Compatible seems a conventional Mac. Its standard configuration includes a Motorola 25-MHz 68040 processor, 8MB of RAM, and a 160MB hard drive (a CD ROM drive is optional). But this hybrid Quadra also includes an add-in card with a 25-MHz 486SX chip, as well as DOS 6.2 preinstalled on the hard drive's 40MB (or larger) DOS partition. Unfortunately, you'll have to purchase Windows separately.

MAC AND PC IN ONE: The Macintosh Quadra 610 features a 486SX-based add-in card that lets it run Mac and Windows/DOS programs simultaneously.

From Mac to Windows

When you turn on the system, the Quadra 610 boots up as a Mac. Switching to the PC is easy: Hit a hot-key, and within seconds you're staring at the familiar and unintuitive C> prompt. The Quadra's two processors enable you to run both Mac and DOS/Windows programs at the same time. For example, I loaded a self-running Harvard Graphics 2.0 for Windows demo and then hot-keyed over to the Mac side to run Forever Growing Garden, a CD ROM game for children. When I hot-keyed back to Windows, the Harvard demo was still running. (If you have two monitors, you can connect both of them to the Quadra 610 to view Mac and Windows/DOS sessions simultaneously.) Yet another welcome feature: You can cut and paste text, PICT, RTF, and bit-map files between Windows and Macintosh programs using standard copy and paste commands.

So far, so good. However, the more you experiment with the Quadra 610, the more you discover its limitations as a Windows/DOS machine. For instance, since Mac and PC keyboards are laid out differently from one another, you're forced to learn a series of hot-key combinations for basic PC keys such as <Page Up>, <Page Down>, <Home>, <End>, and <Insert>. Another problem—the power switch is located directly below the floppy drive. Since this switch resembles the eject button on a PC, I pressed it to eject a disk and accidentally turned off the computer. Alas, what I needed was another hot-key command. (On the Mac side, you use a software command to eject a floppy.)

Unfortunately, we were unable to run PC World Test Center benchmarks on the Quadra 610 DOS Compatible because it lacks a PC parallel port—essential for accurate test results. The DOS Compatibility Card supports two serial ports—COM1 and COM2—which you can map to an unused Mac printer port or modem port.

No PC Sound

The Quadra 610's Windows/DOS capabilities are further limited by its lack of PC expansion slots and SoundBlaster support. Although the unit we received included a CD ROM drive, we could not run any Windows or DOS multimedia programs because the Quadra offers no sound capabilities beyond the PC's standard beep, and there's no room for a PC sound card. According to Apple, future DOS-compatible Quadras may offer improved sound features.

Even changing the Windows video driver required a call to Apple's technical support. Although the Macintosh Quadra 610 DOS Compatible comes with Windows drivers on a floppy disk, the system's manual does not explain which disk you should use or how to install a new driver.

With a 160MB hard drive and 8MB of RAM, the system costs $1579. A monitor costs extra; current Quadra owners can buy the $399 DOS Compatibility Card. (Apple prepares the DOS partition for you.) Considering its shortcomings, the Quadra 610 is best suited for the Mac user who runs an occasional DOS or Windows program, rather than the cross-platform power user in search of the perfect Mac-PC hybrid.

—Jeff Bertolucci

Macintosh Quadra 610 DOS Compatible

This Mac-PC hybrid is fine for Mac users who run one or two Windows or DOS programs, but dedicated PC users should avoid it.

Apple Computer
800/538-9696, ext. 525
List price: from $1579 (monitor extra), DOS Compatibility Card $399
Reader service no. 711

Dell Notebooks: Attractive Hardware, Software, and Service Bundles

If at first you don't succeed, try, try again. That's the angle Dell Computer is taking with its return to the ultracompetitive notebook PC market. While its new Latitude series is technologically ho-hum, the worthy software, hardware, and service bundles should appeal to novice notebook users.

Based on Intel's SL-enhanced 486SX processors, the Latitudes—jointly developed and manufactured with AST Computer—consist of five models priced from $1699 to $3249. The line features two processor speeds (25 MHz and 33 MHz), a 120MB, 170MB, or 260MB hard disk, and three display types: monochrome, dual-scan color, and active-matrix color. Standard equipment includes 4MB of RAM, a slot for a PCMCIA Type II or Type III device, an embedded trackball, an external VGA monitor port offering 1024 by 768 resolution at 16 colors, and a nickel–metal-hydride battery Dell says runs for 1.7 to 2.2 hours per charge, depending on the model.

While these specifications are par for today's notebooks, Dell intends to differentiate itself by concentrating on software, solutions, and service rather than high-tech wizardry. First off, every system comes with a starter kit for America Online; Traveling Software's CommWorks for Windows; LapLink V; and RadioMail, a two-way wireless messaging service. For an additional charge, Dell will ship Latitudes with factory-installed software and hardware bundles tailored to specific users. For instance, Dell's Mobile Office package contains Microsoft Office—a software suite that includes Word, Excel, and PowerPoint—while the Mobile PowerPack provides a 14.4-kbps fax-modem and a second battery pack.

I examined the 433C, Dell's midrange Latitude that weighs an uninviting 6.4 pounds. This note has a reasonably clear 9½-inch dual-scan LCD color display, 8MB of RAM, and a 170MB hard disk. (With Mobile Office or Mobile PowerPack, the 433C costs $2999.) The Latitude's technology feels like a compromise of sorts. First, the system provided an unimpressive 1 hour, 48 minutes of battery life doing routine word processing with Word for Windows. The unit's suspend-resume feature, which starts up with the programs and files that were open when you shut down, is slow. On the plus side, every Latitude comes with lifetime toll-free phone support for both hardware and communications questions, and a year of factory service with overnight return.

Undoubtedly, Dell's robust service and bundling options will win over users who are looking for a reliable notebook that's backed by sound support. But intermediate and advanced users in search of the latest technology, the lightest system, or the lowest price may find they want to look elsewhere.

—Joe Hutsko

Latitude Notebooks

Dell's new Latitude line bets heavily on service and support but comes up short on technological innovation.
Dell Computer Corp.
800/289-3355
List price: $1699 to $3249
Reader service no. 712

NEW DELL NOTEBOOKS: Bundled software and top-notch support will appeal to novices, but power users may prefer competing products.

64-Bit Graphics Power From ATI

ATI Technologies, looking to keep pace with the fast-moving graphics board market, has introduced a 64-bit graphics accelerator board. Based on ATI's new mach64 graphics processor, the Graphics Pro Turbo board features a 64-bit data path to handle demanding applications such as desktop publishing and image editing. The board also features ATI's SpectraDAC, a high-speed RAMDAC chip that enables 100-Hz screen refresh at 24-bit color.

The ATI Graphics Pro Turbo board ships standard with 2MB of VRAM, and it can hold up to 4MB for displaying 24-bit color at 1280 by 1024 resolution. Finally, the board enhances digital-video playback, expanding small video windows without dropping frames or creating blocky images. For those users who are working with high-resolution graphics and multimedia software, the Graphics Pro Turbo board provides an impressive option.

Like many vendors, ATI is bolstering the software side of its product with Windows-based utilities. For instance, one of the Graphics Pro Turbo utilities creates an extended virtual screen so that you can pan quickly to off-screen applications. ATI also provides Windows-based and on-the-fly resolution switching, and it claims to offer on-the-fly color-mode switching (the latter feature was under development at press time). The product comes in ISA, VL, and PCI bus versions.

—Michael Desmond

Graphics Pro Turbo

ATI ups the video-board ante with a 64-bit graphics board that offers multimedia playback, video acceleration, and screen utility software.
ATI Technologies
905/882-2600
List price: with 2MB VRAM $599, with 4MB VRAM $899
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"WINProbe's most impressive offering is its memory-reclamation capability. This feature alone is worth the price of admission."
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COMPATIBILITY

WINProbe requires an IBM AT, 386, 486, PS/2 or compatible with at least 1MB of RAM, DOS 3.1 or higher, Windows 3.0 or higher, and either a Hercules mono, EGA, VGA, or SVGA video. A mouse is recommended but not required.

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New Newtons: Sleeker Design, Longer Battery Life

Newton is a shining example of the oft-forgotten fact that no matter how many meetings and focus groups go into product design, the crucial test takes place in the real world. The original Newton took its share of criticism, and its not-quite-ready-for-prime-time character recognition became the butt of cartoons and comedians' jokes. The result: two new Newton MessagePads—the 100 and the 110.

The 100 is essentially the original Newton with a new set of ROM chips (version 1.3) that fix bugs and add features. The biggest change—you can defer character recognition. You can also choose letter recognition instead of the default word recognition, or even opt for number-only recognition. Overall accuracy is much improved, with fewer of the original's errors. There's also been a huge price cut, from $699 to $499. Current Newton owners will need to pay $99 for the new ROMs.

The Newton 110 offers all the new features of the 100 and then some, for $599. It's longer and thinner than the original and easier to hold. There's a flip-up cover, the PCMCIA slot has moved to the side, and a new spring-loaded pen stores in the 110 case.

Still, the real improvements are internal. The 110 runs on four AA batteries instead of the original's AAAs, effectively doubling working time. And an optional ($99) recharging station with an AC adapter and nickel-cadmium batteries recharges as you work. Internal RAM's been beefed up from 640K to 1MB.

With all these improvements, the new Newtons take a big step toward the promised nirvana of genuinely useful personal digital assistants.

–Stan Miastkowski

NEWTON'S SECOND CHANCE: Longer and leaner, the new 110 has a flip-up cover, a spring-loaded pen, and a PCMCIA slot on the side.

Newton MessagePad 100 and 110

New ROM chips in the 100 add features and banish bugs, while the 110 sports a sleeker design, longer battery life, and more RAM.

Apple Computer
800/767-2775
List price: 100 $499, 110 $599; ROM upgrade for original unit $99
Reader service no. 714

Acer Boards the Multimedia PC Bandwagon

Acer America, another competitor in the crowded multimedia PC market, has added five models to its Acros and AcerPower lines. The new systems range from a 33-MHz 486SX desktop to a 60-MHz Pentium minitower, all loaded with hardware and software and carrying street prices between $1200 and $2900. In terms of price and features, these PCs stack up very well against competing systems from Packard Bell, AST, and other mass-market multimedia PC vendors.

I recently looked at a new Acer Acros 4221G desktop, the low-end model in Acer's new series. The 33-MHz 486SX system includes a 210MB hard drive, 4MB of RAM (expandable to 36MB), a local bus video accelerator with 512K of video RAM, four ISA slots, a 145-watt power supply, a 3½-inch floppy, three drive bays, and a mouse.

As with most of today's 486s, Acer's new systems are upgradable to the pending Pentium OverDrive CPU. Other features include a 9600/4800-bps fax-modem (except with the Pentium), a 16-bit sound card, a double-speed CD ROM drive, and speakers. Street price for the 4221G should range from $1200 to $1300. Add an Acer 14-inch SVGA Energy Star–compliant monitor, and the price climbs to about $1550.

The system's software bundle includes Microsoft's DOS 6.2, Windows 3.1, Entertainment and Productivity Packs, Multimedia Works, Encarta, Cinemania '94, Sound Bits, and Multimedia Golf; Intuit's Quicken; Phoenix's MicroFax; and trial offers for Prodigy and America Online.

My Acros system set up easily and ran without incident. All the software is preinstalled—naturally, you have to swap CD ROMs to change multimedia applications. I was soon whacking a golf ball into the rough in Microsoft Golf and at odds with some of the critics' views in Cinemania '94. My only grumble: I would prefer speakers with volume control knobs. Without them you have to open the sound card window and diddle with the mixer volume.

These new Acer systems follow the industry trend of more computer for less money. Home and small-business users should keep Acer in mind when shopping for a multimedia PC.

–Gene Smarte

Acer PC Systems

MULTIMEDIA **Competitive multimedia PC hardware-software bundles make these systems worthy contenders.**

Acer America
800/368-2237
Street price (without monitor): 486 $1200 to $2000, Pentium $2700 to $2900
Reader service no. 715

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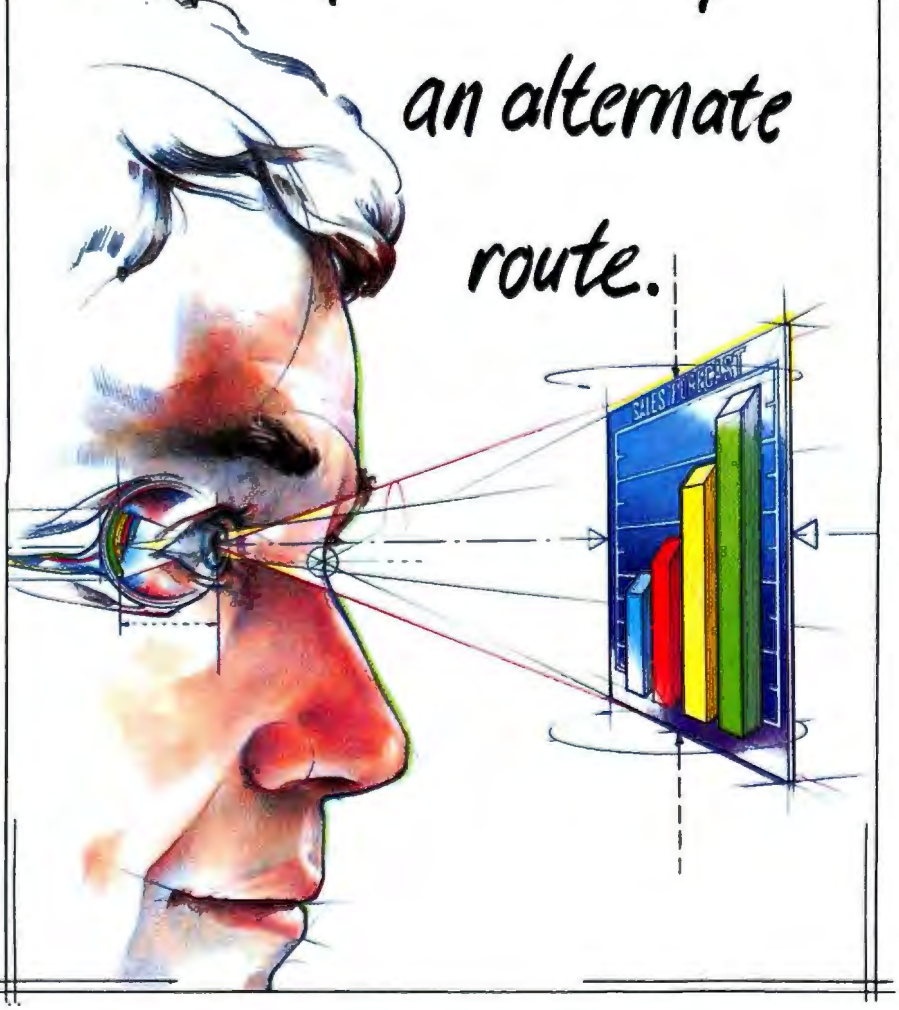

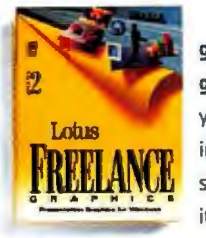

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Microsoft Access 2.0 Adds Magic With More Wizards and OLE 2.0

Using Microsoft Access 1.0, I was delighted with how quickly I could create a good-looking form or report with Wizards, Access's built-in helpers. The only problem I encountered was setting up data files to best leverage the Wizards' capabilities; despite its many intriguing innovations, version 1.0 was a little unfriendly for basic tasks such as designing and relating tables. Access 2.0 simplifies these and other jobs, such as mail merges—thanks to new Wizards and expanded tool bars. The new version also makes it easier to share information between programs, and includes new features for every level of user.

New Wizards Appear

The Table Wizard is my favorite new feature in Access 2.0. Instead of making you type in data file definitions (which can be a lengthy process) and then use tedious dialogs to define file relationships, the Table Wizard goes through these paces for you. You choose from extensive lists of business and personal files, which you can customize to suit your needs. The Table Wizard can save lots of time both for beginning users, who won't have to learn the particulars of keying and relating files, and for developers, who prefer to spend time on the more creative aspects of putting together an application.

The Query Wizard, another new Access 2.0 helper, helps you cross-tabulate data, find duplicate records, create archives, and perform other tasks. When you right-click in a query design window, you'll find more menu choices, including a tool that tells Access to show only the top records after you run a query. This lets you quickly find important data—for example, the top ten salespeople in your organization. Other new query features include Rushmore optimization (the performance booster that's part of Microsoft's FoxPro, an app known for its superior speed) and automatic linking of files on matching fields, even when the files involved are not formally related.

Access 2.0's menus and tool bars are now more consistent with those of the other Microsoft Office Professional programs, including Excel, Word, PowerPoint, and Microsoft Mail. This is part of Microsoft's strategy to improve the ease of use and information sharing capabilities of its business applications. Microsoft's push toward integration is evident in Access 2.0's new tool bar buttons. The Publish It button converts Access data into a Word document, then launches Word with the new file open; the Mail It button lets you send Access data in either Excel or Word format to another user via VIM- or MAPI-compliant E-mail; and the Analyze It button converts an Access file into a spreadsheet and opens it in Excel. Another new button called Merge It launches Access's Mail Merge Wizard, which simplifies the previously cumbersome task of importing Access data into an existing Word document.

Access 2.0 supports OLE 2.0—also referred to as visual editing. This new level of OLE lets you edit objects such as Word documents without leaving Access. OLE 2.0 makes it easier to work with objects, such as spreadsheets, stored as part of an Access database.

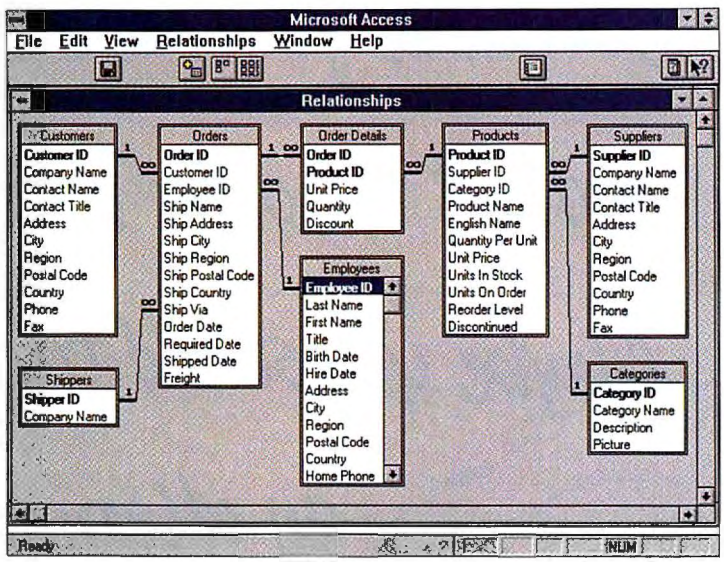
More Improvements

Besides all these new features, Access 2.0 improves on many of the tools found in the first version: It's easier to do things like align elements in a form or report design. In the area of data sharing, Access 2.0 expands its reach by including a driver that provides direct access to Paradox 4 data.

People using Access to work with data on a SQL server can get information faster than before. Microsoft sped up the ODBC drivers that provide the pipeline to SQL server data. And the SQL View window that lets you enter SQL statements to request data is more flexible. It lets you use commands not available through QBE, as well as move to other Access windows while working on your SQL statements.

Access application developers will find several new tools to make jobs easier. A diagram now shows how files in a database are related, and with the Database Documentor you can print the details of various database characteristics. Developers and other power users will also appreciate additions such as validation of data regardless of where the data is entered (whether in a form or in a table), and input masks you can add to fields to automatically fill in constants (for example, dashes and slashes in phone numbers).

—Celeste Robinson



MICROSOFT ACCESS 2.0 graphically displays database-table relationships. The Database Documentor can print the details of database characteristics.

Access 2.0

Wizards and OLE 2.0 make this powerful database easier to use.
Microsoft Corp.
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Advantage: An Inexpensive, Good-Looking PIM

Appearance, rather than functionality, is a big part of what distinguishes today's personal information managers. Appearance is important—if a PIM doesn't look right to you, you'll never use it. Polaris's Advantage has an interface that resembles a series of folders, a unique metaphor among low-cost PIMs.

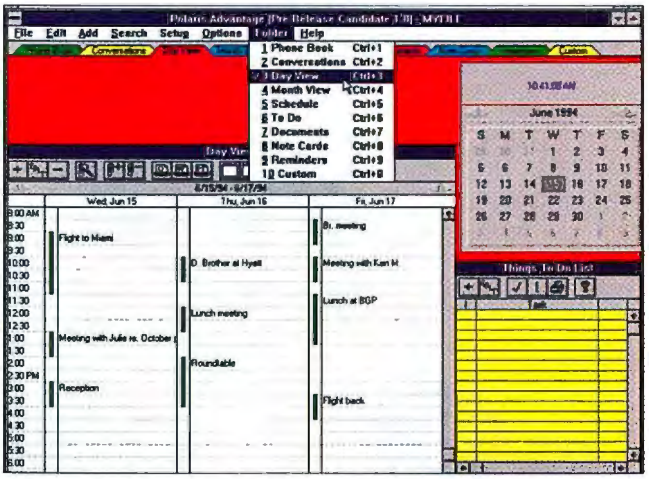
The product is aimed at PIM novices but will appeal to experienced users, too. Expected to sell for about $79 on the street, Advantage lacks the fancier features (such as a macro language and customizable forms) of Polaris's original PIM, PackRat. But working with a preproduction copy, I found Advantage much easier to use.

When you open the program, you see ten folders offering the PIM essentials: a scheduler, phone book, and to-do list. You can customize a folder to show several modules. For example, you may want the daily calendar, phone book, and to-do list to appear all together on the same screen.

Advantage's scheduler displays your appointments on a one-, two-, three-, or five-day calendar, or on a weekly or monthly calendar. You can set reminder alarms, schedule recurring appointments, and track special events such as birthdays. Along with a phone book, Advantage offers a conversation log for taking notes and tracking the dates of calls. The to-do list helps you prioritize tasks and rolls over uncompleted items, showing them in red on the next day's list.

Advantage's document manager lets you list documents using long descriptions, instead of the short names you see in DOS and the Windows File Manager. Links with popular Windows apps allow mail merge using your word processor and Advantage's phone book.

—Laurianne McLaughlin



SLIMMED-DOWN PACKRAT: Polaris's Advantage PIM has an attractive folder-based interface, but lacks many of PackRat's high-end features.

Advantage

Simple PIM has scheduler, phone book, and to-do list in a folder-based interface.
Polaris Software
619/592-7400
List price: $149
Reader service no. 699

Stacker 4.0 Breaks the 2-to-1 Compression Barrier

Thanks to its new SmartPack technology, Stac Electronics' Stacker 4.0 for Windows and DOS can give new life to cramped hard disks—even disks already compressed by DoubleSpace or an earlier version of Stacker. With Microsoft's recent removal of DoubleSpace from DOS 6.2 (due to a lawsuit brought by Stac), Stacker is the major remaining choice for MS-DOS users who haven't jumped on the compression bandwagon.

By compressing data and storing it in the nooks and crannies of a hard disk's sectors that normally go unused, Stacker 4.0 is the first real-time compression product to achieve an average compression ratio greater than 2 to 1. The results can be startling: When I installed the package on a nearly full 170MB hard drive running Stacker 3.1, I suddenly had 60MB of newly available space—above and beyond the compression that Stacker 3.1 had already accomplished. (The 60MB figure is Stacker's estimate; actual results will vary, depending on the type of files on the hard drive.)

DoubleSpace users who convert to Stacker 4.0 get several benefits beyond extra elbow room. The Stacker driver uses Novell's DPMS technology to reduce its RAM footprint in conventional memory to 17KB, compared to 37K for DoubleSpace. Stacker can create compressed disk partitions of up to 2GB; DoubleSpace is limited to 512MB partitions. And the program automatically backs up vital files to ensure that recovering from a hard-disk disaster is as painless as possible.

Once I had Stacker running properly on my 33-MHz 486 PC, the only sign of its presence was a slight degradation in hard-disk performance. The setup process, however, could have gone much more smoothly: All three of my test installations required after-the-fact tinkering to perform satisfactorily, even though I had chosen Stacker's Express Setup option.

While the program's slim manual didn't cover all my issues, Stac's technical support staff was very helpful. But even they couldn't immediately solve one mystery: When I tried to decompress a Stacker-compressed drive, the program told me the drive was too fragmented to decompress—right after it had informed me the drive had 0 percent fragmentation. Also, Stacker isn't compatible with Windows 3.11 for Workgroups' 32-bit file access.

—Harry McCracken

Stacker 4.0 for Windows and DOS

The most space-efficient disk compression program yet, but installation can be thorny.
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List price: $149, $49.95 competitive upgrade
Reader service no. 700

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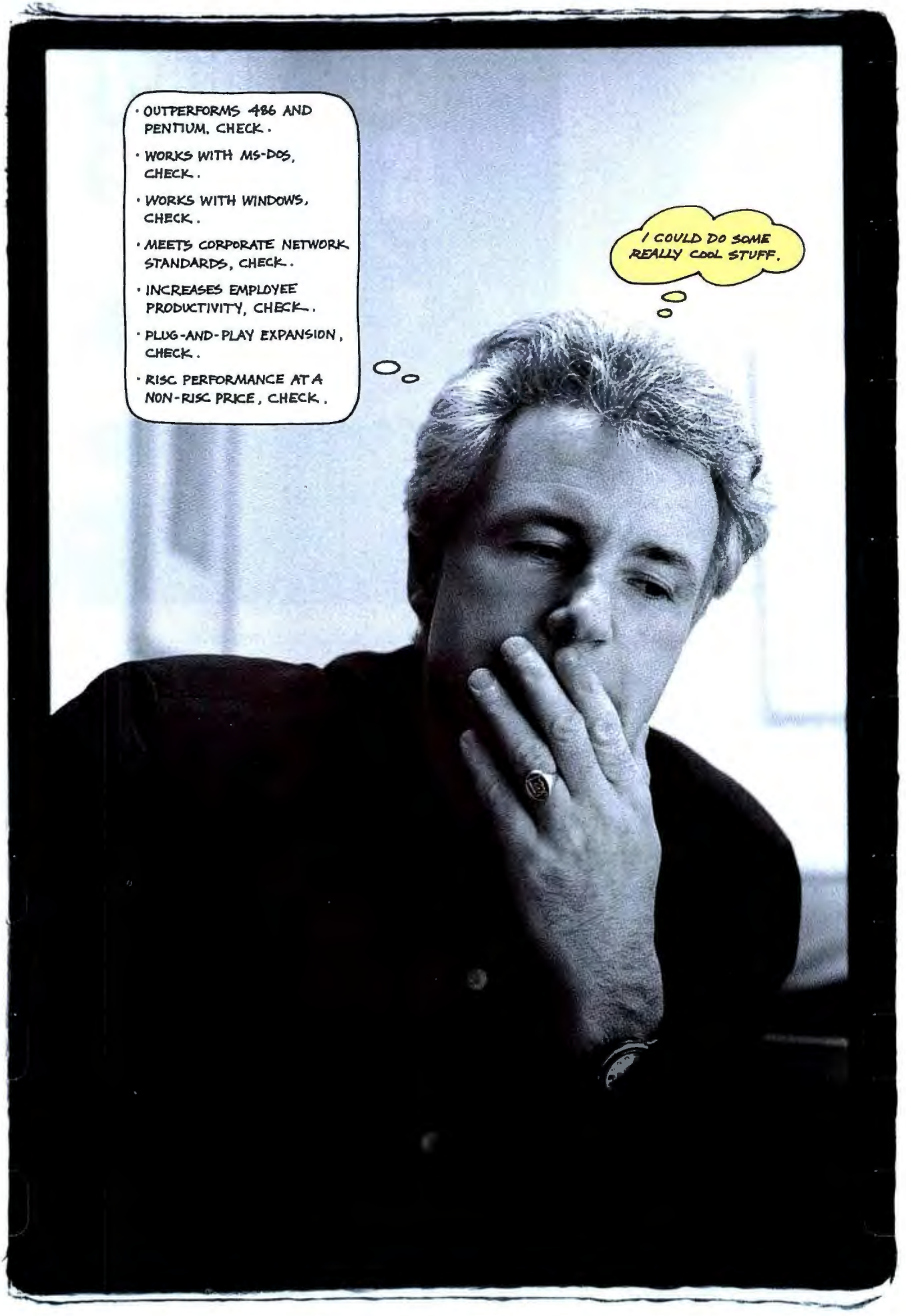
Circle 76 on reader service card


• OUTPERFORMS 486 AND PENTIUM. CHECK.
• WORKS WITH MS-DOS, CHECK.
• WORKS WITH WINDOWS, CHECK.
• MEETS CORPORATE NETWORK STANDARDS, CHECK.
• INCREASES EMPLOYEE PRODUCTIVITY, CHECK.
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I COULD DO SOME REALLY COOL STUFF.

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more powerful
than a PC, more human
than a Macintosh
and designed to work
with both?

PowerPC systems for less than $2,500 running Macintosh, Windows, DOS and native applications that make Pentium look like a draft horse."

This is just the latest example of Apple's commitment to making it easier for MS-DOS and Windows users to take advantage of Macintosh innovations—without sacrificing the investments they've already made in PC technology.

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The whole computer industry is buzzing about the potential of RISC technology in PCs.

"My next computer will be a PowerPC. I was using Intel-based machines long before the PC was a glimmer in IBM's eye, but as Emerson said, foolishly held consistency is the hobgoblin of little minds.... It's time for a change, and the time is now," wrote Bill Machrone in *PC Week*. "That next machine will probably wear an Apple logo.... Apple appears to be a good six months ahead of IBM in terms of [PowerPC] product development and software integration."

Plug-and-play Ethernet networking is standard. So is plug-and-play expansion capability. So is CD-quality sound. Put it all together, and you've got a whole new way to think about Macintosh.

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You can hardly pick up a magazine these days without reading about how the worlds of video, sound, telephones and computers are coming together. About new developments like speech recognition, desk-to-desk videoconferencing and integrated voice mail. About how documents of the future will include not just text, numbers and graphics, but sound, video clips and animation.

To make the most of these vast new capabilities, you'll need to have the power of RISC technology—and the simplicity of Macintosh.

Of course, there's no better way to understand the power of Power Macintosh than to try one today at your authorized Apple reseller (for the name of one located near you, call 800-732-3131, ext. 600).

And see just how much more power a Macintosh can give you. The power to be your best.*

Software accelerated for Power Macintosh.

This is just a fraction of the software that is now or soon will be available in versions accelerated for Power Macintosh.

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Adobe Illustrator
Adobe Photoshop
Adobe Premiere
Agfa-Gevaert N.V.
Aldus FreeHand
Aldus PageMaker
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Claris ClarisWorks
ClarisImpact
Electric Image Animation System
Fractal Design Painter
Frame FrameMaker
Graphisoft ArchiCAD
Great Plains Dynamics Release Two
Insignia Solutions SoftWindows
Language Engineering LogoVista E to J
Leaf Systems
Lotus cc:Mail
Macromedia Authorware Professional
Macromedia Director
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Oracle7
QuarkXPress
Radius RocketShare
Radius VideoVision Studio
RasterOps Horizon 24
Ray Dream Designer
Scitex Corporation Ltd.
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Strata StudioPro
SuperMac cards and peripherals
VideoFusion
Virtus WalkThrough
Wolfram Research Mathematica
WordPerfect 3.0
WordPerfect Office

Introducing Power Macintosh.

Apple

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Check your preconceptions at the door.

This isn't just a new family of Macintosh® personal computers. It's a whole new kind of personal computer.

A new architecture. A new chip. A new standard that exceeds previous personal computing standards—yet works with MS-DOS, Windows and Macintosh.

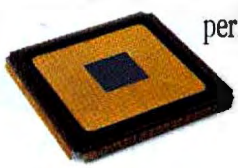
Introducing Power Macintosh™ personal computers. More powerful than a Pentium processor-based PC. More human than Macintosh. The most powerful personal computers in the world.

Power Macintosh	6100/60	7100/66	8100/80
Processor	PowerPC 601	PowerPC 601	PowerPC 601
Speed	60 MHz	66 MHz	80 MHz
Memory	8MB to 72MB	8MB to 136MB	8MB to 264MB
Expansion slots	1 PDS or NuBus	3 NuBus	3 NuBus
Hard disk storage	160MB or 250MB	250MB or 500MB	250MB to 1GB
Video support	DRAM	DRAM, VRAM 1MB to 2MB	DRAM, VRAM 2MB to 4MB
Networking	Ethernet	Ethernet	Ethernet
Apple Price	From $1,819	From $2,899	From $4,249

All this plus built-in Macintosh PC Exchange,™ AppleScript,™ QuickTime™ software, TrueType™ fonts, GeoPort™ serial ports, 16-bit stereo audio input and output, file sharing without a dedicated server and more.

The power of Apple, IBM and Motorola.

At the heart of Power Macintosh is the PowerPC™ 601 microprocessor: the first of a new family of ultra-high-performance RISC chips developed in a unique three-year collaboration between Apple, IBM and Motorola.



The PowerPC 601 has a lot of power inside it: the combined resources of IBM, Motorola and Apple.

RISC technology brings a whole new level of performance to personal computing. Software written to take advantage of its unique capabilities, in fact, will blow the doors off the same programs written for 486 PCs—and will run significantly faster than programs for Pentium processor-based PCs.

RISC technology makes everything work faster: from 3-D modeling applications that require floating-point computations to basic business software.

Combine the increased power of RISC with the practical simplicity of a Macintosh, and the result is more work done in less time, with lower training and support costs.

The power to run MS-DOS, Windows and Macintosh software.

Many Power Macintosh configurations come bundled with SoftWindows, a software innovation that enables Power Macintosh to run hundreds of off-the-shelf MS-DOS and Windows programs at 386 and 486 performance levels. (Of course, every Power Macintosh can run thousands of Macintosh personal productivity programs, too.)

But that's just the beginning. "By the end of 1994," wrote *PC/Computing*, "you'll see

From left, the Power Macintosh 8100/80, Power Macintosh 7100/66 and Power Macintosh 6100/60.

Effective 3/14/94. Apple Price includes the Power Macintosh 6100/60 with 8MB of memory and a 160MB hard drive. For the sake of custom configuration, keyboard, monitor and mouse are sold separately. Unless bundled with a particular configuration, SoftWindows must be purchased separately. TrueType are trademarks of Apple Computer, Inc. PowerPC is a trademark of International Business Machines Corporation, used under license therefrom. SoftWindows is a trademark of Insignia Solutions Inc.

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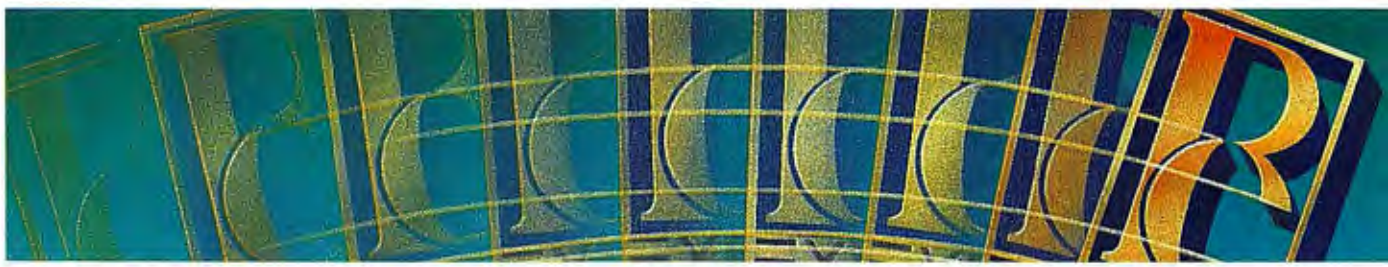

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BLENHEIM

A Scheduler for Managers

Once upon a time, I worked in restaurants for a living. I used to see the managers wrestle with stubby pencils and reams of paper in a sweaty effort to schedule weekly shifts for dozens of employees. It looked like an exercise in futility: Too few employees ended up working a shift, breaks conflicted, or people were scheduled to work on their days off. And as I recall, those managers usually worked 18-hour days.

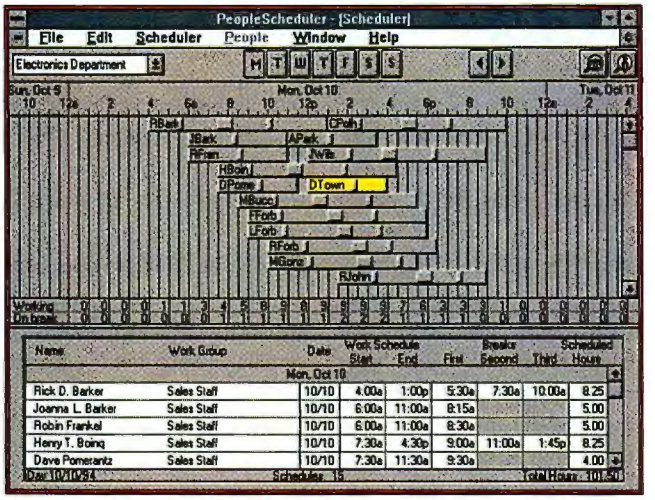
Adaptive Software changes all that with PeopleScheduler, a product that should make anyone who schedules shift-based, part-time, flex-time, and full-time employees practically dance for joy. The product comes in DOS and Windows flavors; both versions have a simple point-and-click interface that looks like a hybrid of a PIM and a project manager. To schedule employees, you select an employee's name and a date from the menu, then click and drag elongated buttons (called time bars) across a timetable. As you change work times, the readjusted schedule appears in a data table at the bottom of the screen. When schedules conflict, the program tells you so.

When your schedule is just the way you want it, use the program's calendaring feature to paste the schedule into future dates. PeopleScheduler also lets you keep records, including job titles, skills, hire dates, attendance, vacations, and notes. You can select from a variety of templates and print customized reports. Navigation is also easy: Click a date and PeopleScheduler shows that day's schedule.

While PeopleScheduler is unquestionably useful for managers who use stand-alone Windows or DOS PCs, it still has a couple holes. For one, the interface is almost too clever: With the arsenal of time bars, real-time status tables that list start and end times and breaks, and various option buttons, there's a lot to take in. And since the program lacks built-in OLE support, it can't integrate with other calendaring, accounting, or similar programs—an ability that would make PeopleScheduler particularly useful in a net-worked environment. (The company says it plans to add such a feature in its future releases of the program.)

But considering that nothing like this existed before—except for complex project management packages costing about as much as an entire PC—these are minor quibbles. Priced at $495, PeopleScheduler is one of those products born to run on a manager's PC. In fact, most managers will wonder how they ever lived without it.

—Bronwyn Fryer



SCHEDULING WORK SHIFTS is fast and simple with PeopleScheduler's time bars—drag them left or right to show any scheduling conflicts.

PeopleScheduler
Sets up employee schedules quickly and easily.
Adaptive Software
800/598-1222
Street price: $495
Reader service no. 701

TeamFlow 3.1 Offers Flowcharts for Quality Control

The term *total quality management* typically refers to a company's attempts to streamline business operations and improve customer satisfaction. To do this, you need flowcharts to explain how work will progress. TeamFlow 3.1 for Windows lets you quickly create good-looking deployment flowcharts that outline a quality control project—including employees' duties, relationships, and collaborative efforts.

Conventional flowcharts use color or text to show roles in a project. But with a TeamFlow deployment flowchart, the names of team members display in a bar across the chart's top. Project stages align under the names, making it easier to see who's in charge of what.

TeamFlow offers a point-and-click method for constructing flowcharts. (Less sophisticated packages make you write scripts or size and drag shapes on a grid.) You begin by entering project members' names and contact information in TeamFlow's database. The program then creates a template for your flowchart, with team member names listed across the top. To start diagramming the project's steps, place the cursor under a member's name, and click. A pop-up box asks what kind of step you want to represent—a task, meeting, report, discussion, or milestone. Each has an assigned shape; click your choice and the shape appears below the member's name.

TeamFlow 3.1 connects the shapes horizontally to show who's working together, and connects lines vertically to show project flow. One more powerful feature: You can manage related documents, such as memos or reports, by linking them to stages in the flowchart.

—Laurianne McLaughlin

TeamFlow 3.1 for Windows
Creates deployment flowcharts for managing complex business projects.
CFM, Inc.
800/647-1708, 617/275-5258
List price: $295 until September 30, $395 after, upgrade $49.95
Reader service no. 702

SkyScraper: A Utility That Makes More of Your OS/2 Desktop

You can take the penthouse view of your desktop with SkyScraper from Binar Graphics. This OS/2 utility extends your limited screen space by creating a virtual screen up to 50 times larger than your display that you can navigate around using your mouse. The program's graphical interface sits unobtrusively at the bottom of your screen and lets you instantly switch between any number of virtual screens that you configure.

SkyScraper
This OS/2 desktop manager lets you create virtual screens for your applications.
Binar Graphics
800/228-0666
List price: $99
Reader service no. 703

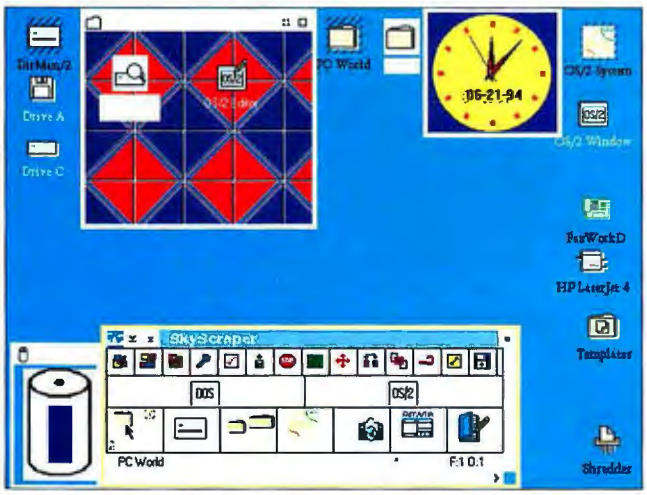
SkyScraper takes OS/2's work-area concept a step further by giving you one-click access to any windowed or full-screen application. The program uses an office building metaphor, with several "floors" that each contain any number of separate "offices."

SkyScraper lets you bring all windows to one screen, move applications from one screen to another, and move to any application with a single keystroke. You can even save and restore up to eight custom desktops, with your applications distributed any way you like.

Since SkyScraper integrates with the OS/2 WorkPlace Shell, you can open a folder by dragging it into an office. Or drag icons within SkyScraper to move folders to another floor and office. You can move from one desktop to another just by moving your mouse to the edge of the screen. SkyScraper can copy a window to the same place on all your screens, and and you can enlarge windows to span more than a single screen.

This is a great utility for any OS/2 user who routinely works with multiple applications or on a small screen, such as that on a notebook PC.

—Lou Miranda



VIRTUAL DESKTOP FOR OS/2: SkyScraper from Binar Graphics lets you create a virtual screen 50 times larger than your display.

Q/Media 2.0 for Windows Builds Multimedia Presentations

Unlike the leading presentation packages such as Harvard Graphics, PowerPoint, and Freelance, Q/Media 2.0 for Windows isn't a tool for creating sophisticated graphics and other exotic effects from scratch. Rather, it's designed to help you pull together graphics, animation, video, and sound from various sources. You then use Q/Media to add text, backgrounds, and scene transitions to create appealing multimedia presentations.

Q/Media 2.0 for Windows uses a clip list approach to presentation building. In the program's Clip List window, you choose clips to use in your presentation—say, a BMP image you created in a paint program, or an AVI video file from a clip media CD ROM. Using the mouse, you drag a file name into a scene; the file then becomes an object. You can add or delete objects and shuffle their order in your presentation. The next step is to add text, transitions, and backgrounds and save your finished "movie."

Q/Media 2.0 has several enhancements that version 1.2 lacked, including OLE 2.0 support. This feature lets you drag an object from another OLE 2.0–compliant application into Q/Media 2.0, click the object, and use the parent application's menus and tools without leaving Q/Media.

You can create complex hyperlinks and add 3-D buttons to use in interactive navigation through a presentation, including branching (this gives you the ability to skip a particular segment, such as a tutorial on last year's financial statement). A new integrated outline feature lets you see all the text at once. And if you change text in the outliner, Q/Media automatically updates the affected scenes. The program includes predefined heading and body text styles, useful for building presentations fast. You can also save background scenes—including text and images—as templates for later use.

While Q/Media 2.0 for Windows ships on 3½-inch floppies, the package includes an optional clip media CD ROM with about 200 video, sound, animation, and graphics files. If you know the basics of creating a multimedia show and are ready to experiment with more complex presentations, you might give this $199 program a try.

—Gene Smarte

Q/Media 2.0 for Windows
This multimedia presentation package integrates sound, video, graphics, animation, and text from various sources.
Q/Media Software Corp.
800/444-9356
List price: $169, with CD ROM $199
Reader service no. 704

Way to go, Apple.

Apple's new Power Macintosh™ computers are here. Based on the new PowerPC™ microprocessor, they truly have the power to change the course of computing. So congratulations, Apple. Way to go, go, go.

PowerPC Microprocessors. *A change for the better.*

MOTOROLA

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Find a Job With Job–Power Source

Whether you're fresh out of college or you're looking for a career change, Job–Power Source is a good place to start the job search. This $49.95 CD ROM is a resource for the job seeker, with tips on résumé writing, interviewing, and negotiating your salary.

Where and how do you look for employment that sounds interesting? One place to start is Job–Power Source's introductory menu: Click the Investigative button and explore more than 200 careers. Each career description contains a plethora of information, including educational and training requirements, working conditions, salary, and growth prospects. If you're skeptical about a particular job market, Job–Power Source offers the U.S. Department of Labor's *Occupational Outlook Handbook*, a government publication that predicts which markets will grow and shrink in the nineties.

You may also want to search Job–Power Source's Dictionary of Occupational Titles, a database of 12,740 job titles. But don't get too excited: When I selected this topic, I was told that the dictionary doesn't come with Job–Power Source; it is only available in Job–Power Source Professional. You're advised to call the company for "additional information"—a euphemism for "send us more money and we'll send you Job–Power Source Professional."

Despite this baiting, Job–Power Source does fulfill its other promises. It includes text from 11 best-selling career books by Ron and Caryl Krannich, with everything you need to know about the job search process. However, the text gets a bit redundant: It was clear I was reading the same advice from the various books.

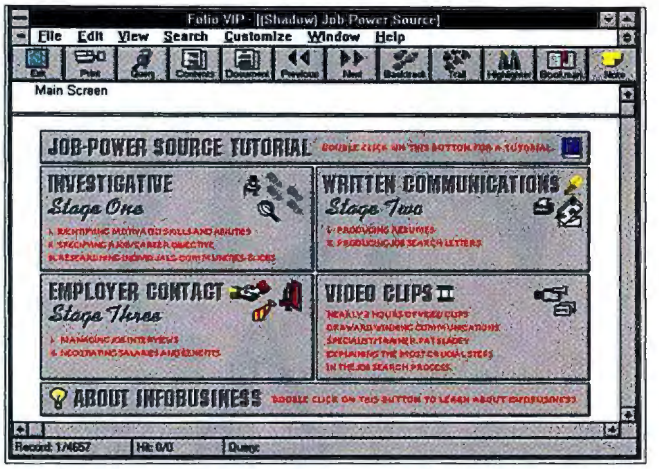
If you're uncertain about your skills and talents, Job–Power Source offers personal guidance and advice for clarifying goals and interests and selling your abilities to companies. The program offers worksheets for setting career goals, outlining personal priorities, and testing preparedness for the job search.

It also includes information on and examples of how to write résumés and cover letters, conduct interviews, and negotiate salary and benefits. The Query tool makes it easy to search the topics, but with so much information to cover, hypertext links to related topics would be helpful.

This isn't to say that Job–Power Source is all text. When you tire of reading career advice, you can watch video clips (ranging from 30 seconds to about 3 minutes) of communications specialist Pat Sladley. These define résumé guidelines and phone and interview etiquette—information that you would have to dig for in the text. Unfortunately, however, the clips are grainy and run in a small 2-by-3-inch window. The maximized scenes are blurry, and the movements are jerky.

Job–Power Source can tell you where and how to look for employment, and how to market yourself once you pinpoint the right job. But if your goals are relatively focused, you might find it cheaper to browse a bookstore for resource guides, which typically cost half the price of this CD ROM.

–Arden Hoffman



CLIMB THE CORPORATE LADDER with the Job–Power Source CD ROM. The opening screen guides you through your career search.

Job–Power Source

MULTIMEDIA **Looking for a job? Check out this CD ROM before pounding the pavement.**

InfoBusiness
801/221-1100,
801/225-0817 (fax)
List price: $49.95, Job–Power Source Professional $149.95
Reader service no. 695

Print Shop on a Disk

The Print Shop Deluxe CD Ensemble has just about everything you need (except maybe a color printer) to create eye-catching greeting cards, envelopes, banners, and business cards. For starters, you get The Print Shop Deluxe, Broderbund's handy Windows program for designing a wide variety of printed materials. It guides you through the process step by step. Its opening screen prompts you to select a project—greeting card, sign, banner, letterhead, or calendar. Just click a button and follow the instructions. The Print Shop Deluxe offers an impressive selection of background, border, text, and graphics options.

Equally impressive is the CD ROM's seemingly endless collection of hundreds of clip art images—everything from dollar bills to dancing alligators. You can store an image on your hard drive in one of several graphical formats such as PostScript, PCX, or TIFF. Unfortunately, you can't view an image until you've moved it from the CD ROM to the drive, but the package includes several reference booklets that show every image stored on the CD ROM. The product sells for a street price of about $80.

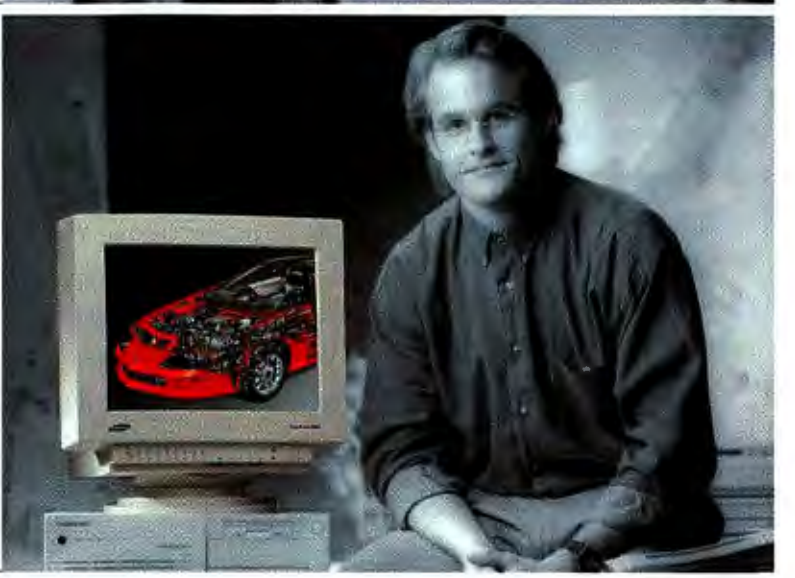
–Jeff Bertolucci

The Print Shop Deluxe CD Ensemble

This program for creating greeting cards, banners, and envelopes has hundreds of clip art images on CD ROM.
Broderbund
800/521-6263
Street price: $80
Reader service no. 696

Samsung
A new point of view.

SyncMaster 17GL



SyncMaster 17GLs

It's about how you work...Attitude. Satisfaction. Pride. The 17-inch SyncMaster™ monitors reflect today's changing lifestyles. Hassle-free. Value-oriented.

Samsung took for granted you wanted bright, crisp clear images that don't flicker. You're also concerned about safety and energy conservation, so they're standard on the whole series.

Life should be as simple as possible, so we added innovative new features like On-Screen Display and Real Color Control, and as you would expect, the GL Series comes with a two-year limited warranty.

Think about how you view your work. Samsung did. And came up with a whole new point of view.

TECHNOLOGY THAT WORKS FOR LIFE

SAMSUNG ELECTRONICS

SyncMaster	14GL	15GL	17GL	17GLs
Size	14"	15"	17"	17"
Dot Pitch	.28	.28	.28	.26
Maximum Resolution	1024x768	1024x768	1280x1024	1600x1280
Maximum Refresh Rate at Maximum Res. (Hz)	76	76	60	60
MPR-II (Low Radiation)	•	•	•	•
Power Management	•	•	•	•
Flat Square Screen		•	•	•
On-Screen Programming			•	•
Real Color Control				•
Warranty	2 Years	2 Years	2 Years	2 Years

*1994 Samsung Electronics America Inc. The EPA Energy Star Logo is not to be considered a product endorsement. Image on SyncMaster 17GL courtesy of Mike Dunn Design. Image on SyncMaster 17GLs courtesy of David Kimble

PowerViewer

It's 9:00, Monday morning and you've just learned the horrifying news. That big meeting with the president of the company next week? It's been moved up. Way, way up. And that report for the big meeting? It's due in half an hour. Fortunately, you've got PowerViewer™ for Windows™, the one tool that lets you access virtually any database and create presentation-ready reports with a few simple clicks of the mouse. You take a long sip of coffee, sit down in front of your computer and click open PowerViewer.

Access More Information.

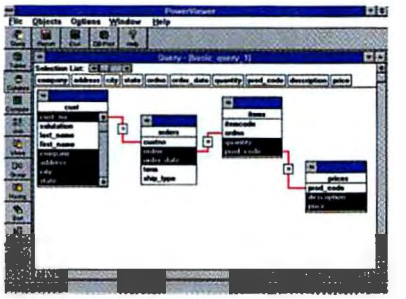
Click. Quickly, you access the Connect Profile menu and select the database you want. Because PowerViewer supports over 25 of the most popular PC and relational databases, all the information you need is right at your fingertips. And with Powersoft's Database Connection Hotline, you know any questions you have will receive immediate answers. Click. You go into the Report Painter and select the specific data for your report using one of PowerViewer's powerful point-and-click query techniques. You choose the one that suits you best, whether it's our easy-to-use QuickSelect, our powerful graphical query builder, or a query you've saved from a previous task. Click. Now you're ready to create your report. You select one of the many built-in QuickStyle templates that enable you to create stunning reports with full-color 2D and 3D graphs and charts. PowerGuides and Data Smart design tools lead you through every step and let you preview and customize any aspect of your report in seconds. Include a pie chart. Change fonts. Add colors. Pull in your corporate logo. And click, click, click — suddenly, you've created a masterpiece. PowerViewer makes information access as simple as point and click. It empowers you to make full use of your company's information and lets you do it faster and with greater ease than you ever thought possible.

Create Stunning Reports.

PowerViewer, Just $99.*

It's 11:00 and you've just come out of the big meeting. Your report was a hit. A big hit. So big, in fact, the president has asked you to run it by the entire company, gather everyone's opinions and give him a report on your findings. Under ordinary circumstances, this would be the kind of news that could ruin your entire month. Fortunately, one of your colleagues has PowerMaker™ for Windows, the tool that gives you all the functionality of PowerViewer plus the power to design fully-interactive forms, manipulate databases and create complete Windows-based applications in no time.

Click
Click



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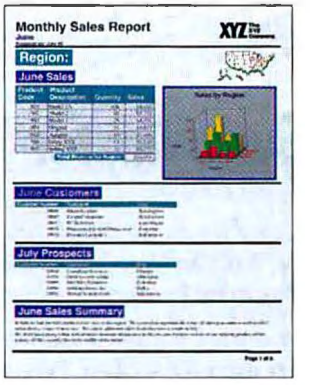

POWERSOFT ENTERPRISE SERIES™

* Introductory prices are subject to change without notice. Prices do not include sales tax, shipping or handling.

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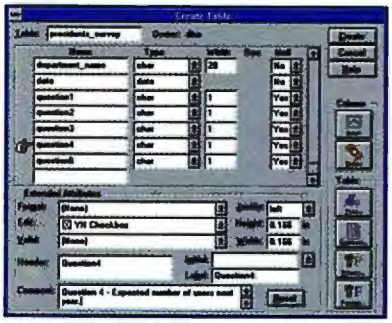

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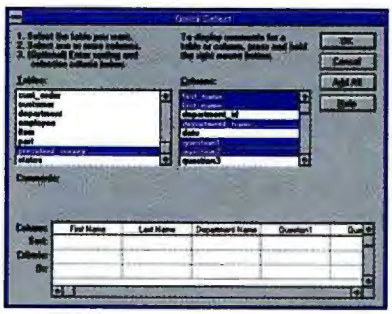

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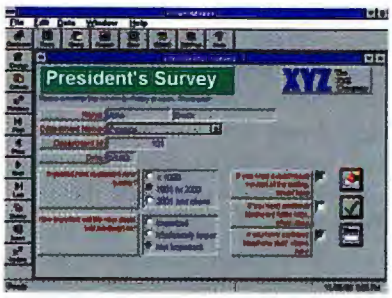

PowerMaker

Build Applications Too.

Click. You open PowerMaker, access the Connect Profile menu and select a database to capture responses to your employee survey. You can use the powerful WATCOM™ SQL relational database that's included in PowerMaker or select any other database on your network. Then, with the touch of a mouse, you access the Database Painter and PowerMaker guides you painlessly through creating your database layout.

Click. Next, you access the Form Painter. Another touch of the mouse links your database to the survey form you're about to create. Then, just like when you created your report earlier, you simply choose a QuickStyle form template, layout your survey and customize it in seconds. Edit text. Rearrange questions. Add toolbars. Bring in all the bells and whistles. In minutes, you've created your very own Windows application.

PowerMaker, Just $199.*

Click. Now, it's time to distribute your application to the world. PowerMaker not only enables you to share your applications with everyone on your network; it lets you do it without any user runtime fees. So you just put your "President's Survey" on the network and tell your colleagues it's coming. They simply click open the icon and fill in the blanks. Your database is updated automatically. All you have to do is go in and create your final report. And you already know how easy that's going to be. PowerMaker lets you take the power of PowerViewer a step further, helping you build and distribute your own form-based applications, as well as update databases. With PowerMaker, you can create living, breathing Windows applications that your entire department can use. And you can do it all by yourself in just a few short minutes.

Call 1-800-273-2841 Today.

Of course, this scenario is merely a reenactment of the typical office crisis. But the fact is, PowerViewer and PowerMaker make accessing the information you need, producing stunning reports, and even creating and distributing your own Windows applications as simple as point and click. And right now, these tools are not only incredibly easy to use. They're also incredibly easy to buy, because we're offering them to you at special prices of just $99 for PowerViewer and $199 for PowerMaker. And each is backed by Powersoft's 30-day satisfaction guarantee. To order PowerViewer and PowerMaker today, simply contact your corporate reseller, stop by CompUSA or call Powersoft directly at **1-800-273-2841.**

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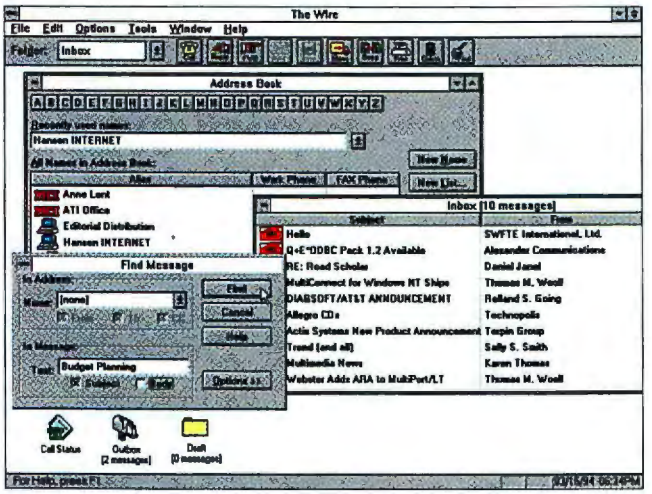
Powersoft Corporation
561 Virginia Road, Concord, MA 01742-2732

Circle 158 on reader service card

The Wire 3.0 Offers a Friendly Face for MCI Mail

MCI Mail is a useful communications tool that suffers from an esoteric, hostile user interface. That's why Swfte International's The Wire has become popular—it offers a graphical front end that makes MCI Mail easier to use.

With The Wire 3.0, Swfte's done an excellent job of refining its product. At first glance, the program looks and works pretty much the same as The Wire 2.0. You do all your work offline, creating and replying to MCI messages. Clicking the Call icon logs you on, sends and receives your messages, and quickly logs you off. (You can also tell the package to automatically check your messages at regular intervals.)



THE WIRE 3.0 hides the esoteric MCI Mail interface with a graphical front end for easy message management.

But under the hood, there's a wealth of new features. One of my favorites is the built-in spelling checker. There's also an ad hoc addressing option that lets you send a quick note without having to first enter all pertinent information in your address book. You can also create multiple address books.

Other features allow the product to better manage heavy MCI Mail traffic. A redesign of the underlying database lets you create nested folders for storing and managing lots of mail, and the product now aggressively uses Windows drag-and-drop. For example, to attach a binary file to a message—an exasperating multistep process in MCI Mail—you simply pick your file from Windows' File Manager and drag it to The Wire's message window.

—Stan Miastkowski

The Wire 3.0

Popular MCI Mail front end adds a raft of new features.
Swfte Int'l, Ltd.
800/237-9383, 302/234-1740
List price: $99.95, upgrade from 2.0 $10
Reader service no. 678

Spectrum's Envoy: The Communications Command Center

It's a fax-modem. It's a sound card. It's a phone answering machine.

Envoy is all of the above, at different times or even all at once. This add-in card is part of an emerging breed of multifunction boards that change their persona—automatically or with an icon click—to fit your communications needs. While this may seem like a product with an identity crisis, small-office denizens will appreciate its ability to use a single phone line for fax, E-mail, and voice calls, and to have the PC manage them all. Envoy performs these tasks very effectively.

Envoy takes its cues from the Discriminator, a utility that determines the type of incoming call. If it's a fax, Envoy calls up the accompanying fax program (QuickLink II) to receive it; if it's a voice call, Envoy routes the call to the Personal Telephone Assistant (PTA) program. Both QuickLink II and PTA give you a slew of handling options for your fax and voice messages, such as fax viewing and printing and the ability to listen to and actually edit voice messages using a diagram of the voice waveform. You can also store voice messages in folders.

PTA is chock-full of neat stuff. It lets you record greetings and attach date- and time-stamped notes to phone book entries—useful for tracking contact histories. You can even convert Envoy into a speakerphone. Envoy's big drawback, however, is its insufficient integration of data communications such as E-mail: The Discriminator software can't distinguish data from voice and fax calls. When you load a communications application, such as QuickLink II's data module or Windows' Terminal, Envoy closes the Discriminator and becomes a simple data modem. Spectrum promises a three-way (data, fax, and voice) Discriminator in a future version.

Envoy owes its chameleon-like flexibility to its heavy use of digital signal processor (DSP) technology. With DSP, many of the functions originally based in hardware are handled by software. Need a 14.4-kbps fax-modem? Double-click the appropriate icon in the Envoy Program Group to convert the board into just that. Need a sound file recorder, player, and editor? Double-click the Recorder icon. Because so much functionality is in the software, this DSP board is very easy to upgrade. For instance, you'll be able to increase modem data speeds as software add-ons become available.

—Bryan Hastings

Envoy

A voice, fax, and data management system for your PC that even acts as a sound card and speakerphone.
Spectrum Signal Processing
604/421-5422
List price: $349
Reader service no. 679

Announcing the latest breakthrough in high-performance notebook computers – the TravelMate™ 4000E WinDX4™/75.

The new TI TravelMate 4000E WinDX4/75MHz notebook. With its IntelDX4 processor, you have the power to be more productive.

At Texas Instruments, we've listened to your needs. That's why we've created a way for you to work faster and increase your productivity — with the new TravelMate WinDX4/75 active matrix color notebook computers.

You'll find a lightning-fast 75MHz IntelDX4 processor inside. Combined with our innovative system architecture, your new TravelMate will scream with speed. And with 3 to 5 hours of battery life and a 455MB hard drive, you can be more productive even when you're on the go.

Finally, with so many high-performance features packed in, who needs a desktop PC? The TravelMate 4000E WinDX4/75 does it all. To learn where you can reserve yours today, simply call **1-800-TI-TEXAS** (1-800-848-3927), after all, they're going fast.

TRAVELMATE 4000E SERIES NOTEBOOKS

DISPLAY	PROCESSOR	MEMORY†
Active Matrix Color (9.5")	IntelDX4-75MHz	4MB RAM/455MB HDD
Active Matrix Color	IntelDX4-75MHz	4MB RAM/340MB HDD
Active Matrix Color	486DX2-50MHz	4MB RAM/200MB HDD
Dual Scan Color	486DX2-50MHz	4MB RAM/200MB HDD
Color	486DX2-40MHz	4MB RAM/200MB HDD
Color	486SX-25MHz	4MB RAM/120MB HDD
Monochrome	486DX2-50MHz	4MB RAM/200MB HDD
Monochrome	486SX-25MHz	4MB RAM/120MB HDD

TRAVELMATE INTELLIGENT DOCKING SYSTEM

COMPATIBILITY	EXPANSION	INTERFACES
TI TM4000E Series Notebooks	Six 16-bit ISA slots, two PCMCIA Type III slots, four drive bays	Parallel/2 Serial, VGA, Mouse, keyboard, game port and RJ-11 jack

† RAM expandable to 20MB with optional memory.

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EXTENDING YOUR REACH
WITH INNOVATION™

TEXAS INSTRUMENTS

Circle 220 on reader service card

When all else fails,

Starting at $139!

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.

If you're concerned about lightning, rest assured that when measured using the ANSI/IEEE 587 Category A test wave, Back-UPS are superior to

APC Voted most reliable by 3-to-1

Tripp

Best

PC MAGAZINE

In a recent poll by PC Magazine's MagNet, APC was voted the most reliable UPS manufacturer by a 3-to-1 margin. That's dependability that will see you though years of unmatched power protection.

PC MAGAZINE UK EDITORS' CHOICE

"The clear winner in price performance...it's unbeatable..."

August 1993
APC Back UPS 1250

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Back-UPS® prevail

"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 Traux 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!"

virtually all separate surge suppressors. Surge performance is even backed by a $25,000 Lifetime Equipment Protection Guarantee.

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.)

MADE IN

And since data processed on networked clients needs protection too, the $139 Back-UPS 250 provides an economical solution for all your LAN workstations.

Back-UPS (R to L)	Application	Sugg. List
250	LAN nodes, internet hardware, POS	$139
400	Desktop 486, 386 systems, servers	$229
450	Tower 486, 386 systems, servers	$279
600	Heavily configured systems, CAD/CAM workstations	$399
900	Multiple systems, longer runtime applications	$599
1250	Multiple systems, LAN hubs, small minis, telecom equipment	$799

More than... 1,000,000 Satisfied Users

APC has won more awards for performance and reliability than all other UPS vendors combined...including four consecutive LAN Times *Readers Choice awards...*

PC World Top 20 Upgrade

Windows Mag. Readers Choice

READERS CHOICE

Reseller News Editor's Choice

Discovering how essential Back-UPS protection is can be hard...if you wait for the next storm to roll through. But discovering how afforable it has become is easy...

Call today and find out (the easy way) why more than 1,000,000 satisfied users bank on Back-UPS from APC. With more awards than all other brands combined, field-proven reliability, and a two year warranty, Back-UPS are power protection you can purchase with confidence.

MICROSOFT WINDOWS COMPATIBLE yes NetWare Tested and Approved

ARTISOFT COMPATIBLE LANtastic

SCO ODT Available and Ready

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AWARD-WINNING FEATURES

Instantaneous backup power beats blackouts and brownouts

Unmatched lightning (tested to UL1449) and surge protection for maximum hardware safety

Network-grade line conditioning and EMI/RFI filters prevent glitches

LAN Interface (on Back-UPS 400 and up) provides automatic shutdown to all major OS: Windows, NT, NetWare, LAN Server, LAN Manager, LANtastic, Unix, OS/2, Vines, AppleShare/System7 and more.

Site diagnostics automatically spot missing ground and reversed polarity, two common miswirings which usually require an electrician's visit to diagnose.

Option switches allow you to customize transfer voltage and alarm settings.

Test Switch for ongoing peace of mind

2 year warranty and full safety approvals

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Dept. P3

Circle 45 on reader service card

Turn Your E-Mail Into a Conferencing and Collaboration Tool

Want a recipe for better communication at work? Combine CompuServe's convenient online forums, cc:Mail for Windows' friendly interface, Lotus Notes' document databases, and simmer on your existing E-mail server. Sweeten with a low price, then serve warm to your employees, suppliers, and clients.

What you'll cook up is Collabra Share, an electronic forum that lets your company organize, discuss, and disseminate information using your existing network, E-mail, applications, and information sources. Unlike E-mail that simply sends messages from one person to another, Collabra is more like a message-and-document trough. People inside or outside your company can use Collabra whenever they need to locate or review a shared document, work together on a project, or exchange information. (My jaw dropped when I saw how I could use cc:Mail Remote to dial into a Collabra mail server, then search for and retrieve a press release. Not only that: I could also see all the comments people had made about the release.)

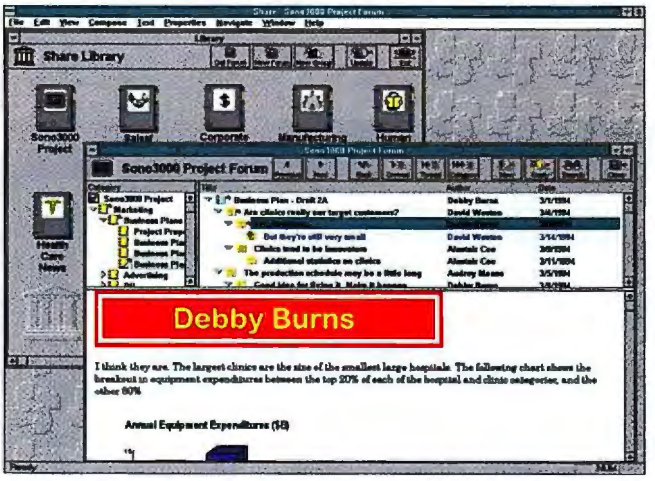
Although Collabra doesn't offer all the directories, workflow options, forms, or application development tools of Notes, you don't have to pay for additional hardware, software, or administrators either. Prices start at $69.95 per user.

–Bronwyn Fryer

Collabra Share

A low-cost groupware product that lets you share documents and electronic mail messages, and collaborate on projects.

Collabra Software Inc.
800/474-7427,
415/940-6440 (fax)
List price: $69.95 per user for ten-user license
Reader service no. 681



PROJECT FORUMS are easy to set up and organize in Collabra Share, a new messaging package that works with your existing E-mail system.

An Easier Way to Retrieve Data From Minis and Mainframes

Despite rumors to the contrary, there are plenty of mainframes and minicomputers hidden in climate-controlled rooms, happily crunching away on corporate data. Plenty of PCs need access to that information as well, and providing that has been the role of garden-variety terminal emulation packages. Sure, they do the job, but with a crude character-based interface.

Attachmate Extra 4.0 for Windows is a different animal. It lets you retrieve host data using the Windows features you've grown accustomed to—such as icons, button bars, drag-and-drop, and the Clipboard—giving you a graphical connection to your company's big iron.

Extra comes with several predefined interfaces for popular host applications such as PROFS and CICS. The heart of the product's power lies in the customizability provided by Extra Basic, a full-fledged scripting language that's compatible with Microsoft's Visual Basic. You can use this feature to create custom interfaces that let you manipulate specific corporate data easily. For example, Extra Basic can create a script to import last month's sales figures from the mainframe directly into an Excel spreadsheet or Word document and back again. That script can be attached to an icon and invoked with a mouse click.

–Stan Miastkowski

ATTACHMATE EXTRA'S BUILT-IN VISUAL BASIC–COMPATIBLE LANGUAGE lets you create custom interfaces to mainframe applications.

Extra 4.0 for Windows

Use Windows to automate data retrieval from a mainframe or minicomputer.

Attachmate Corp.
206/644-4010
List price: $425
Reader service no. 680

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Killer Pixels

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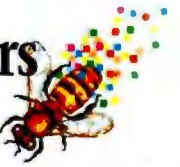

accelerated by mach 64 ATI TECHNOLOGIES INC.

ATI's GRAPHICS PRO TURBO unleashes hordes of killer pixels that will turn your PC into an amazing hive of graphics activity. Stirred up by our *mach64*, 64-bit accelerator chip, your applications will be swarming across the screen at speeds of over 100 million Winmarks*. And your DOS applications will run faster than ever before.

True Killer Color

ATI's deadly new strain of pixels is not only fast, it's vibrantly colored as well, with accelerated 24-bit true color that never stops working, even at resolutions as high as 1280x1024. GRAPHICS PRO TURBO runs in 16.7 million colors as fast as other cards do in just 256.

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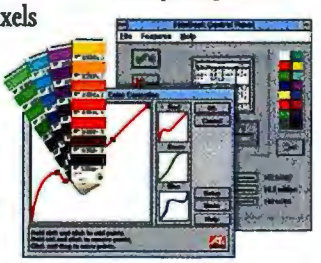
Wilder Windows

GRAPHICS PRO TURBO has a real buzz for Windows users too, with acres of virtual desktop and flicker-free graphics at up to 100Hz refresh. Exclusive software handles color calibration, and our unique WinSwitch lets you change color and resolution modes without restarting Windows. Plus, the GRAPHICS PRO TURBO makes full-motion video really hum with no additional multimedia hardware. So don't bee stung by lesser graphics. Get the GRAPHICS PRO TURBO. It's a honey of a card.

Desktop settings



Color calibration

Easy control of desktop settings and color calibration with FlexDesk panel.

True Color + *High Resolution*

WinSwitch changes color and resolution... without leaving Windows.

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COMPLETE PERFORMANCE DATA
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	GRAPHICS PRO TURBO	Matrox MGA II+	Diamond Viper
Winbench 3.11†	123.0	93.5	85.1
Winbench 4.0*	42.5	35.5	23.9
Winbench 4.0*	26.0	14.9	5.6
DOS Performance††	3,871	575	1,685
Motion Video Performance†††	24	11	13

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* All performance tests done on a Pentium P54C 100MHz, 16MB RAM, 256K cache, 420MB HD, using 2MB PCI graphics cards. † Winbench 3.11 at 1024x768 resolution, 256 colors at 70Hz. †† DOS performance tested using PC Bench 8.0 (video harmonic) ††† Motion Video performance measured under Windows using 65K colors. Test clip recorded at 320x240 at 30 fps using Indeo codec.

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Kiplingers CA-Simply Money 1.5

The new version of Kiplingers CA-Simply Money lets you pay your bills electronically using Checkfree Corporation's payment service, CheckFree. The service is free the first month, then costs $9.95 per month for up to 20 transactions (additional transactions cost $3.50 for 10). Electronic banking is integrated into CA-Simply Money 1.5: The program's Tools menu features a CheckFree option that lets you transfer funds and make payment inquiries via modem. Version 1.5 can also pay mortgages and other fixed monthly payments automatically. The program now offers more advice on a variety of financial topics, including car buying and retirement planning. For long-range planning, three new financial calculators help you make decisions about life insurance, college savings, and adjustable rate mortgages. Kiplingers CA-Simply Money 1.5 lists for $39.95. Computer Associates, 800/820-5550, 516/342-5224.

Reader service no. 682

VocalChat

VocalChat software runs across NetWare-based LANs to provide telephone and intercom capabilities to network users. You can use VocalChat to send and receive voice mail without using a telephone system, broadcast audio messages to an entire network or selected groups, and carry on audio conferences. (You'll need a microphone and a sound card in addition to the software.) VocalChat converts audio information into a standard WAV file, then compresses the file and sends it across the network. This TSR includes voice activation capabilities for hands-free operation. The list price is $199. VocalTec Inc., 201/768-9400.

Reader service no. 683

Green Keeper, PC Ener-G Saver

These two energy-saving devices turn off your monitor, printer, or other office equipment after a user-specified period. With both products, you plug the keyboard and power cords into an external box, install software on your PC, and then set a period of time after which your components automatically power down. EPA calculations show that you can save up to $135 per year by shutting off a monitor–laser printer combo during idle times. Since Green Keeper has a single 10-amp outlet, it turns off all connected components simultaneously. Green Keeper comes with an assortment of adapter cords and lists for $69.95. B&B Electronics, 800/346-3119.

Reader service no. 684

PC Ener-G Saver follows the same principle as Green Keeper but has separate 3-amp outlets for the monitor and printer, allowing you to choose different shut-off times for each device. PC Ener-G Saver also includes built-in surge suppression. The product lists for $99.95. PC Green Technologies Inc., 800/984-7336.

Reader service no. 685

Nokia Multigraph 447X

The market for 17-inch monitors is splitting in two. At the bottom you've got 17-inch monitors selling for as little as $750. These monitors may be large, but they're not necessarily good. At the top are 17-inch monitors that sell for $1000 or more but deliver extremely high-quality images for the money. The Nokia Multigraph 447X is in the latter camp. It uses a Trinitron tube, supports high refresh rates (75 Hz at 1280 by 1024), and uses an on-screen menu to control everything from brightness and contrast to white uniformity and convergence. The Multigraph's list price is $1250, and street pricing will not be much lower. Nokia Display Products, 800/296-6542.

Reader service no. 686

GO GREEN with Green Keeper, a power-saving device that turns off PC peripherals.

Automap Pro

Road warriors rejoice: A colorful new Windows route-planning tool eliminates the guesswork in planning sales calls and could increase your traveling efficiency. Automap Pro plans complicated trips—with up to 100 stops—across the United States, northern Mexico, and Canada. The program converts the ZIP codes in your customer database into precise map locations. It also optimizes routes based on the parameters you set. For instance, if you work a typical eight-hour day and need to make 15 calls, Automap calculates your driving time based on personal preferences, average speeds of different roads, and road conditions. It also calculates gas and toll costs. And if you can't remember faces, simply scan in a photo of Pete the Grocer and his mug will appear next to his supermarket icon on your customized map. You won't find remote parts of the United States, nor will you find one-way streets, though the product includes some 410,000 miles of freeways, toll ways, and state and county roads. It costs $399. Automap Inc., 206/455-3552.

Reader service no. 687

Solomon IV for Windows

Solomon IV for Windows is accounting software targeted at medium-size businesses. It provides 20 business-oriented accounting modules, including general ledger, accounts payable, accounts receivable, inventory management, order processing, and more. Featuring a client-server architecture based on SQL database technology, Solomon IV for Windows allows users to easily customize its modules—essential for any growing business. The program's price ranges from $1295 per module for 6 users to $10,995 per module for 100 users. Solomon Software, 800/879-0444.

Reader service no. 688

trueSpace for Windows

Long ago, seeing 3-D images meant fishing through the cereal box for the goofy glasses.

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Built-in script recorder	Yes	Yes
Phonebook	Customizable	Fixed
Split-screen session window	Yes	No
Scrollback buffer	200 pages	31 pages
Supports all popular file transfer protocols and terminal emulations	Yes	Yes
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Shares a COM port with WinFax PRO	Yes	No
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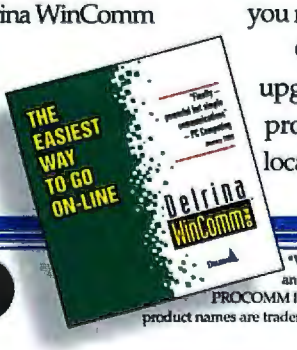

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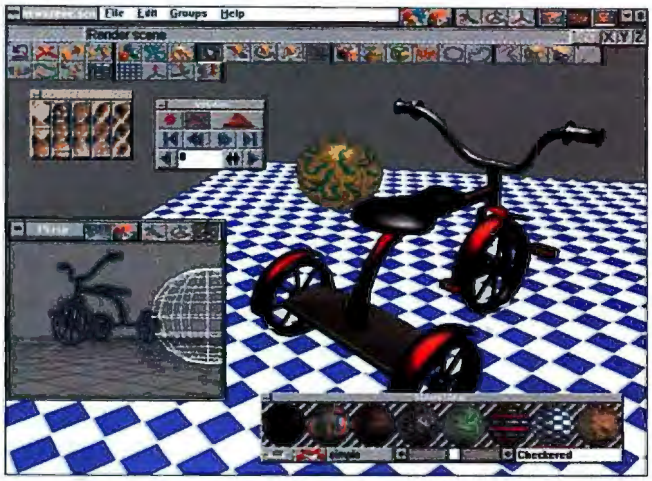

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Caligari's trueSpace for Windows lets you paint, draw, and arrange graphics in a virtual work space environment without the glasses. By combining CAD rendering with sophisticated painting and animation tools, the program lets you create 32-bit 3-D illustrations for slide or video presentations. You can view each trueSpace object from many angles, as well as rotate, twist, distort, position, and paint them in real time. Plain-English menus and intuitive icons make trueSpace easy to use. CorelDraw and Adobe Illustrator users can import 2-D images for 3-D manipulation. For presentations, you can use TrueType fonts to create floating 3-D logos and add realistic effects with trueSpace's palette of preset surface textures (such as orange peel, wood, sand, and stucco). The program lists for $795. Caligari Corp., 800/351-7620, 415/390-9600.

Reader service no. 693

Fast Courier Modems

Buying a modem used to be simple—just pick a speed. But above 14.4 kbps, the new international 28.8-kbps (V.34) standard is still a work in progress. Meanwhile, do you buy one of the proprietary high-speed modems? U.S. Robotics may have the answer. Its new line of Courier fax-modems supports V.32 terbo (AT&T's 19.2-kbps standard), V.fast-class (Rockwell's 28.8-kbps standard), and V.17 (the international standard for 14.4-kbps faxing). And when V.34 is finalized and becomes a formal standard, you'll be able to upgrade your Courier free by loading new software into the modem's built-in flash memory. U.S. Robotics will send you a disk, or you'll be able to download the software from the company's bulletin board. List pricing is $595 for an external unit, $545 for an internal one. Versions with the company's High Speed Technology (HST) are available at $795 for the external version; $745 for the internal. U.S. Robotics, 800/342-5877, 708/982-5010.

Reader service no. 689

Microsoft Office Developer's Kit

In order to make its Office application suite more attractive to businesses, Microsoft is encouraging small developers to write vertical market applica-

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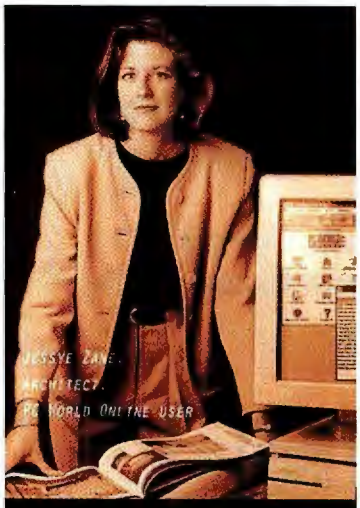
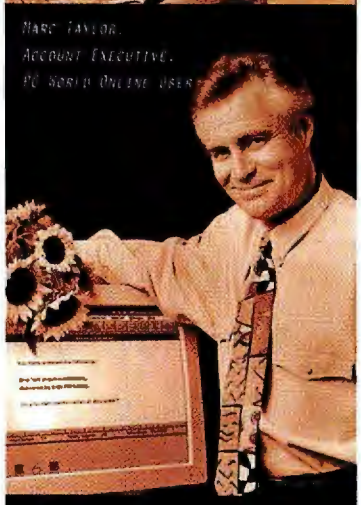
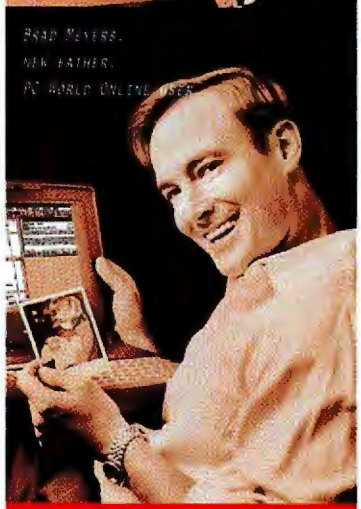


THIS MORNING JESSYE ZANE, WHO IS VERY PARTICULAR ABOUT AESTHETICS, TOOK A MOMENT TO ADMIRE OUR WINDOWS.



AT 5 PM, MARC TAYLOR EVALUATED 12 SOFTWARE PACKAGES, READ THE LATEST ELECTRONIC NEWS, RECEIVED EXPERT ADVICE ON 3 TECHNICAL QUESTIONS, SENT MAIL TO 100 POTENTIAL CLIENTS AND STILL HAD TIME TO BUY FLOWERS FOR A 7 PM DATE.



AND AFTER A LONG NIGHT'S WORK, BRAD MEYERS TOOK A MINUTE TO LET 200 ASSOCIATES KNOW THAT JOSHUA WEIGHED 8LBS., 7OZ.

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tions specifically for the package. One means of encouragement is Microsoft Office Developer's Kit. The heart of this CD ROM is an enormous hypertext engine that contains the Excel and Word developer's kits, work-group templates, sample code, and other useful tools. The product also provides an object browser with information on any OLE 2.0 object that's been properly installed on your hard disk (the information comes with the objects; the browser just gives you a convenient place to look at it). Microsoft Office Developer's Kit lists for $99.95 and will be included free with Visual Basic 3.0 Professional Edition. Microsoft Corp., 800/426-9400.

Reader service no. 690

In the Black

In the Black gives small-business managers a two-in-one financial package: You can keep general ledger accounts for your small business, plus you can manage your personal finances. In the Black also includes an integrated contact manager and a task manager. The contact manager offers sorting capabilities, which can prove helpful for categorizing information on customers or sales. The task manager can remind you to call clients, print checks, process recurring transactions, and pay bills. In the Black's innovative Language Switch icon translates accounting terms into plain English. For instance, click the icon, and the menu item A/P Invoice Entry becomes Enter Vendor Invoices. In the Black's accounting module helps you manage accounts, invoices, budgets, audits, and more. For financial management, this $89.95 program lets you keep track of checking and savings accounts, print budget reports, and plan for retirement and college expenses. Microrim Inc., 800/628-6990, 206/649-9500.

Reader service no. 692

Teleform 3 for Windows

Teleform 3 for Windows is a major upgrade to Cardiff Software's forms interpretation software. The program lets you design complex forms that, when faxed or scanned into a Teleform-equipped PC, are automatically recognized and interpreted. Using sophisticated optical mark recognition (OMR) and optical character recognition (OCR) technologies, Teleform reads data from handwritten, typed, and preprinted text, as well as from filled-in bubbles. It also exports data to most major database and spreadsheet formats. In addition to having improved OMR and OCR capabilities, version 3 addresses a major shortcoming of earlier versions by adding a completely reworked forms designer module with the features of a high-end Windows desktop publishing package. These features include TrueType font support, powerful drawing and object alignment tools, and increased flexibility in object placement and design. The forms designer module also allows the simultaneous editing of multiple forms, supports object drag-and-drop between forms, and exports forms to other Windows programs as standard EPS files. Teleform 3 for Windows lists for $1495; upgrades are $249. Cardiff Software, 800/659-8755, 619/259-6450 (fax).

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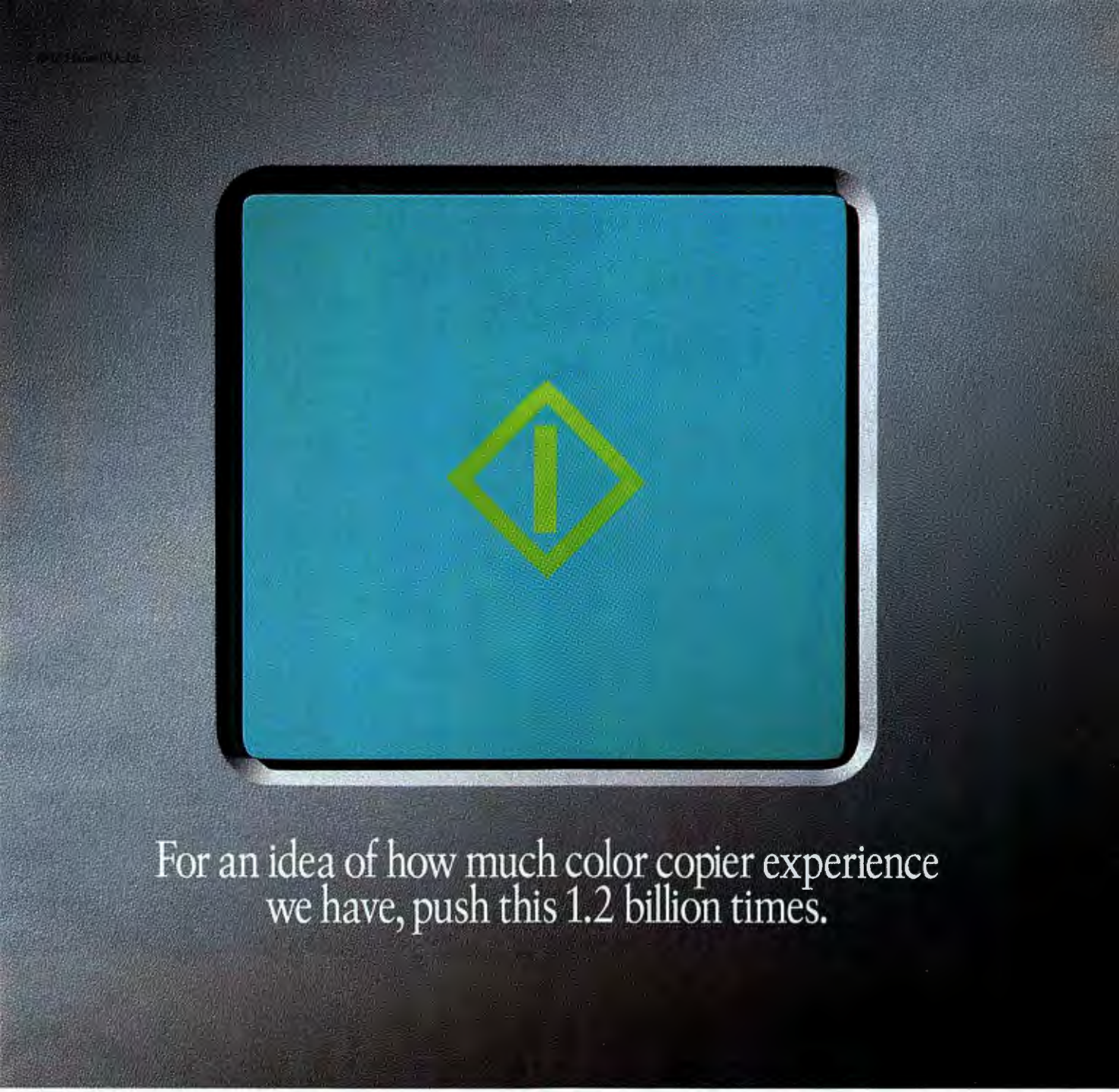
For more information about any product, contact the manufacturer or circle the number on the reader service card.



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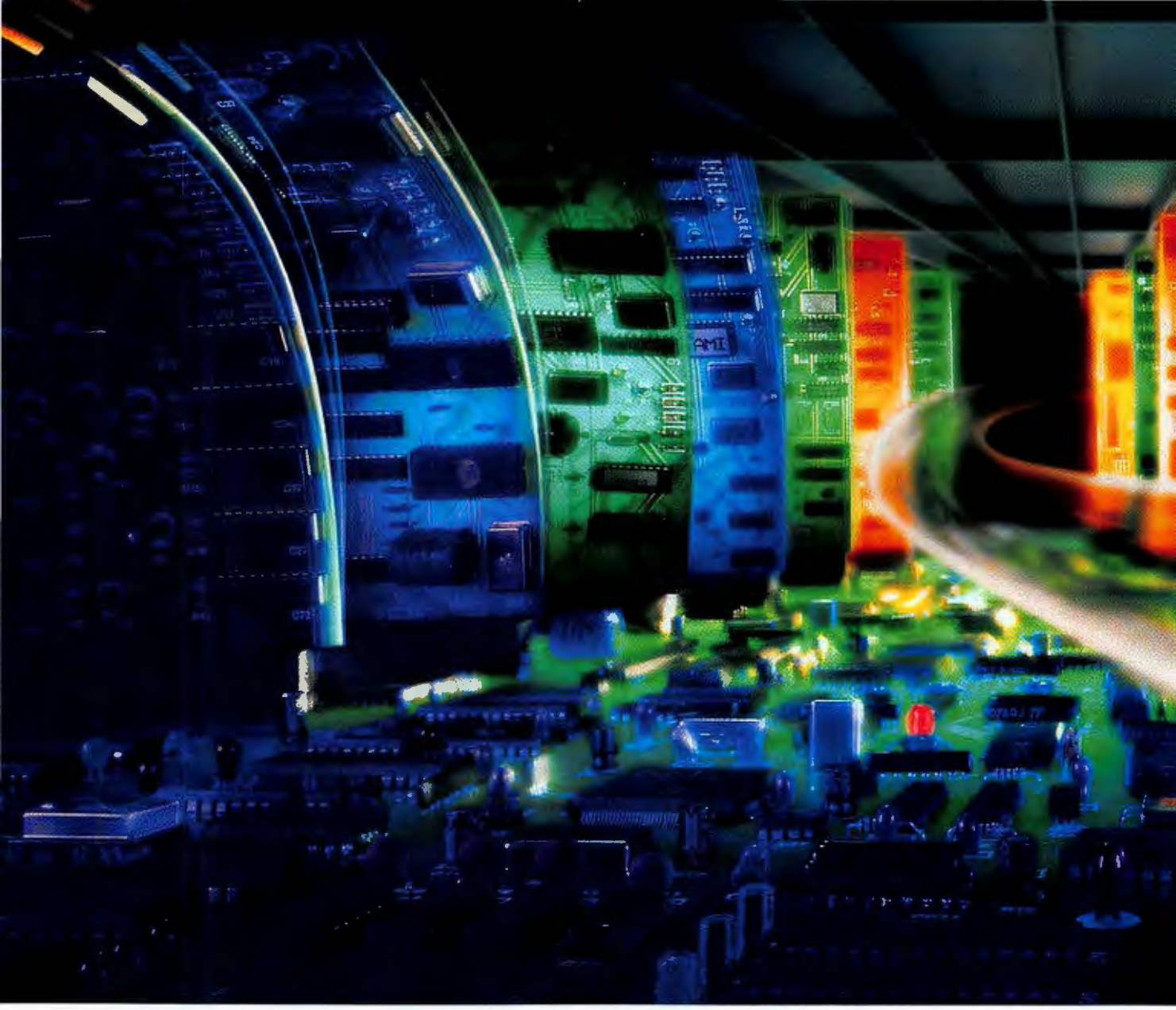

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How do you get a better-performing PC? Start with the best-performing PC processor. And then build a great system around it.

Today's Pentium™ processor-based systems are built to run circles around whatever you're using now. In addition to enhancements such as more RAM and larger hard drives, many feature important design improvements like the PCI local bus. So demanding applications using pictures and graphics don't just crawl onto your screen, they jump.

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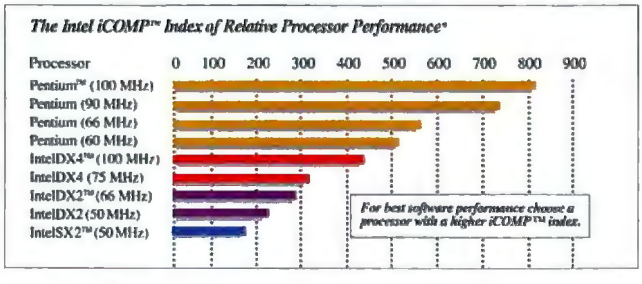
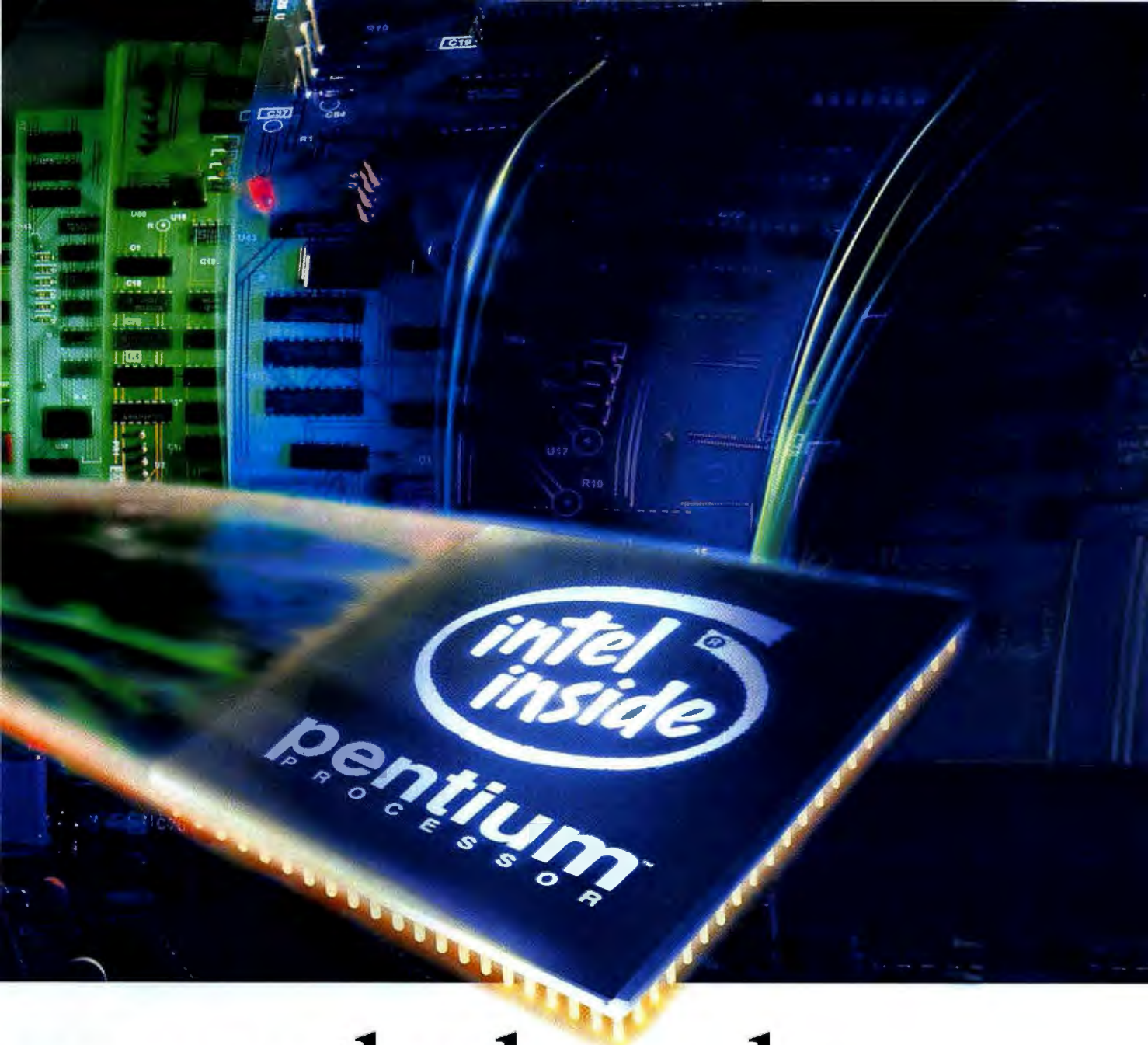


©1994 Intel Corporation. *Source: iCOMP: A Simplified Measure of Relative Intel Microprocessor Performance, Intel Corp., 1992.



across the board.

introduced designs based on the Pentium processor, giving you a wide range of choices in Pentium processor-based systems. And many of them are surprisingly affordable.

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For more information and a list of the Pentium processor-based systems currently available, call 1-800-395-7009, Ext. 116.

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Your New PC: DOA OR DESTINED FOR GLORY?

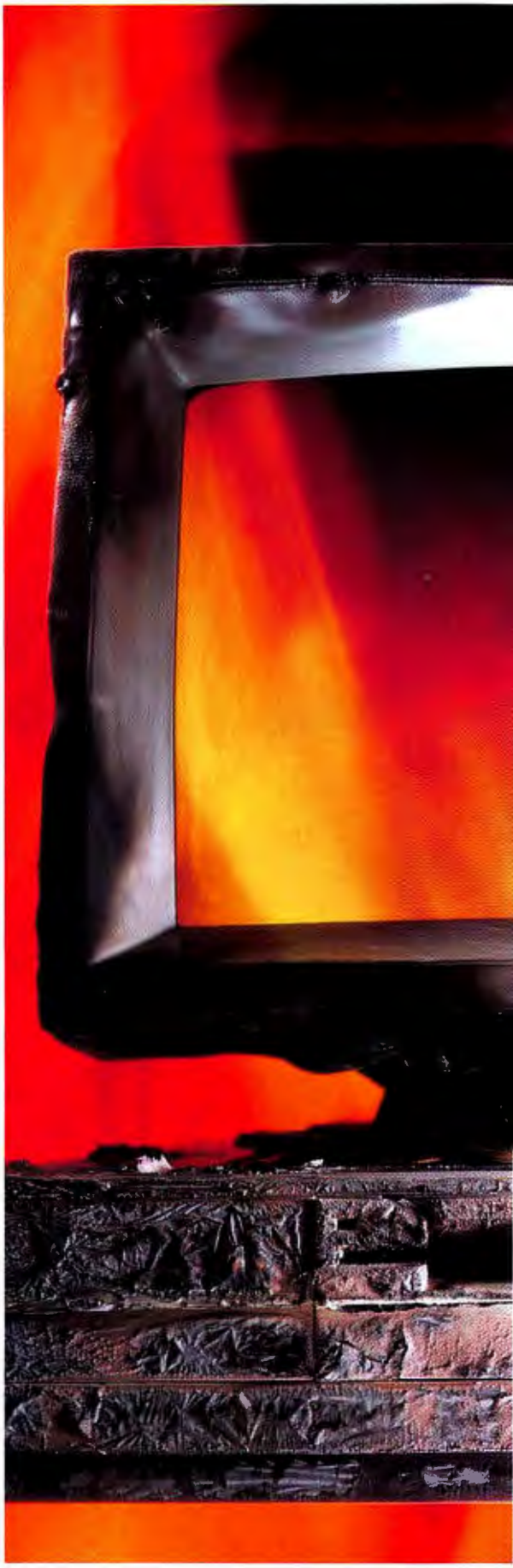
THE EXPERIENCE OF 45,000 PC WORLD READERS TELLS THE FUTURE OF YOUR NEXT PC.

What do consumers want most in a new PC? Reliability. They want their new computer to work right out of the box and keep on working until they're ready to buy a new one. Those aren't unreasonable demands, but it's difficult—if not impossible—to evaluate the reliability of PCs. And what if your computer does fail—as many do? How responsive is the company that sold it to you?

To find out about PC reliability and service, we spent three months investigating: We visited five of the top PC makers and interviewed their executives and assembly workers. We talked to corporate computer buyers, repair specialists, dealers, analysts, and experts in both quality control and service. And over the past months, we've been monitoring our readers' experiences with their PCs. Since October of last year, every issue of *PC World* has included a Reliability and Service Monitor, in which we ask detailed questions about repair and service experiences.

The following two articles represent the results of this research. In them, we rank the leading PC companies, based on their standings in our reader survey, and offer our assessment of the industry as a whole. Consider this our report card on the industry. ■

At a Glance: Quick Takes on Reliability and Service pg. 130
Help Is on the Way...But When? pg. 133



Most Likely to Succeed...or Fail

BY DANIEL TYNAN AND CHRISTINA WOOD

As Larry Smith drove down the streets of Carrollton, Texas, to Wal-Mart he counted himself a lucky man. He was on his way to pick up his brand-new Packard Bell computer—a prize he'd won by entering the Wal-Mart sweepstakes right in his own home town.

But when the Lutheran minister got his bounty out of the packing boxes and onto his desk, his luck began to dry up. For starters, it didn't work. "It was terrible. I had to replace the hard drive once, and the motherboard and keyboard a couple of times each." The problems and failures never seemed to end. With his one-year warranty coming to a close, Reverend Smith packed up the computer and drove it hastily back to Wal-Mart. Fortunately, the store was generous enough to replace it with a newer model—free of charge. "I think I deserved it for the aggravation I went through," says Smith. And his problems didn't end there.

Is Smith's experience just a freak example of bad luck? Well, it's certainly an extreme case. But by no means is he an anomaly among the ranks of PC buyers.

Since October of 1993, we have been polling our readers on their experiences with their new PCs. During the past months, we've heard horror stories like Smith's as well as happier tales of extreme loyalty to computer sellers—and everything in between.

Kiss of Death

Hardware problems are an inescapable fact. Almost one quarter of the 45,000 people who responded to our survey experienced some kind of problem. Of this group, nearly 29 percent said the problem occurred within the first month after they purchased their PC. Further, 7 percent of all respondents reported one or more components dead on arrival. Of course, it's human nature to kvetch about problems and remain silent when everything goes well, so our raw numbers may be higher than those you'd get by polling people at random. But the survey does point to dramatic differences among brands (see Reliability Ranking, page 120).

At the top of the reliability charts rest some of the giants of the computer industry. The list of companies that scored high marks for reliability includes Compaq, Hewlett-Packard, NCR, IBM, and AST. But we also discovered some surprises. Considerably smaller Everex and Epson also make it to the top of the reliability charts. Fewer than one in five DEC users reported a problem with their computer—the lowest problem rate in the survey. (However, DEC's slightly higher than average DOA rate knocked it down to the second tier in the rankings.)

Foundering at the bottom of the charts are a gaggle of low-cost PC makers, including Insight, Cornell, Comtrade, and Ambra. Four out of every ten respondents using these machines experienced some kind of problem. In between the two reliability extremes sit a host of household names—like Packard Bell, Dell, Gateway 2000, Leading Edge, Northgate, and Zenith Data Systems (ZDS).

What makes one PC more reliable than another? And does that reliability have to cost more? To find out, we went behind the factory doors of some of the largest PC makers in the world: AST Research, Compaq, Dell, Gateway 2000, and IBM. We examined their assembly process, observed their testing procedures, and ***continues***

ROBERT CARDIN

RELIABILITY RANKING

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AST
COMPAQ
EPSON
EVEREX
HEWLETT-PACKARD
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NCR

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ACER
ALR
CANON
DEC
HYUNDAI
MAGNAVOX
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SWAN
UNISYS
WYSE

Average
ACMA
COMPUADD
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DTK
GATEWAY 2000
LEADING EDGE
NO-NAME CLONE
TANDY

Below Average
AUSTIN
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COMPUDYNE
LASER
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TRI-STAR
USA FLEX
WANG
ZDS
ZEOS

Worst
AMBRA
ARES
COMTRADE
CORNELL
INSIGHT
MICRO EXPRESS
MICRON

Source: PC World Reliability and Service Monitor (see page 130). Companies listed alphabetically within groupings.

interviewed dozens of managers and line workers. We also spoke with computer dealers, industry analysts, quality control experts, and computer buyers to determine just how reliable today's PCs are—and which companies make the most reliable ones.

Our conclusion? There's plenty of room for improvement, but our survey indicates some companies are doing a markedly better job than others. While the standard-bearers of the industry produce some of the most reliable systems around, they can still improve. And the best of their younger competitors have only recently begun to think about quality.

Behind Closed Doors

Quick, who makes your computer? If you said "IBM," or "Austin," or even "Leon's House of Clones," you're only half right. While any one of those names may be branded on the front of your PC, someone else made the vast majority of the parts inside it. But don't be misled by the common components. There's a huge difference in the effort and expense companies go to when they put these parts together.

What sets the leading companies apart is their intelligence of design, careful selection of components, and rigorous testing, says Marc Litvinoff, program director at the Gartner Group in Stamford, Connecticut. "That's the difference between a Compaq or a Dell and a company that buys components and slaps together a machine. The machine may be okay, but the risks are higher with a box like that."

The fruits of good design can be as obvious as the pencil-eraser–size pointing device in the middle of the IBM ThinkPad keyboard, or as subtle as the custom heat sink Compaq designed into its Pentium computers to guard against overheating. But these design efforts translate into more than a single cool feature. They affect every element of a computer—from the selection of components to the way it's assembled.

"You look at 486DX-66 PCs from two different companies and say they have the same processor, the same speed hard disk, so they all should be just as fast," says Joe Simo, manager of data collection for Plexus, a circuit board manufacturer in Neenah, Wisconsin. "But they're not. That's because the components some manufacturers choose are better matched for each other."

To make sure that all those components are on speaking terms, most manufacturers build a handful of prototypes and test them. But the top companies—such as HP, IBM, and Compaq—go several steps further. They run compatibility tests with network interface cards, peripherals, operating systems, and applications. They unleash new designs on select users to gauge how easy—or difficult—the machine is to use. And they put new designs (and components from new suppliers) through fiendish torture tests to uncover the flaws that standard diagnostic tests would miss—but that could send your computer to an early grave.

The Breaking Point

At Compaq, such testing is a way of life. In a fortified dungeon beneath the company's Houston complex, the air is dense with the hum of machinery and the smell of melting plastic. Here Rick H. Smith, director of reliability engineering, oversees the chambers where fledgling designs and new components are fried, frozen, dropped, shaken, and generally abused.

Reliability, says Smith, starts with good design. "You can have a lot of things that cause problems, but if you've designed the computer right, you're going to minimize them," he says.

To measure how well new designs will survive the elements, Smith's team of engineers tests them inside a walk-in temperature chamber, which can shift from –60 to 160 degrees Celsius or simulate the air pressure at 30,000 feet. And even though component suppliers do their own stress testing, Smith's team double-checks components from new suppliers or new parts from old suppliers. They boil new motherboards in oil and steam them in pressure cookers. Then Compaq robots are turned loose on designs: They methodically open and shut notebooks, pound endlessly on keyboards, and twist AC cords like taffy—simulating lifetimes of use.

Subjecting new designs to such extremes allows Smith's crew to find hidden defects and fix them, long before the machine winds up

Buying Reliability: 10 Tips From the Pros

Buying a reliable computer can seem like a roll of the dice. But like most games of chance, it requires a certain amount of skill. So before you head for the craps table, study these tips from the sharks—people who've learned to play the reliability game to win.

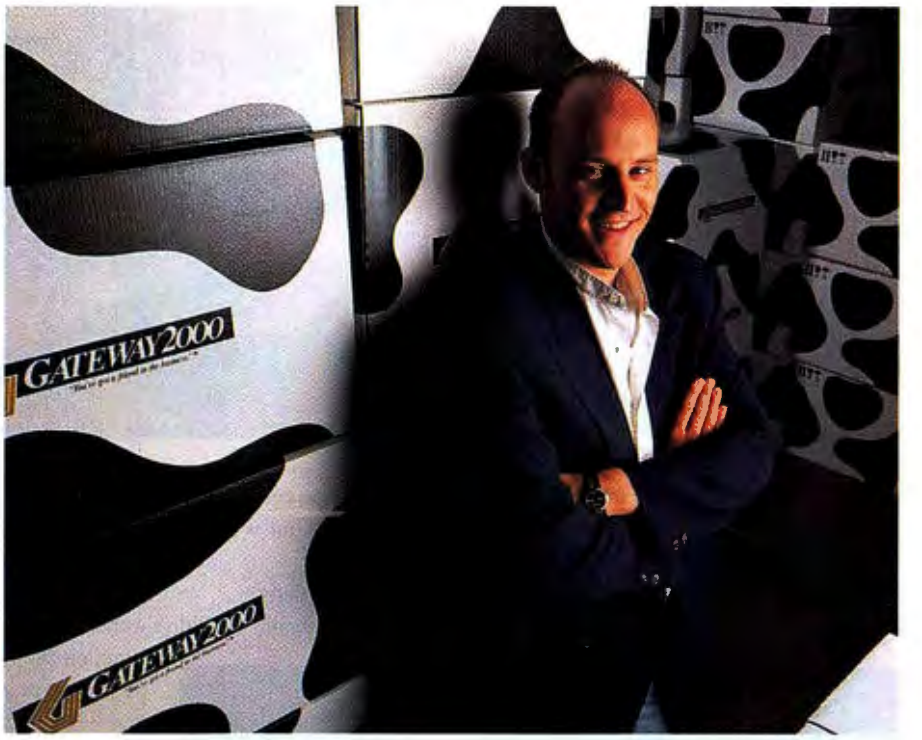
1 Sample the goods.
If you're considering a large order, ask if you can get an evaluation unit. That way you can check it out before you bet the farm.

2 Buy from the top tier.
This should reduce system breakdowns, or at least guarantee good response time.

3 Don't be afraid to ask.
A little haggling can go a long way. Though some of the more reliable PCs have higher price

Our focus is on overall value to the customer: a combination of price, quality, and service.

TED WAITTE *Founder & CEO, Gateway*



on your desk. By pushing a PC to its breaking point, they can gauge the life expectancy of a computer—a key factor in the company's decision to offer a three-year warranty on all its desktop PCs.

All this hard work seems to be paying off. In our survey, Compaq machines ranked with those from NCR, IBM, and HP as the most trouble-free in the industry.

Manufacturers that lack the resources of a Compaq or an IBM have been forced to find other ways to gauge the quality of their designs. Like many upstart companies, Gateway 2000, the enormously popular clone maker in North Sioux City, South Dakota, relies on component suppliers to test parts, focusing its testing efforts almost exclusively on ferreting out hardware and software incompatibilities. Then the company "burns in" new designs (the PCs run a series of tests that check each component) for 1000 hours—the equivalent of 90 days of normal use.

But Gateway would like to sell more PCs in the corporate market, and large corporate buyers, nurtured by the rigorous testing procedures of IBM and Compaq, have stringent testing requirements. To compete in that tough market, Gateway plans to institute more extensive testing of designs, including temperature tests, later this year.

The Big Combo

A few bad parts can spoil even the best designs. In fact, *PC World* readers told us that faulty components caused 70 percent of their problems, with the biggest offenders being hard drives (21 percent), motherboards (20 percent), monitors (12 percent), floppy drives (11 percent), and power supplies (10 percent).

To get the best parts they can, responsible PC manufacturers put the squeeze on their suppliers. They demand that suppliers prove that they have strict quality control procedures and meet rigid quotas for problem-free units. Also key is limiting the number of suppliers, which makes it easier to track down the source of problems when they do occur.

"If you use a single supplier and something goes wrong, it can affect all of your PCs, but you can fix it quickly," notes Martin Reynolds, director of technology assessment for InfoCorp, a marketing research firm based in Santa Clara, California. "If you use multiple suppliers, you can have a nagging problem for months and not know the cause."

REID HORN

tags, some companies are willing to cut a deal even if you're just buying one or two PCs.

4 Avoid special orders.
If you need computers in a hurry and want to limit problems, order advertised or in-stock systems, advises Hillary Buckman, MIS director for Polaris Service, a computer maintenance company in Hudson, Massachusetts. Although the company may have tested a unit in its standard configuration, it may not test your custom unit again.

5 Be a pessimist: Buy spares.
If you're buying in volume and can handle repairs in-house, buying a spare computer or two can *save* you money. That's what Frank Vizza, an engineer involved with PC purchasing at United States Cellular in Chicago, does.

6 Beware the cutting edge.
Many corporate buyers don't purchase new technology. But if you need the most powerful system available, buy it from a company that offers a 30-day, money-back guarantee, advises Gil Held, author of *The Equipment Acquisition Book* ($49.95, Van Nostrand Reinhold, 800/842-3636).

7 Give a pop quiz.
Tobin Leong, a purchasing agent for Synetics, a system integrator, suggests asking who makes key components: hard drive, motherboard, and video card.

8 Mind your Q's and A's.
Before buying a system, ask your salesperson what tests systems undergo, Held says. In particular, ask about burn-in tests.

9 Check under the hood.
Take the case off of your new PC and examine the goods. The inside should look clean, with no loose wires or cables indicating sloppy assembly.

10 Throw your weight around.
A volume customer is a valued customer. If your purchase order is large enough, you will be amazed at how much dealing companies will do to get—and keep—your business.

—Randy Ross and Laurianne McLaughlin

These days, the big PC manufacturers hold suppliers accountable for testing and quality control—and they spend less time inspecting and testing parts themselves. But unless a company keeps a close eye on its component suppliers, this policy can backfire—as Dell discovered last year when it was required by the Consumer Product Safety Commission to recall all of its 320SLi and 325SLi subnotebooks.

All of the companies we visited test how well their designs and packaging will withstand shipping, either by performing their own tests or by hiring an outside firm such as UPS. Here IBM drops a computer to see how it fares.

The portables were deemed a potential fire hazard due to a cracked capacitor on their motherboards. Dell learned about the problem when three users reported that their SLi's were producing smoke and excessive heat and that the plastic on the case was rippling. Dell discontinued these models last June and repaired the defective motherboards; the company currently sells only notebooks manufactured by AST but is planning to introduce its own line later this year.

Gary Mink, a program manager in the Austin, Texas, company's laptop department, says that Dell has changed its design testing procedures to check for possible cracks in motherboard components.

"Quite frankly, the biggest problem tends to be getting suppliers to meet our quality requirements," says Steve Martson, Dell's vice president of worldwide procurement.

Martson joined Dell last summer, around the time the mail-order giant retreated (temporarily) from the notebook market. At the time, the company was in the midst of revamping its internal quality controls, including the way it buys parts. Martson started by sending teams of engineers to Dell's Far East suppliers to keep a closer eye on quality. Then he began whittling Dell's list of suppliers. "When I started we had double digits in terms of the number of motherboard suppliers," he notes. "We've reduced that considerably."

Dell has begun issuing "report cards" to suppliers, periodically rating them on defect rates, on-time delivery, and other criteria. Suppliers that don't make the grade risk losing Dell's business. "Dell learned the hard way last year," says Leslie Fiering, an analyst for the Gartner Group in Santa Clara, California. " 'Sure, let's have the vendors do all their own quality certification.' It didn't work. Compaq does that, but Compaq employees live at the suppliers' factories." Fiering adds that Dell has sharpened up its internal procedures considerably.

The Enforcers

Privately, component suppliers say that IBM, Compaq, Hewlett-Packard, Apple, and DEC have the toughest quality requirements and that they have coached the suppliers on how to crank up the quality of their parts. Even Dell admits that it has gained from Big Blue's efforts. "IBM sends in teams of people to a lot of these suppliers," says Martson. "And in many cases that helps us."

You can have a lot of things that cause problems, but if you've designed the computer right, you're going to minimize them.

RICK H. SMITH *Director of Reliability Engineering, Compaq*

IBM officials claim that this close working relationship helps the company wrangle higher-grade components from suppliers. "We're getting a better product than most of our competitors are," says Jeff Gallinat, a commodity manager for the IBM PC Company in Research Triangle Park, North Carolina.

But some component makers say the tough standards of the leading companies improve quality for all their customers.

"We aren't cherry-picking parts to send to customers," says Peter Knight, senior vice president of business development for Conner Peripherals, which sells hard drives to all the major PC manufacturers. "We just take the product off the line as the order comes in."

Does that mean that all manufacturers get parts of the same quality? In cases where there are only a handful of suppliers, as with hard drives and microprocessors, yes. But when a part has many sources—for example, motherboards and monitors—the differences can be huge. And if a company sticks a cheap motherboard in your new PC, you might not find out about it until you push the system to its limit.

PHOTOS: REID HORN

Have It Your Way

You're dreaming of the perfect computer. And this time you're going to get the works. None of the ads offer what you're looking for. You need *more* than that—more RAM, a bigger hard drive, a CD ROM drive, some special sauce, a sesame-seed bun. You're plotting a special order.

But there are risks to buying a custom system. What if you order more software than will fit on the hard drive? Did you get enough RAM to run that hungry program you had preloaded? When you custom-order, you have to know what you're doing—*or* trust the salesperson.

Mail-order companies have, for years, touted their ability to build a computer any way you want it. But a new shop has opened: IBM PC Direct. And few people are aware of how quickly this dark horse does the job.

Getting It Right

Once you've picked your hardware and chosen from the 69 software applications that IBM PC Direct can preinstall (Dell offers more than 80 applications, Gateway has 10), the salesperson runs the order through The Configurator. This custom software makes sure that, among other things, your new PC has enough hard drive to hold the software, enough memory to run it, and that the necessary parts are in stock. Although the majority of IBM PC Direct's competitors use a configurator of some kind, most rely on salespeople to assess whether the hard drive and memory are adequate—a challenge, given the changing software landscape.

My guiding philosophy is that each employee should staple themselves to the order.

TOMMY BENTON *Manager of Manufacturing, IBM PC Direct*

The Configurator gives IBM PC Direct's salespeople a technical edge, but the company really shines when it comes to making sure it builds the computer you ordered. In most manufacturing plants, a printout accompanies every machine through the assembly process. The assemblers read the part number from the printout and check a comments field to be sure special requests are taken care of. Each person installs a part and passes the system down the line.

But at IBM PC Direct, one person builds the whole machine. The assembler follows directions that appear on the screen of a hand-held bar-code scanner. When the scanner tells her which motherboard to get, she scans its bar code, and the computer checks to ensure it's the right one. Only when she has scanned the correct part can she move on. The advantage? Employees know what they're doing, aren't bored, and are wholly responsible for every part that goes into your computer. It takes 2 hours and 15 minutes to build a computer, and 2 hours of that is testing.

The control over the order and assembly process at IBM PC Direct narrows the margin for error so much it's almost invisible. It also makes it possible to get that computer to you fast. And the speed with which IBM moved from being an old blue bovine to this lean, speedy racehorse speaks well of its ability to change with the times.

—Christina Wood

"If you load all the memory it can hold and fill all eight slots, it probably won't work right," says InfoCorp's Reynolds.

That's one reason why the graybeards of the PC industry—including IBM, Compaq, and AST—design and manufacture their own motherboards. They claim that this gives them an advantage: They can fine-tune the boards to work smoothly with other system components and maintain tight control over cost and quality. (You usually have to pay a price for the added capabilities, though—such proprietary boards can be more expensive to repair and upgrade than industry-standard boards.)

But motherboards don't have to be proprietary to be reliable and well built. In 1991, Solectron, a motherboard manufacturer in Milpitas, California, won the Malcolm Baldridge Award for Quality. And Intel supplies motherboards to many manufacturers.

Buying a system with a reputable motherboard is important, but that alone won't guarantee a good system, says Robert Gunn, vice president of marketing for Micronics in Fremont, California. The company provides motherboards to Gateway and Dell, among other market leaders. According to Gunn, "The issue in building a system is putting all the components together and testing it to make sure it all works."

The Human Factor

When you think about how computers are built, you probably imagine automated assembly lines and the steady clacking of high-speed robots. Not so. That kind of system is too inflexible in today's fast-moving market. Computers are built by the most versatile machine around: people.

Making each computer by hand makes it possible for companies to build a PC exactly the way you want it. But it also introduces human error into the process. No matter how good the parts or design, if a petulant factory worker drop-kicks your hard disk, your PC may be down for the count. When you buy a computer, you're paying for the skills and attitudes of the people who put it together.

"There's always a link between what's going on in the field and the personnel assembling the systems," says Marlin Miller, director of product marketing for Quantum, a hard disk manufacturer in Milpitas, California.

Suppliers like Quantum periodically visit their large customers to teach workers the right way to handle sensitive parts. The result: Fewer errors at the factory and fewer failures on your desk.

For some manufacturers, these occasional visits from a supplier may be all the formal training its assemblers get. Even a company as large as AST, which took over manufacturing for Tandy last summer, sends its factory workers out to the assembly lines with no classroom training. New hires are paired up with experienced assemblers and must learn as they go.

While the other companies we visited all require classroom instruction for new workers, none could match the collegiate enthusiasm we found at IBM. Every factory employee puts in a week studying assembly and safety techniques before touching a computer. That's not remarkable compared to Dell, Compaq, or Gateway. What is unique about the IBM training center is that it was started and is staffed by assembly workers.

"We decided we needed more training," says Clif Melvin, a 15-year veteran of manufacturing who is currently a senior education specialist for the Learning Center. So Melvin and his co-workers told management that they needed funds to set up a training center. "Now we own the process."

And ownership has its rewards. Because employees feel responsible for the PCs they build and confident they'll be rewarded for making them better, they're on the lookout for problems. A PS/2 assembly worker got a $1500 bonus when he spotted the same flaw on three consecutive video adapters and stopped the production line, preventing 25,000 incompatible cards from being built into PCs. And IBM's Ideas Program has everyone thinking about how to improve the product. One happy employee in the purchasing department suggested an economical design change to a keyboard—and landed a check for $150,000.

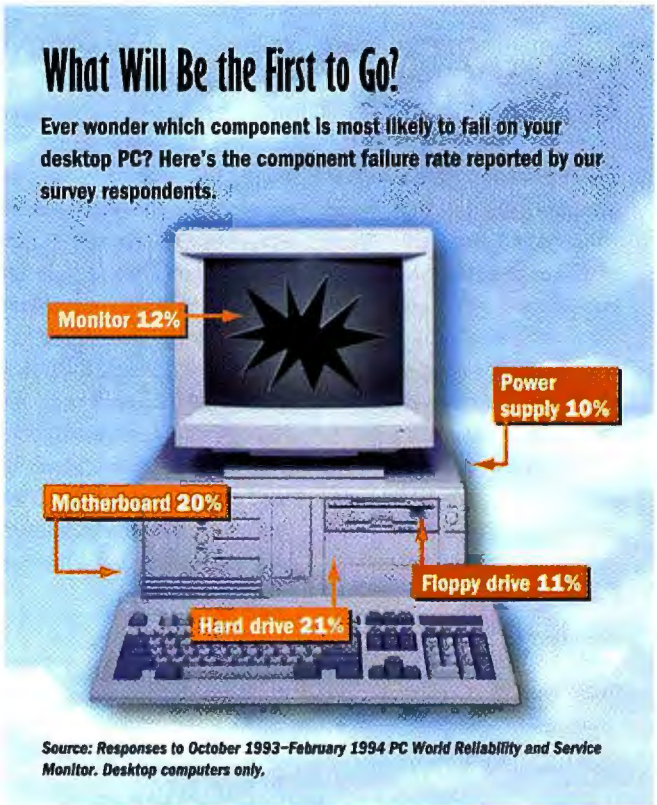
To see how long a keyboard will last, Compaq's robot simulates a lifetime of speed typing.

Do training and rewards make for more reliable products? Although it's hard to attribute product quality to any one factor (and Big Blue has pretty solid quality control on all fronts), IBM has one of the lowest out-of-box-failure rates, according to our survey.

Shadow of a Doubt

Even the best components, handled by blissful, well-trained employees, sometimes don't make it all the way through the manufacturing process without getting damaged.

That's why AST (and most of the computer manufacturers we visited) subjects every system to a variety of tests during manufacturing, ranging from a quick power-on test immediately following assembly to make sure the parts work, to running the machine with a monitor and keyboard attached to make sure that the finished computer—and software—work before the PC is boxed up. But the longest test—and, some say, the most essential—is the burn-in process.



Climbing the stairs from the factory, Frank Lugger, director of demand fulfillment for AST's Fort Worth PC assembly plant, pauses in the burn-in room. A narrow, windowless mezzanine above the manufacturing floor, the burn-in room feels claustrophobic after the white-tiled expanse of the plant below. Beside Lugger, hundreds of newborn computers without monitors or keyboards roost on metal racks. Each day, every one of the more than 2000 PCs AST produces at this site takes the conveyor belt up here to incubate.

Three years ago, AST burned in every unit for at least 24 hours. Now, thanks to higher quality components and some careful data analysis, the company has reduced burn-in time to 2 hours. Burn-in testing is expensive. But without it, Lugger says, more PCs wouldn't work when customers received them. "I would love to get to the point where we won't have burn-in at all," says Lugger. "[But] I don't think the industry is ready." According to our survey, AST computers have a lower-than-average DOA rate.

IBM, Compaq, and Dell also put every one of their computers through burn-in before it goes out the door. But Gateway takes a different approach. Instead of burning in every computer, Gateway engineers randomly pull 46 units (that's roughly 1 percent of the company's daily production) and burn them in for 20 hours. Gateway does, however, run every system through a 20-minute diagnostic check before it's shipped. **continued on page 128**

REID HORN

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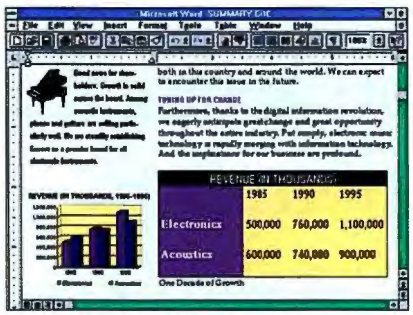

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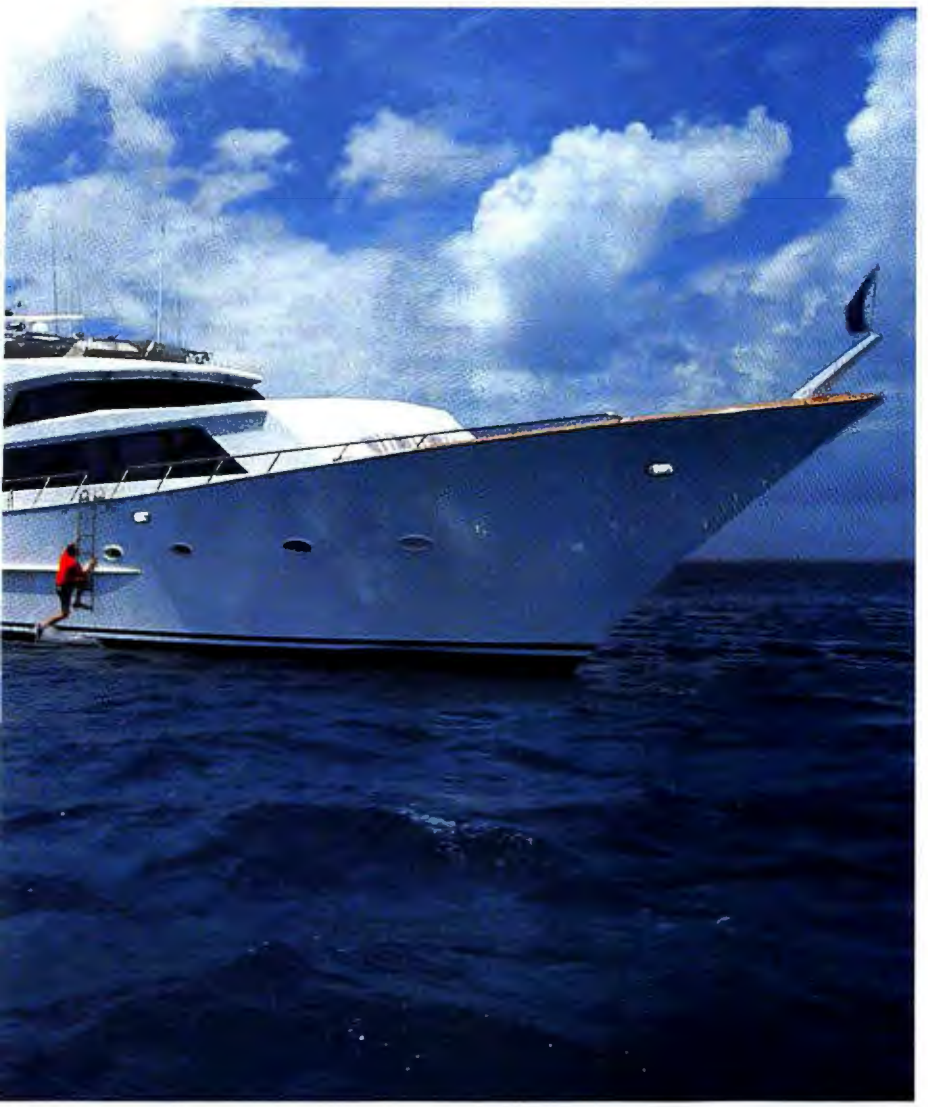

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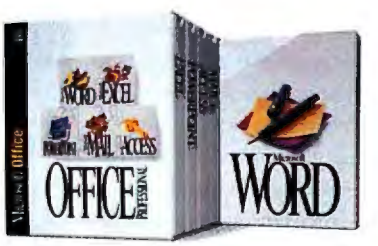

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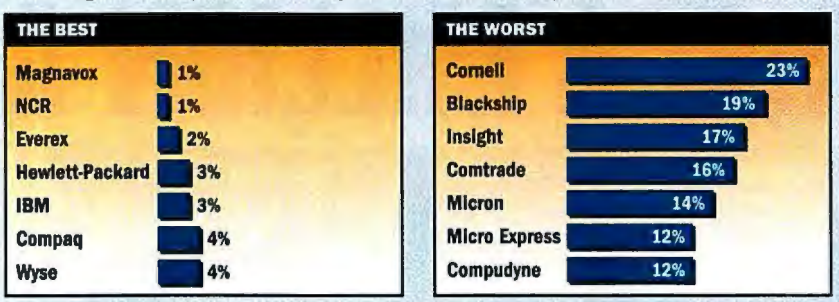
Gateway says that the data it gathers from customers indicates that its random burn-in testing is working just fine. "Our 20-hour burn-in tells us we have no major catastrophes," says Gateway's marketing manager Mike Schmith. "A 100 percent burn-in would show us the same."

Readers responding to our survey tell a different story, though. Of all the Gateway customers responding to the survey, 8.5 percent said that one or more components were not working when they took their new computer out of the box. That's a higher percentage than for any other market leader with the exception of Zeos. And 36 percent of the Gateway customers who reported a problem said that it occurred in the first month of use—a higher percentage than the industry average. Overall, Gateway earns only an average score in our Reliability Ranking.

We spoke to dozens of component suppliers, testing specialists, and third-party repair technicians, and opinions vary on the necessity of burning in every machine. All agreed, though, that it is the best way to detect early-life failures.

More Dead Than Alive?

Percentage of all respondents who reported one or more components dead on arrival.



Based on October 1993–February 1994 PC World Reliability and Service Monitor. Desktop computers only; numbers reflect experience of survey respondents and are not projectable to broader population.

Sweet Smell of Success

With Gateway's renegade approach to testing and less-than-stellar reliability scores, you would think that herds of customers would wish they had picked a different PC. In fact, the opposite is true: Gateway's customer satisfaction ratings are among the highest in our reader survey.

Of the 6700 Gateway customers who responded to our survey (3000 more responses than submitted by customers of IBM, the company with the next-highest number), an astounding 94 percent would buy another computer from Gateway, and 69 percent would recommend the brand highly to a friend. This is despite the fact that in a recent phone survey, an overwhelming majority of *PC World* readers rated reliability as the most important factor when purchasing a computer.

What is it about Gateway that inspires such loyalty? Image surely plays a part. Despite Gateway's $1.7 billion in revenues last year, many users still see it as a small company doing battle with giants. The most likely explanation, though, is its ability to offer cutting-edge performance at a cut-rate price. The company has managed this by making some shrewd choices to keep overhead down. It relies on component suppliers to handle *all* the stress testing of parts, forgoes the expensive 100 percent burn-in process, and lets UPS handle its shipping tests. (The other market leaders either do their own shipping tests or hire an outside stress-testing lab to do it for them.) These are calculated risks that probably bump up Gateway's failure rate but apparently cost the company very little in customer loyalty and goodwill.

IBM engineers crush an empty box to see how much weight it can take, a key factor in a PC's ability to survive shipping and warehousing.

PHOTOS: REID HORN

"Gateway always seems to hit the sweet spot in the market," notes InfoCorp's Reynolds. "They always seem to be offering the best performing machine at the right time. It's like they sit at the balance between how much to spend on quality, how much to spend on support, and how much the machine will cost."

The Narrow Margin

IBM and Compaq have responded to the success of Gateway and other low-cost competitors by slashing prices and selling direct—competing against these companies on their own turf. Slowly, they've begun to regain some of the market share they'd lost.

As the price differences shrink and the tables turn back toward the big guys, the clone makers are being forced to look for economical ways to compete. Their biggest hurdle: reliability.

Just ask Scott Flaig, Dell's senior vice president of worldwide operations. Flaig admits that Dell is in transition. In the past year alone, the company has implemented sweeping changes in the way that it designs products, manages suppliers, and controls quality. Can Dell recover from the damage caused by the recall of its SLi laptops? Sure, says Flaig. "You come back with great product. You come back with quality control programs and reliability programs that are very comprehensive."

Dell is not the only company that has had to learn this lesson. Gateway, which started in 1985 with two people on a cattle ranch, now cranks out more than

4000 PCs a day. Last December, the company initiated a continuous improvement plan. Each month, Gateway production teams are expected to build more machines with fewer defects than they did the month before. And although Gateway has always relied on just a few select component suppliers, it has started training those suppliers to build better parts. Gateway is also in the process of beefing up its network testing procedures.

Even more-established companies can't afford to rest on their laurels. AST, which doubled the number of PCs it produces when it acquired Tandy's manufacturing facilities, has implemented sweeping changes at its Fort Worth plant. The company is changing the way it manages suppliers and is improving quality controls in the manufacturing process.

"Everybody hits the wall," the Gartner Group's Litvinoff points out. "The issue is, how do you get over that wall?"

While Dell, Gateway, and others are attempting to scale the wall, IBM and Compaq are succeeding on this new competitive turf. They're leaner, they're faster, and they have an advantage when it comes to quality control: history. Says Compaq's chief executive officer, Eckhard Pfeiffer, "By having a substantial amount of our test equipment in place prior to introducing lower-priced PCs, we've been able to continue thorough testing without added costs."

The toughest environment a computer will ever see is the manufacturing process.

FRANK LUGGER
Director of Demand Fulfillment, AST

Edge of Doom

Is one PC brand more reliable than another? Absolutely. Do you have to pay more for that reliability? Probably.

"There's value in quality products, and people will pay more for these products within a reasonable amount," says Robert Corrigan, president of the IBM PC Company. "This [is] true for personal computers as well as for automobiles, electronics, clothing...just about any product."

But according to Reynolds, whether people will pay more for reliability depends entirely on the customer. A lot of low-cost machines go to people spending their own dollars, he notes. They take a chance and hope that if there's a problem, the company will take care of it. Meanwhile they've saved a lot of money.

Many customers decide they'd rather gamble than pay more for a PC from an industry leader. Some defects won't show up until the PC is pushed to the edge—a limit most users never reach. But many corporate users, especially those buying "mission critical" PCs such as network servers, still play it safe. "We're concerned about the durability of clones in a business environment," says Richard Perreault, director of corporate systems at Blue Cross and Blue Shield in Providence, Rhode Island. Perreault owns two clones, but he'd never buy one for his company. "If my home PC is out of commission for a few days, it's not an earth-shattering event. In the business environment, it is."

Out of the Past

For years, hardware conflicts, support hassles, and—all too often—dead machines have been an inescapable fact of life for PC users. Early adopters were willing to sort through these problems because they were getting in on a new technology. But today, computers are reaching a generation of consumers who expect PCs to behave more like their other home electronics and appliances.

Some PC company executives aren't fond of this comparison. "VCRs and TVs are single-function devices," says Safi Qureshey, CEO at AST Research in Irvine, California. "The PC is a multifunction device."

With their mix of sophisticated electronics, mechanical parts, and limitless add-ons, PCs are also far more complex—and growing more complicated every day. Some manufacturers doubt we'll ever reach the day when your average hardware support technician is as lonely as the Maytag repairman.

But Compaq's Rick Smith argues that manufacturers need to take responsibility for building more reliable computers.

"We don't believe that what [the industry is] shipping to customers today is acceptable," Smith says. A computer should be like your TV—you should be able to turn it on and it works."

Daniel Tynan is a contributing editor and Christina Wood an assistant editor for PC World. *Database specialist Uri Geva, freelance writers Clare LaPlante and Sarah Klein, senior editors Roberta Furger and Randy Ross, research manager Thomas Gewecke, senior technical editor Karl Koessel, assistant editor Laurianne McLaughlin, and contributing editor Celeste Robinson contributed to this report.*

OVERALL RANKING

Best
AST
COMPAQ
DELL
IBM

Above Average
ALR
GATEWAY 2000
HEWLETT-PACKARD
NEC
NORTHGATE
ZEOS

Average
DTK
EVEREX
MICRON
NO-NAME CLONE

Below Average
COMPUADD
COMPUDYNE
LEADING EDGE
PACKARD BELL
TANDY

Worst
ACER
INSIGHT
ZDS

Source: PC World Reliability and Service Monitor. Rankings based on combined rankings for reliability and service. Companies listed alphabetically within groupings.

At a Glance: Quick Takes on Reliability and Service

Acer America
Good marks for reliability but among the worst at resolving problems.

ALR
Fewer problems than average. They aren't speedy with repairs, but eventually they get them done.

AST Research
Low, low problem rate pushes them into the top tier.

Compaq Computer
Excellent reliability, great service.

CompuAdd
The definition of average for reliability, but slow to fix problems.

Compudyne
Keep the company's phone number handy—you may need it. Fortunately, they're good at solving problems.

Dell Computer
Tops in satisfaction.

DTK Computer
Generally quick to pick up the phone and make repairs, but lots of problems go unresolved.

Everex Systems
Among the best in reliability, but they leave too many problems hanging.

Gateway 2000
Middle of the pack in reliability, average repair turnaround, but spin a little Gateway magic and customers remain loyal till the cows come home.

A WORD ABOUT THE NUMBERS

The Reliability and Service Monitor is a monthly fax survey that gets bound into every issue of *PC World*. The rankings and scores presented in these articles were generated by carefully analyzing the results of more than 45,000 surveys that readers returned to *PC World* between October 1993 and February 1994.

Because the Reliability and Service Monitor is not a random-sample survey, its results are not statistically projectable either to the larger base of *PC World* readers, or to PC owners in general; and the results contained in these articles are valid only as statements of the personal experiences of those readers who returned a survey to *PC World*. However, because the survey is not inherently biased in favor of any particular brand, it does provide valuable insight into the relative differences among the many companies reported on in these two articles. Those differences are the focus of this special report.

To minimize the potential for reporting bias (such as having only owners who had a problem fill out the questionnaire), we offer a monthly prize, which all respondents are eligible to win. We encourage respondents to return the survey even if their computer has been trouble-free. In fact, over three-quarters of the respondents to our survey were not reporting a hardware failure. In addition, we sent an identical survey to a randomly selected group of subscribers to verify that the general, aggregate measures of reliability and service generated by the fax survey (such as average incidence of component failure) were not substantially different from those obtained using a random-sample methodology.

Although we have compiled data on 41 companies, we limit our reporting in the reliability portions of this report to those companies about which we have received at least 50 responses; and, in the service portion, to companies about which we have at least 50 respondents who are reporting a hardware prob-

Hewlett-Packard

Top marks for quality, but many report their problems weren't fixed.

IBM

What does an IBM PC's higher price tag get you? Excellent reliability.

Insight

Nowhere to go but up.

Leading Edge Products

Speedy at repairs, but room for improvement elsewhere.

Micron Computer

Experts at apologizing. High DOA and problem rates, but customers love them anyway.

NEC Technologies

Few problems, but slo-o-ow to fix them.

Northgate Computer

Less than impressive reliability rating, but quick to correct problems.

Packard Bell

DOA and problem rates are nothing to be ashamed of, but the time-to-talk and buy-again rates are.

Tandy

Respectable scores, but very low buy-again rate. What are they doing wrong?

Zenith Data Systems (ZDS)

Lots of problems and hard to reach, though when you do reach them they fix things fast.

Zeos International

Quick service makes up for lots of problems.

LEGEND

All data compiled from the PC World Reliability and Service Monitor, October 1993 to February 1994. Comments reflect performance in selected reliability and service categories. Stars are awarded based on responses tabulated from customers of individual companies. **Five stars:** best. **Four stars:** above average. **Three stars:** average. **Two stars:** below average. **One star:** worst.

DOA RATE: The percentage of all respondents who reported one or more components dead on arrival. Five stars: less than 4 percent. Four stars: 4 to less than 6.5 percent. Three stars: 6.5 to less than 9 percent. Two stars: 9 to less than 11.5 percent. One star: 11.5 percent or more.

PROBLEM RATE: The percentage of all respondents reporting one or more problems. Five stars: less than 27 percent. Four stars: 27 to less than 31 percent. Three stars: 31 to less than 35 percent. Two stars: 35 to less than 39 percent. One star: 39 percent or more.

TIME TO TALK: How long it took for respondents reporting problems to reach a support staffer who could help them with their problem. Five stars: less than 24 hours. Four stars: 24 to less than 30 hours. Three stars: 30 to less than 36 hours. Two stars: 36 to less than 42 hours. One star: 42 hours or more.

TIME TO FIX: How long it took the company to repair hardware problems reported by respondents. Five stars: less than one week. Four stars: 7 days. Three stars: 8 days. Two stars: 9 days. One star: 10 days or more.

BUY AGAIN BASED ON SERVICE AND SUPPORT: The percentage of respondents reporting problems who would buy from the company again, based on the service they received. Five stars: more than 77.5 percent. Four stars: 77.5 to more than 70 percent. Three stars: 70 to more than 62.5 percent. Two stars: 62.5 to more than 55 percent. One star: 55 percent or less.

lem. This base reporting requirement minimizes the margin for error on any one company's scores.

To determine the reliability ranking for each company, we measured four categories: percentage of respondents who had one or more problems; percentage reporting no problem ever; percentage with any component dead on arrival (DOA); and the number of problems reported per respondent.

To determine the service ranking, only respondents who experienced a problem were counted. Five categories were measured: satisfaction with service (the percentage of respondents who rated service at 1 or 2 and the percentage who rated service at 4 or 5, 5 being highest); the percentage who said their problem was never resolved; the percentage who said they would buy the same brand again; how long it took for the respondent to talk to a person who could help them; and how long it took to resolve the problem being reported.

In each of the four reliability and five service categories, each company was ranked from 1 to 5 based on the average of the scores of the companies being ranked. Each company's category rankings were weighted and summed to provide a reliability score and a service score. The scores were then ranked from 1 to 5 for reliability and 1 to 5 for service. An overall ranking for each company was determined from the sum of its reliability and service scores.

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Circle 248 on reader service card

Help Is on the Way ...But When?

BY ANITA AMIRREZVANI

ROBERT CARDIN

Kathy Lambert vividly remembers the day her computer failed. It was a Sunday—Mother's Day, in fact—and she was frantically trying to finish a legal brief so she could go on vacation. That's when the hard drive in her Gateway computer crashed, taking the file she'd been working on for months with it.

Lambert, a legal secretary and self-described computer nut from Meridian, Mississippi, was on the phone to Gateway's Sioux City headquarters right away. "We tried just about everything, but it turned out to be a bad sector in the motherboard, so all they could do was ship me a new board," says Lambert. She took her PC to a local repair shop to install the replacement.

If life were fair, the story would end there. But unfortunately for Lambert and her vacation plans, the local computer repair shop wound up shorting out the system, causing both floppy drives to fail in the process.

With the clock still ticking, Lambert was back on the phone to Gateway where "the techs worked overtime to figure out the problem," she says. "At one point their phone lines were busy and I couldn't get through, but the techs called me back at least once a day to make sure everything was working okay."

And when the technician she was working with realized how tight a deadline Lambert was operating under, "he kicked the problem upstairs to his supervisor and they had someone out here in 24 hours."

And yes, Lambert made her court deadline—and got to take her vacation.

Don't Be Left Out in the Cold

The best—and worst—at resolving problems to customers' satisfaction.

THE BEST	THE WORST
Micron	Tandy
Dell	Leading Edge
Northgate	Acer
ALR	Everex
Compudyne	Packard Bell

Source: October 1993–February 1994 PC World Reliability and Service Monitor. Desktop computers only. Numbers reflect experience of survey respondents and are not projectable to broader population.

Readers Pick the Best—and Worst

It's one of those maddening facts of life that computers fail—usually when you need them most. So you need a company that will answer the phone when you call and help get your PC fixed quickly, and with a minimum of hassle.

To rate the quality of service provided by today's leading PC makers, we decided to do the simple thing: Ask consumers. In October 1993, we began publishing a survey in *PC World*, called the Reliability and Service Monitor, that asked readers to tell us their experiences—good and bad—when calling for service or technical assistance. The response was staggering. To date we've tabulated some 45,000 surveys covering everyone from Acma to ZDS.

From this collection, we compiled detailed summaries on 21 companies, ranking them on key service issues: the amount of time it took customers to get through on the phone; how long it took to get a problem resolved; the percentage of problems that were never resolved; the reported level of customer satisfaction; and—perhaps the most telling factor—the customers' willingness to buy the same brand again based on the service and support they received.

Winners and Losers

After all the calculations had been done and the responses analyzed, we had one clear winner in customer satisfaction: Micron Computer of Nampa, Idaho, whose service consistently received high marks from customers. Despite the company's poor reliability rating, 88 percent of customers said they would buy from Micron again, due in large part to the company's "can-do" attitude when it comes to resolving problems. Micron is flanked by Northgate, Dell, and Zeos, whose service earned them high customer satisfaction ratings and top positions in our rankings.

At the bottom of the list sits a group of vastly different companies: Acer, Insight, Packard Bell, and Zenith Data Systems (ZDS). Though each of these firms sells to different types of customers and through different channels, according to survey respondents they

SERVICE RANKING

Best
DELL
MICRON
NORTHGATE
ZEOS

Above Average
AST
COMPAQ
COMPUDYNE
GATEWAY 2000
IBM

Average
ALR
DTK
HEWLETT-PACKARD
NEC
NO-NAME CLONE

Below Average
COMPUADD
EVEREX
LEADING EDGE
TANDY

Worst
ACER
INSIGHT
PACKARD BELL
ZDS

Source: PC World Reliability and Service Monitor. Full methodology on page 130. Companies listed alphabetically within groupings.

share one dubious distinction: None of them were able to rise to the service challenge.

The survey results had many bright spots—such as Northgate's ability to finish repairs in less than a week, and Micron's average hold times of just 3 minutes (a wait that even the most impatient caller can probably bear). But judging from the responses we received from our readers, the industry as a whole needs a lesson in customer service.

Consider these statistics: Almost 27 percent of respondents with problems said that their problems were never resolved to their satisfaction. And when we asked respondents whether they would buy from the same PC company again, only 67 percent of those reporting problems said they would—compared to an average buy-again rate of 81 percent among respondents who didn't have a problem.

The most common complaints were about faulty components, particularly hard and floppy drives, monitors, motherboards, and power supplies. About 7 percent of all respondents said that one or more components were dead on arrival in their new computer. Cornell, Blackship, Insight, and Comtrade won the dubious achievement award in this area, with dead-on-arrival rates of 23, 19, 17, and 16 percent, respectively. Interestingly, all of these companies sell direct, so it's possible that some of the component failures are the result of careless shippers. Many of the bigger companies, though, have addressed this potential problem either by conducting shipping tests themselves or by contracting with outside testing or shipping firms.

More than half of the people who reported problems managed to get them resolved over the phone. Only about 13 percent of those reporting problems had to have their entire system replaced or a component swapped out, and 5 percent said they needed to return their system to the factory for repairs.

Where You Buy Matters

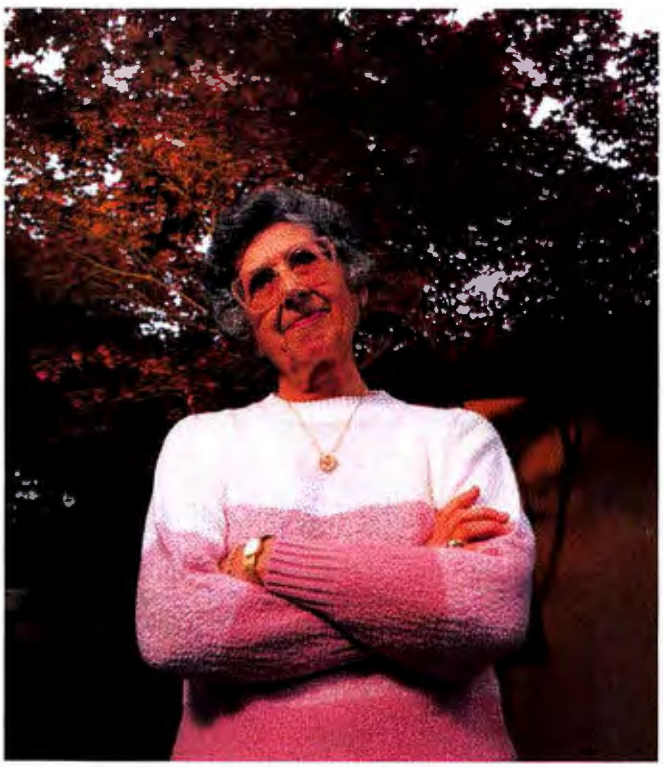
Although the lion's share of the complaints that flood *PC World*'s *Consumer Watch* department are about mail-order companies, three of the top four companies in our Service Ranking—Micron, Northgate, and Zeos—are exclusively mail-order houses. Dell, which is also a top contender, was one of the first national companies to sell PCs by phone or mail. Now, however, you can buy a Dell computer just about anywhere. Although on the whole Dell customers were quite satisfied with the service provided, those buying from computer superstores reported higher satisfaction scores than customers buying through any other channel.

Among all respondents, readers who bought through home electronics stores and retail outlets were less likely to buy the same brand again. Of those who had problems, about half said they would definitely *not* make the same purchase as a result of the quality of the company's service and support. At the other end of the spectrum, the highest satisfaction ratings went to value-added resellers, who generally wooed customers through their knowledge, responsiveness, and excellent service and support.

Getting Help—A Mixed Bag

The first step in getting service is a telephone call. On average, survey respondents reported waiting 8 minutes on hold. But in these days of call routing and multitiered queues, the real issue is how long it takes you to reach the person who can actually help you. On average, it took slightly less than a day and a half to get through to that person. Micron, Northgate, Hewlett-Packard, Tandy, and IBM helped callers more quickly than any other company, according to our respondents. The lowest marks in this area went to Acer, Insight, Packard Bell, and ZDS, which averaged more than two days per caller in our survey.

Perhaps even more important is how long it takes to get a problem resolved. Participants reported an average of 8 days. Of the 21 companies covered in our report card, Northgate was the fastest—at less than one week—while NEC and ALR trailed the pack at 11 days or



I got so frustrated I brought the computer back to Sears and told them, Fix it or give me another one.

MARIETTA LEAVELLE *Fresno, California*

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Circle 211 on reader service card

JONATHAN LEVINE

The Dell technician stayed on the phone with me for almost 4 hours after I erased my hard disk. It was like he was just down the street.

ALEX McMULLEN *Area Chief Inspector, City of New York's Bureau of Water Supply*

more. (Although this wait may seem long, especially for business-related products, other industries don't fare much better. According to Michael Carraher, owner of the customer satisfaction survey firm Michael A. Carraher Qualitative Research in Philadelphia, VCR and stereo repair times are comparable.)

The most telling statistic was that almost one-quarter of respondents reporting a problem said it was never resolved to their satisfaction. Among the worst in this area are Everex, Tandy, Leading Edge, Acer, and Packard Bell. Micron's performance was outstanding, with less than 9 percent of customers reporting an unresolved problem (see the sidebar "What's Micron's Secret?").

The Nuts and Bolts of Satisfaction

In computers, as in life, it doesn't matter how much you screw up, as long as you're good at saying you're sorry. Most companies know that customers whose problems are resolved express *more* satisfaction than those who never have a problem at all. Take Gateway, for example: More than one-third of its customers who answered our survey reported problems—but a whopping 81 percent of those with problems said they'd buy the same brand again, based on the service and support they received. Micron, Dell, Zeos, and Compaq also scored at the top of this category.

Last on the list was Tandy, with only 34 percent of respondents reporting a problem saying they were willing to buy Tandy products again. This damning figure is especially surprising in light of the company's reliability rating. About 33 percent of survey respondents had problems with the company's products—that's comparable to many other companies in the survey. Moreover, less than 6 percent of all Tandy buyers got stuck with PCs with components that were dead

Too Much of a Good Thing!

Computers have become mass-market items, and just about everyone is feeling the strain of supporting them. Major software companies like Microsoft and WordPerfect recently stopped providing free support in order to cut costs. Hardware companies haven't taken that step—yet. Meanwhile, even the most highly rated PC manufacturers in our survey have experienced growing pains, which have made it difficult to support all the new customers.

Gateway, for example, took well-deserved hits in the press last year for its jammed support lines and lengthy shipping delays. Today, the company claims to have some 700 support people out of a total staff of 3600. That's the result of hiring one new support person per day.

Some companies, like Compaq, have recently adjusted their support strategies to differentiate their products. "In 1991 we didn't have much service," says Nemo Azamian, Compaq's director of technical support. "If customers wanted to talk with us, we said, 'Why don't you go talk to your dealer?' A lot of them did—but quite a few of them went and talked to our competitors."

When Compaq took its first plunge into selling directly to consumers, the company was flooded with phone calls. Today, Compaq has increased its technical support staff, but it still can't meet the support needs of its low-cost ProLinea and Presario lines.

The old warhorse in the direct sales and support business is Dell Computer Corporation. Dell is so sure of itself that in the summer of 1992, it began offering $25 to any caller who waited more than 5 minutes on hold. "We took 1.4 million calls and only paid out to 69 people," says Steve Smith, director of delivery and operations.

But some of the companies in our survey haven't quite gotten over the hump. Leading Edge, for example, is one of the slowest to answer the phone, according to the survey. "I think that maybe we and some of the other companies aren't allocating the time to do QA checks on our phone calls because we're feeling resource constraints," says David J. Young, Leading Edge's vice president of technical services.

Young says a number of new policies have been put into effect. "We're having repairs on all of our 286s, 386s, and monitors done by a third party so we can provide a faster turnaround time on newer products." The company is also subcontracting all questions about software to another support provider. Finally, Leading Edge plans to increase the number of support staff by 33 percent.

Packard Bell faced similar support woes, as demonstrated by its low marks in our survey. The company claims to own a huge share of the business transacted at stores like Sears, Costco, and Circuit City, which typically don't provide support. "We're the one-stop shop for our customers," says John Hlavac, Packard Bell's vice president of international service and support.

Hlavac says that improvements have been made in a couple of critical areas, such as getting parts more quickly to Packard Bell's third-party service providers

REID HORN

We'll pay $25 to any customer for whom we can't answer the phone within 5 minutes.

STEVE SMITH *Director of Delivery and Operations, Dell*

on arrival—a smaller percentage than readers who bought from most other companies, including Gateway and Dell, two companies with high satisfaction ratings. Everex, Leading Edge, Packard Bell, and ZDS finished close to last in this category, with only about half of their customers willing to buy again after evaluating the help they received with their PCs.

Repair experts interviewed for this special report echoed some of these findings. Thomas Klug, a service technician at Beyond Bytes, a computer consultant and value-added reseller (VAR) in Independence, Missouri, says that Packard Bell systems represent some of the biggest problems. "It's not that the breakdowns are greater, but there is no support," says Klug, noting that customers have reported trying for a week to reach Packard Bell's technical support department. "They sell a lot of computers to first-time buyers who call in more often, and they can't handle the calls," says Klug.

and speeding up the ability of technical support staff to access database information. His ultimate goal is ambitious: to reduce wait times on the phone to less than 2 minutes.

In the future, free support will probably disappear for hardware users. Dell is already preparing a portfolio of "value-added" services, such as systems integration and networking, that will cost money. Most companies admit to considering the possibility of charging even for basic support, especially now that they're being flooded with calls about software. "My prediction is that we'll continue to provide free support through '94, but not much longer," says Leading Edge's Young. "Those of us in the second tier are just waiting for the leading manufacturers to take the first step."

When we asked *all* survey respondents to rate their companies, we were surprised to learn that Micron, a small and relatively new PC manufacturer, scored the highest satisfaction rating—an average of 4.1 on a scale of 1 to 5. Nipping at Micron's heels were Northgate with 4.0, Dell with 3.8, and Zeos with 3.7. Trailing the pack in this critical category were Packard Bell, Leading Edge, and Tandy; each of these companies received satisfaction ratings of 2.9 or less.

It's important to remember, however, that customer satisfaction is strongly influenced by expectation. IBM, which had one of the lowest rates of reported problems but only a moderate satisfaction ranking of 3.4, is a telling example.

"In terms of raw reliability, IBM PCs have favorable numbers, but IBM tends not to win on satisfaction," says Kevin Beam, research director for Reliability Ratings, a Needham, Massachusetts, firm that surveys systems reliability. "Since IBM is more expensive than many clones, there's probably an expectation that its computers should be more reliable." Meanwhile, according to Beam, people who buy clones often have lower expectations and tend to champion their PC vendor. "They're favorably disposed toward a good experience with the product," he points out.

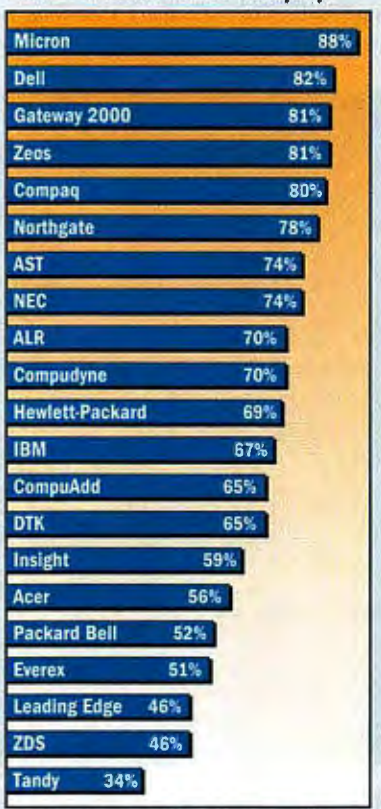
Getting the Best Service for Your Dollar

What our survey results don't show is that service and support have become fiercely competitive issues as PCs and their prices look more and more alike. This means you can demand more than ever. "Companies are trying to differentiate themselves by increasing the length of warranties or providing greater value in their service offerings," says Jay Friedman, research director for Prognostics, a Menlo Park, California, research firm.

For example, Compaq and Leading Edge announced a three-year warranty policy; Compaq also offers 24-hour techni-

Coming Back for Seconds

This chart shows the percentage of customers with problems who would buy another PC from the same company.



Source: October 1993–February 1994 PC World Reliability and Service Monitor. Desktop computers only; numbers reflect experience of survey respondents and are not projectable to broader population.

What's Micron's Secret?

Never say bigger is better. Micron Computer is a mail-order company in Nampa, Idaho, that's been in the PC business for only two-and-a-half years, but it received a higher satisfaction rating than any other company in our survey. Even readers who had problems with its products rated the company favorably. Close to 94 percent reported that problems were resolved to their satisfaction, and 88 percent said they'd buy from Micron again, based on the service and support they received.

Of the 21 companies in our report card, Micron was one of the fastest to provide help. Callers reported waiting an average of 3 minutes—the lowest in that category. Some 39 percent reported they were on hold less than 1 minute or not at all.

Interestingly, Micron is one of the slower companies at repairing broken units, but its speed at picking up the phone seems to make up for the slow turnaround.

The Personal Touch

Micron's policies don't look much different on paper from anyone else's, but according to Steve Fredricks, Micron's manager of technical support, the company strives for the personal touch with all of its customers. Support staff spend an average of 10 to 13 minutes per caller, and they even help out when customers are calling about other companies' products. "We'll stay on the phone and try to work through the problem."

Good quality control, of course, helps ensure that a company's support department receives fewer calls. Ironically, however, nearly 39 percent of all Micron owners reported problems with their PCs—an above-average rate—and the company's component dead-on-arrival rate was the fifth highest of all the companies. Buyers' enthusiasm for Micron shows that good service compensates for a multitude of sins.

Micron has some built-in advantages in servicing its customers: its relatively small volume, its low-cost location, and its lean-and-mean attitude. Micron is "comfortable, but no frills," says Fredricks. "We don't have plush carpeting, marble floors, or 70-inch video screens, and our company is driven more by employee dedication than compensation." Clearly, customers are reaping the benefits.

cal support for its desktop computers. Most PC companies now provide at least one year of on-site service as a standard feature, a benefit that was unheard of only a few years ago. (On-site service isn't as glamorous as it may sound, however. You'll probably have to spend a good amount of time troubleshooting the problem with the technical staff before the company is willing to dispatch someone with a replacement part. Nonetheless, this is better than having to send the PC off to Timbuktu—see "On-Site Service Disappointment" in the May issue's *Consumer Watch*.)

Extra perks like a three-year warranty are sweet, but don't forget the basics when shopping for service:

- Buy from companies that rate at the top of our Reliability and Service Rankings.
- Make sure you can get replacement parts quickly—overnight if possible. Mark Babb, a buyer for Group Technologies in Tampa, Florida, bought about 250 Gateway systems in the past year and had problems with the monitors. But Gateway hasn't lost him as a customer: "I'll continue to buy from them because they send out new parts in a day or two, and they're fast at fixing problems," he says.
- If you're buying for your business, purchase the same model PC for all users when possible, so it will be easier to swap parts. Jeff Rykal, purchaser for Computech, the information technology service arm for several companies in Chicago, also looks for PCs that use nonproprietary components. That way SIMMs, power supplies, hard drives, and so on can be easily replaced in case of failure.
- If you're buying machines with preinstalled operating systems or applications, find out if the vendor is willing to support that software.
- Make sure your vendor has the expertise to troubleshoot complex situations. "Hardware reliability isn't much of an issue among the top-tier companies; the sticky problems are in multimedia, client-server environments, and in the integration of technologies," points out Steve Clancy, associate director of desktop service and support for Dataquest, a market research firm.
- Don't buy from companies with questionable service and support policies or that do poorly in our rankings. It's just not worth the risk.

Anita Amirrezvani is a contributing editor for PC World.

I love Gateway. Motherboard failures happen, but the technicians worked overtime to figure out the problem.

KATHY LAMBERT *Legal Secretary, Meridian, Mississippi*

REID HORN

HOW MUCH CAN ONE MAIL SYSTEM DO?

Can a mail system let you and everyone else in your office do more? Can it save you time, money and headaches? Can it keep you connected whether you're down the hall, or down under on an important business trip?

Microsoft® Mail can. No wonder it's the best-selling LAN-based mail product in the world.

But first things first. How will Microsoft Mail work with what you already have? Perfectly. Whether you're in MS-DOS®, the Windows™ operating system, on a Mac,® or OS/2®. And you can send mail without exiting the application you're working in. And send faxes right from your word processor. Whether you're in Microsoft Word, Microsoft Excel, Lotus® 1-2-3® or WordPerfect®.

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YOU DECIDE.

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You can save even more time by adding other features that are just as easy to use as Mail. Like Schedule+, the best-selling scheduler for Windows. It helps you manage your calendar and reminds you of meetings and deadlines. It even shows you when everyone else is free. So you can schedule meetings without a lot of legwork.

Want to cut down on paperwork? Use Microsoft electronic forms to speed expense reports, vacation requests and any other routine forms through your office at the speed of light. And you can track them easily. So you won't have to worry that an important request has disappeared into a black hole.

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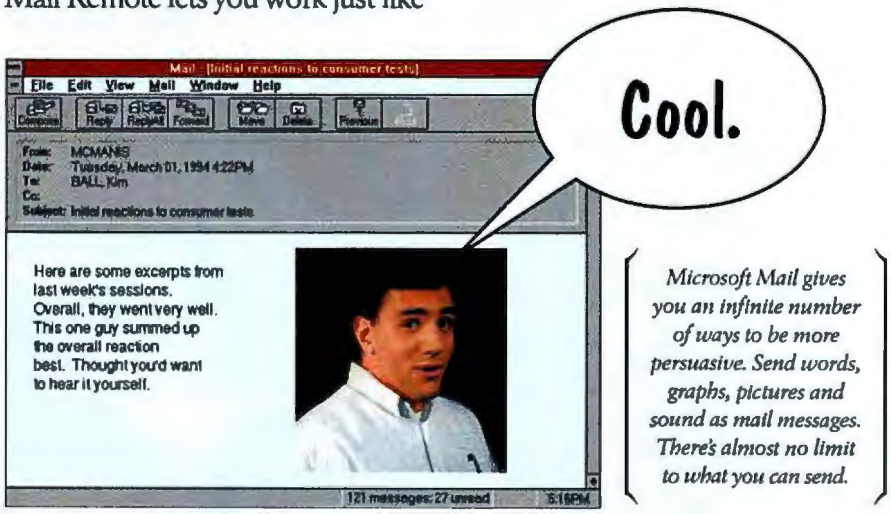
With electronic forms, you never have to worry that important paperwork is stuck in traffic. You'll be able to track expense reports, vacation requests and other important forms as they speed safely through your company.

Finally, with Mail Remote you can avoid disasters by staying connected while you're on the road, because Mail Remote lets you work just like you do in your office. It can even save you money. Just read the important messages, then let Mail Remote respond automatically when rates are lowest.

No other mail system is easier to use. Or gives you so many different ways to stay in control of your work. To prove it, we'll send you a free demo disk. Once you've seen everything you can do, deciding on a mail system will be easy. Just call (800) 871-3271, Dept. E6S.

Microsoft Mail is the best-selling LAN-based mail product in the world. Add Schedule+ for a personal time-management and group scheduling system. And electronic forms to speed paperwork through your office. Take them all on the road with Mail Remote. Together they'll make your whole organization more productive than you ever could have imagined.



Microsoft Mail gives you an infinite number of ways to be more persuasive. Send words, graphs, pictures and sound as mail messages. There's almost no limit to what you can send.

Schedule+'s alarm clock reminds you of meetings, deadlines, anything. So you'll stay organized and save time. Without it, we might have forgotten this caption entirely.

Microsoft

1 POWER DESKTOP

ZEOS PANTERA 66: This big 66-MHz Pentium tower (right) is the fastest system we've ever tested.

1 BUDGET DESKTOP

POLYWELL POLY 486-40DX: A 40-MHz CPU and $1650 price make for a real budget winner (left).

BUDGET MOBILE PC 1

COMPAQ CONCERTO 4/33: This notebook (right) lets you choose between pen and keyboard input.

POWER MOBILE PC 1

TOSHIBA T4700CT: This fast notebook (left) features built-in sound and a great color screen.

TOP 20 PCs

Power Struggles

New Pentium and DX4 PCs jockey for position on the desktop. This month's winners: the Zeos Pantera 66, Polywell Poly 486-40DX, Toshiba T4700CT 486 Notebook, and Compaq Concerto 4/33 Model 250.

STAN MUSILEK

By Rex Farrance and Owen Linderholm

Testing by Dean Andrews, Ulrike Diehlmann, and Susan Silvius; research and support by Gary Van Der Horn.

You're probably used to Intel's dominance on the desktop. But the processor giant no longer has room for complacency: Other processor manufacturers are rattling sabers and marshaling their forces. AMD and Cyrix have been sniping at Intel's DX2-66 flanks for a while now with their own budget CPUs and work-alikes. But neither company is content with just guerrilla attacks, and now both are readying rollouts of 586-class processors for release early next year. And Motorola—with the help of Apple and IBM—is launching its own assault on the power desktop ranks with the PowerPC, already in systems from Apple and planned for desktops from IBM by the end of the year. IBM's PowerPC systems won't run Windows 3.1 except in emulation mode but are expected to run Windows NT directly.

Intel—operating on the assumption that the best defense is a good offense—has launched a preemptive strike, moving the Pentium-66 and DX4-100 into position to defend the low-price ground against Cyrix's and AMD's artillery. Meanwhile the processor leader is hoping to beat back the coming assault from the PowerPC with powerful Pentium-90s and -100s.

The 100-MHz DX4 is here today—positioned between the Pentium and the DX2-66. But PC vendors are pricing aggressively, and some DX4-100s are ending up as budget machines. In fact, one of this month's two DX4-100 desktops, the Dell OptiPlex 4100/L, is priced under $2500. As a result, it makes a 13th-place showing on our Budget Desktops Top 20 and barely misses the Power Desktops chart. DX4-100 systems will lead the charge in the coming months on the budget side. Intel expects them to be priced close to $2000 by fall, and we expect to see them push their way in with the DX2-66s at the top of the chart.

While 90- and 100-MHz clock multiplier Pentiums aren't yet

This Month's Contenders pg. 145 • Power Desktops pg. 146 • Budget Desktops pg. 154 • Mobile PCs pg. 160

here, they will be, starting next month when we'll review the Dell Dimension XPS P/90, our first Pentium-90 contender. Expect a powerhouse configuration and a major leap in performance.

Lightning Strikes From New CPUs

Our Power Desktops Top 20 illustrates how quickly the new CPUs are redrawing the power picture. Last month all five power Best Buys were Pentium-60s. Now only two are in the top ranks, and those have shifted to fourth and fifth. At the top is the new Zeos Pantera 66, a Pentium-66 that recorded the fastest benchmark results ever to come out of the PC World Test Center. Micron zips into second with its potent new 4100PCI Magnum, which features the DX4-100. And Gateway 2000's P5-66—another Pentium-66—is in third. All three of these Best Buys are reviewed this month.

In the meantime the DX2-66 continues its retreat from the power ranks. In a single month the tally of power systems featuring this processor has dropped from ten to six. And while the DX2-66 still holds most of the key positions on the budget chart, Polywell's Poly 486-40DX—based on AMD's 486DX-40—parlays an extraordinary $1650 direct price and surprisingly snappy performance into a number one Best Buy and a direct hit for the bargain conscious. In addition, we review Gateway's retooled P4D-66 Best Buy DX2-66 machine, which fights its way to a second-place Best Buy.

Fresh Notebook Winners

Desktop machines don't monopolize the new-processor action: The Texas Instruments TravelMate 4000E WinDX4/75 Active Color makes a strong showing, placing a close second on the Power chart. Even with a mere 4MB of RAM, it's the fastest notebook we've seen, thanks to its DX4-75 processor. With an active-matrix color screen and the powerful CPU, it still offers a 3-hour battery life. Expect to see more notebooks based on this processor soon.

In addition to the four systems this month that break into the Power Mobile PCs chart, three new notebooks break into our budget ranks—and one takes the number two spot: The Best Buy Toshiba Portégé T3400 is priced at $2748 but comes with great performance for a budget system, 8MB of RAM, an unusually sharp monochrome screen, and a truly phenomenal 6½-hour battery life.

A New Gauge of Reliability

With your faxed responses to our Reliability and Service Monitor pouring in, we now have the data to calculate a solid reliability rating. Reliability has always been one of the most important pieces of the PC value puzzle to you, so we're adding this rating to our overall evaluation criteria for PCs, basing it on the reports of each vendor's product defects and failures. You'll find both the reliability and service numbers on the Top 20 charts. A reliability rating of 69 is average for desktops; 51 is average for notebooks (reflecting notebooks' greater tendency to fail). An average service rating for both notebook and desktop PCs is 69. We give companies these average scores when we have too few responses from our fax surveys to rate them on reliability. As soon as we have enough responses for a particular company to project ratings accurately, we will. See "Your New PC: DOA or Destined for Glory?" for more information on how we research reliability and service. We use the same scoring method for reliability as in that article; we use a slightly different service rating, however, because we also want to factor in support policies, such as the length of the warranty, for each company. Service scores are based on how well a company resolves reported problems; readers' satisfaction with service received; the time it takes to get through to someone who can help; and the time it takes to resolve a problem successfully.

We've also received some survey data from readers that shows that you value the quality of a notebook screen more than any other feature—including price and performance. So we reweighted screen quality in our evaluations. As we go on reviewing desktops and notebooks, we'll continue to update the PC World Top 20s to reflect your preferences, and we'll let you know what we change.

Rex Farrance is an associate editor and Owen Linderholm a senior editor for PC World. *They can be reached on PC World Online (see page 12 for contact information).* PC World *staff members Mike Desmond, Ulrike Diehlmann, John Goddard, Anita Hamilton, Bryan Hastings, Caroline Jones, and Susan Silvius contributed to this article.*

Call 900/903-2972 and use the fax reprint numbers to order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95). To order a month's complete review ($9.95 each), enter its number: December 3012; January 3001; February 3002; March 3003; April 3004; May 3005; June 3006. For a list of all systems tested by the PC World Test Center for Top 20s ($4.95), enter 7. Touch-tone phone required; charges appear on your phone bill.

For more information about all products in this article, circle reader service no. 902.

Buying Smart: Consumer Tips

Buy a Bigger Monitor for High Resolutions

For easy viewing at 800 by 600 resolution, buy a 15-inch monitor. If you'll be using higher resolutions, check them out on the monitor before you buy.

Fight Flicker With 70-Hz Refresh

Before okaying a new monitor purchase, make sure it supports at least a 70-Hz vertical refresh rate at the resolution you use. That rate eliminates the perceptible flicker for most people.

Call Technical Support Before Buying

Get the vendor's toll-free support number before purchasing a new PC. Call and ask some technical questions to gauge responsiveness, knowledgeability, and courtesy.

Use a Credit Card

Use a credit card unless you already have a credit arrangement with the vendor. In case of dispute, the credit card company can help mediate or give a refund if you fail to receive a product.

This Month's Contenders

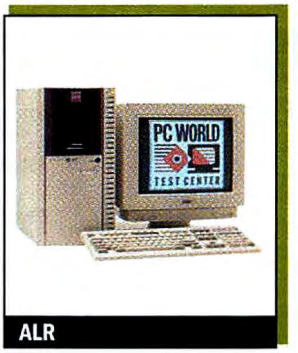
Our look at this month's contenders for the Top 20 power and budget desktops and the Top 20 mobile PCs. Icons show where systems placed on the Top 20 charts.

ALR Evolution V ST/66

PC WORLD TOP 20
16 POWER DESKTOP

PROS: High performance, good expandability
CONS: Steep price

If you're looking for a tower of PC power and can afford to spend $4908, ALR's Evolution V ST/66 may be the system for you. It whizzed through our benchmarks noticeably faster than a typical 60-MHz Pentium, and it's one of five 66-MHz Pentium systems to grace our Power Desktops Top 20 this month. The configuration is what you'd expect from an upscale Pentium: 16MB of RAM, a 256K secondary cache, a 540MB hard drive with a 1MB VL bus caching controller, a 2MB VL bus graphics accelerator, and a 15-inch monitor. Four of eight 72-pin SIMM sockets are free, so you can add up to 64MB of RAM before you need to discard any installed memory.



ALR

The expandability is excellent: Inside the Evolution V ST/66's stylish case are four free drive bays, five free 16-bit ISA slots, and one vacant VL bus slot. The comfortable keyboard and mouse show ALR's concern for usability.

Service rates well, with a five-year parts and 15-month labor warranty. On-site service costs a nominal $9.95 for the first year. Tech support is toll-free 12 hours a day (including weekends), and hold times are only about 2½ minutes on average. ALR customers who responded to our Reliability and Service Monitor indicated relatively few technical problems, contributing to a very good reliability rating. Adding to the good service score, most who reported problems were satisfied with ALR's solutions. If you need plenty of horsepower, be sure to check out the Evolution V ST/66. Though its price keeps it out of the Best Buy ranks, this system is a solid contender at number 16 on our Power Desktops chart. *Advanced Logic Research, 800/444-4257, 714/581-6770* **Reader service no. 719**

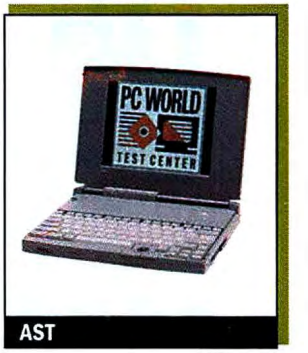
AST Bravo NB 4/33s

PC WORLD TOP 20
5 BUDGET MOBILE PC

PROS: Great price, solid construction
CONS: Average performance

The latest Bravo is proof that AST still has a knack for offering respectable notebooks at the right price. The large 9½-inch dual-scan color display and low $2335 price caught our eye. This 486SX-33, with a generous 8MB of RAM expandable to 20MB and a good-size 200MB hard drive, turned in a performance typical for a notebook of its CPU class. We got a little more than 3 hours of battery life.

The keyboard keys are nicely spaced and quiet. They're stiffer than most, however, and their short travel took a little getting used to. Still, the system is comfortable to use, even on an airline tray table. The no-flex case and screen panel suit this 7.8-pound notebook for the rigors of the road. In addition, this Bravo can display up to 1024 by 768 resolution to an external monitor, though not while using the internal display. The unit also comes with a PCMCIA Type III slot.



AST

AST complements its one-year warranty with toll-free technical support that's available around the clock seven days a week and has hold times of less than 4 minutes. Our Reliability and Service Monitor shows that a fair share of the AST notebook owners who responded were happy with the way the company resolved their problems. Still, the satisfaction level was a bit lower than for most top-tier vendors, and the reliability rating wasn't as high as we'd like. But buyers looking for low-cost color will appreciate the ample configuration and great price. As a result, the Bravo NB 4/33s earns a respectable midrange ranking: number five on our Budget Mobile PCs chart. *AST Research, 800/876-4278* **Reader service no. 720**

Austin Premier 486 System

PC WORLD TOP 20
11 BUDGET DESKTOP

PROS: Good price, uncluttered interior
CONS: Poor documentation

Austin's $2199 Premier 486 System provides a streamlined, compact design and a solid configuration that includes a DX2-66 CPU, 8MB of RAM, a 256K secondary cache, and a 341MB hard drive. That's pretty good for a PC that undercuts our top limit on budget desktop systems by over $300. It's not a great performer, although its showing on our benchmarks fell just 10 percent short of a typical DX2-66's.

Austin

The Premier sports an uncluttered interior with five free 16-bit slots and one free VL bus slot. A 2MB graphics accelerator from Austin fills the other local bus slot. One free internal and two free externally accessible drive bays should suffice for most budget buyers. However, Austin gives you only a 14-inch monitor with its system.

Austin's two-year warranty with free on-site service is good, and the toll-free technical support, available 18 hours a day, 365 days a year, is impressive. Hold times average less than 2 minutes. Our Reliability and Service Monitor fax surveys indicate that a fair number of responding Austin owners have had some technical problem with a system, but most expressed satisfaction with problem resolution. We'd like to see more thorough documentation, however, as the manuals provide only an overview. There's nothing flashy about this setup, but its configuration fits the model of a good budget system well—as does the price. *Austin Computer Systems, 800/752-1577, 512/339-3500* **Reader service no. 721**

THE TOP 20

PC WORLD POWER DESKTOPS

1 Zeos Pantera 66
Brand-new; the hottest yet.

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

BEST BUYS

		Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus
1	➤ Zeos Pantera 66	–	1	90	89	71/82	$3595	Pentium-66	16	528	ISA, PCI
2	➤ Micron 4100PCI Magnum	–	1	88	72	67/86	$3000	DX4-100	16	545	ISA, PCI
3	➤ Gateway P5-66	–	1	87	83	73/77	$3995	Pentium-66	16	540	ISA, PCI
4	▼ IBM PC Company ValuePoint P/60D	2	5	86	80	84/78	$4700	Pentium-60	16	424	ISA, PCI
5	▼ Micron P60 PCI PowerStation	3	2	85	75	67/86	$4217	Pentium-60	16	540	ISA, PCI
6	➤ Zeos 486DX2-66	–	1	85	67	71/82	$2539	486DX2-66	8	528	ISA, VLB
7	➤ Gateway P4D-66 Best Buy	–	1	84	60	73/77	$2415	486DX2-66	8	540	ISA, PCI
8	▼ ALR Evolution V	1	5	84	81	79/75	$4271	Pentium-60	16	540	ISA, VLB
9	▼ Austin Power System 60	5	4	82	64	69/80	$2999	Pentium-60	8	420	ISA, PCI
10	▼ AST Premia LX P/60	7	5	82	75	78/79	$4897	Pentium-60	16	540	ISA, PCI
11	▼ Micron 466 VL Powerstation CD	8	4	82	66	67/86	$3538	486DX2-66	16	527	ISA, VLB
12	▼ Insight PCI P60 CD	4	2	82	79	61/69	$3319	Pentium-60	16	516	ISA, PCI
13	➤ Axik Ace Cache 586-66PCI/MPC	–	1	82	85	69/70	$4498	Pentium-66	16	525	ISA, PCI
14	▼ Gateway P5-60 Best Buy	9	2	82	70	73/77	$2630	Pentium-60	8	425	ISA, PCI
15	➤ Micro Express MicroFlex-VL/Pentium	–	1	81	75	70/74	$4750	Pentium-66	32	540	ISA, VLB
16	➤ ALR Evolution V ST/66	–	1	81	80	79/75	$4908	Pentium-66	16	540	ISA, VLB
17	➤ VTech Platinum 486DX2/66	–	1	81	63	67/68	$2998	486DX2-66	16	500	ISA, VLB
18	▼ AcerPower Series 9000	15	5	81	71	75/69	$4999	Pentium-60	16	540	EISA, VLB
19	▼ DECpc XL 466d2	11	5	81	63	79/83	$4998	486DX2-66	8	1024	ISA, PCI
20	▼ CompuAdd C466D	6	2	81	56	75/75	$2295	486DX2-66	8	425	ISA, VLB

[1] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95); a complete month's review ($9.95 each; December 3012, January 3001, February 3002, March 3003, April 3004, May 3005, June 3006); and a

2 Micron 4100PCI Magnum
Fast DX4; great service.

3 Gateway P5-66
Big power; 17-inch monitor.

4 IBM ValuePoint P/60D
Best Buy six months running.

5 Micron P60 PCI
Fast; loaded; 17-inch monitor.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number [1]	Comments
15"/.28	800/554-5220	current	3091	This well-priced Pentium-66 tower is the fastest system we've ever tested.
15"/.28	800/438-3343	current	3092	Low-cost, loaded DX4-100 outpaces some Pentiums.
17"/.26	800/846-2000	current	3093	Blazing Pentium-66 comes with 17-inch monitor at a great price.
15"/.28	800/772-2227	Jan 94	3041	Six-time Best Buy is helped out against newer systems by IBM's great reliability.
17"/.26	800/438-3343	May 94	3094	4MB caching controller, 17-inch monitor, and great service.
14"/.28	800/554-5220	current	3095	Replaces previous Zeos DX2-66. Fastest DX2-66 on Power Top 20.
15"/.28	800/846-2000	current	3096	Also no. 2 budget Best Buy. Low price.
14"/.28	800/444-4257	Jan 94	3044	Good all-around Pentium drops from last month's no. 1 ranking. Caching controller boosts performance.
15"/.28	800/752-1577	Mar 94	3062	Low-cost Pentium should have more RAM.
17"/.28	800/876-4278	Feb 94	3049	Good all-around Pentium with 17-inch monitor.
17"/.26	800/438-3343	Mar 94	3061	Fast DX2-66 with really good service.
15"/.28	800/998-8011	May 94	3097	Lowest-priced Pentium with 16MB of RAM. Poor service and reliability hold it back.
15"/.28	800/234-2945 [2]	current	3098	Fast Pentium-66 with standard features.
14"/.28	800/846-2000	May 94	3099	Lowest-priced Pentium we've tested. Get it with 16MB of RAM.
14"/.28	800/989-9900	current	3100	Pentium-66 with 32MB of RAM should have performed better.
15"/.28	800/444-4257	current	3101	Price pulls down this otherwise excellent Pentium-66.
15"/.28	800/815-0070	current	3102	Dual-processor system. Drop in another DX2-66 for great NT performance.
17"/.28	800/733-2237	Jan 94	3042	Price down $500 from last month. 17-inch monitor and CD ROM drive.
16"/.28	800/722-9332	Feb 94	3046	Reliability, service, and a 1GB hard drive stand out.
15"/.28	800/627-1961	May 94	3103	Loaded, expandable DX2-66 is also no. 3 budget Best Buy.

[1] list of all systems tested by the PC World Test Center for the Top 20s ($4.95). Touch-tone phone required. Charges will appear on your telephone bill.

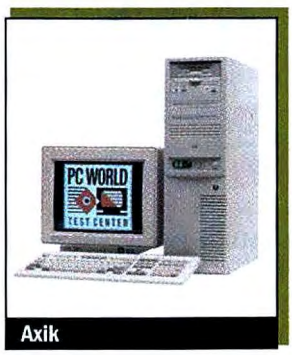
[2] In California call 408/735-1234.

Axik Ace Cache 586-66PCI/MPC

PC WORLD TOP 20 13 POWER DESKTOP

PROS: Great performance, impressive expandability
CONS: High price

High performance and multimedia extras make the $4498 Axik Ace Cache 586-66PCI/MPC an attractive package. Wrapped up in this bundle are a powerful Pentium-66 processor, 16MB of RAM, a 256K secondary cache, a potent 2MB Diamond Viper PCI graphics accelerator, and a 15-inch monitor. No wonder this system finished our benchmarks 15 percent faster than a typical 60-MHz Pentium unit—a flashy showing for a full-fledged multimedia PC.



Axik

Axik gives you a CD ROM drive, a sound card, speakers, headphones, a microphone, and a slew of interactive software packages. It even provides a spacious 525MB SCSI hard drive. A SCSI port on the drive's PCI adapter will come in handy if you want to daisy-chain additional devices. Seven free drive bays, two 16-bit slots, and one 16-bit or PCI slot free are another plus with this big tower.

Axik backs your purchase with a one-year warranty and free on-site service. The toll-free tech support line is open six days a week, and the technicians we spoke to were generally accurate. The Ace Cache is a solid entry in the power desktop market and a challenge to offerings from the bigger vendors. *Axik Computer, 800/234-2945, 408/735-1234* **Reader service no. 722**

CompuAdd C466D Mini-Tower

PROS: Large hard drive, solid support
CONS: High price

CompuAdd's C466D Mini-Tower is a good 486DX2-66 PC. The reason it doesn't get a hearty recommendation is its high $3065 price. Compared to last month's top budget Best Buy, the CompuAdd C466D compact desktop unit (which is still a Best Buy this month), this is almost the same PC in basic configuration, and performance is identical. But that unit is special-priced at $2295 with a 425MB hard drive and 1MB graphics accelerator. Like that PC, this unit has a 256K secondary cache, 8MB of RAM, and a 15-inch monitor. It features a spacious 525MB hard drive and a 2MB Diamond Viper VLB graphics accelerator. You get five bays, one VL bus slot, and five 16-bit slots free.

CompuAdd

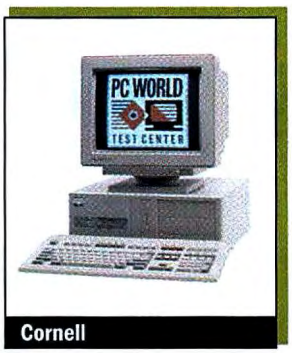
CompuAdd offers a one-year warranty that includes free on-site service. CompuAdd customers reported relatively few problems with their systems, and most expressed solid satisfaction with the way the company resolved their problems. The C466D Mini-Tower, like most CompuAdd products, is a solid PC, providing a nice combination of quality components, good expandability, and solid performance. But considering this unit's high price, the Best Buy compact unit is a much smarter buy. *CompuAdd, 800/627-1961* **Reader service no. 723**

Cornell Power Pak

PC WORLD TOP 20 18 BUDGET DESKTOP

PROS: Great price, lots of free slots
CONS: Slow, tech support delays

Still wondering if you can afford a DX2-66? Cornell's $1495 Power Pak desktop system should remove all doubt. This is a good starter unit and one of the most affordable systems in its class. Performance is less than sparkling, however, especially in Windows apps, as the Power Pak's speed is limited by its scant 4MB of RAM. DOS application speed was competitive, but overall this unit took over 60 percent longer to complete our test suite than a typical DX2-66. The rest of the configuration is basic budget fare: You get a 256K secondary cache, a 250MB hard drive, a 1MB graphics accelerator, and a 14-inch monitor.



Cornell

Expandability is important for an entry-level machine, and the Power Pak has plenty: six free slots (five 16-bit, one VL bus) and four free externally accessible drive bays. The motherboard is well laid out, and all the slots and sockets are in easy reach. Cornell's support policies are attractive and include a terrific three-year warranty, a two-day turnaround on repairs, and Saturday hours. But we couldn't award high marks to the tech support department. One of our anonymous calls wasn't returned, and another required a 2-hour wait for a return call.

Despite the drawbacks, you do get quite a lot for your money. Users who run only DOS applications should like it as is, and buying an 8MB configuration adds just $200 to the price. Small wonder the Power Pak secured the 18th spot on our Budget Desktops Top 20. *Cornell Computer Systems, 800/886-7200, 909/594-5848* **Reader service no. 724**

Dell OptiPlex 4100/L

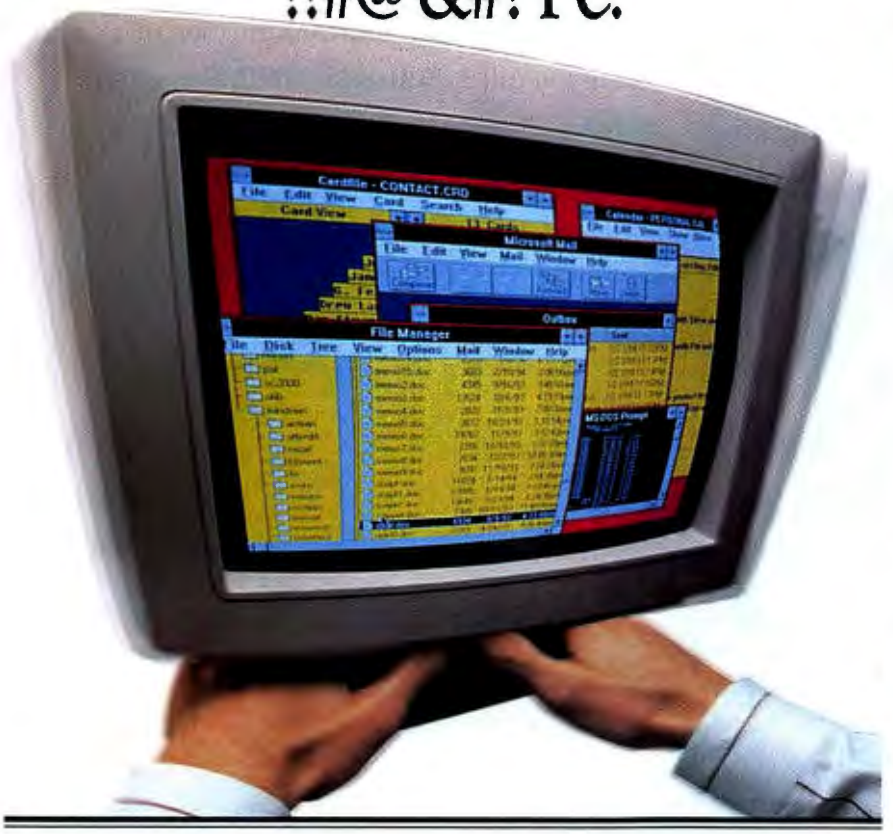
PC WORLD TOP 20 13 BUDGET DESKTOP

PROS: Fast, good price, solid support
CONS: Small hard drive, limited expandability

Budget and power: If you think never the twain shall meet, just check out Dell's compact OptiPlex 4100/L, which is built around Intel's hot new DX4-100 processor. At $2499, it's a hot budget machine, with excellent performance matching a typical Pentium-60's. There's no question that price and performance are the 4100/L's strong suit, but lack of expandability keeps it from winning a Best Buy. The installed 8MB leaves two of four 72-pin SIMM sockets free, but the 4100/L has just one free drive bay (externally accessible) and only three free 16-bit slots.

The high performance–low price combination is achieved at a cost in other areas. For example, 170MB of hard drive space is marginal, even for a budget PC. And while the 2MB integrated local bus graphics adapter yields 256 colors at **continued on page 152**

You need everything on the Paradise project. Too bad it's scattered everywhere in your *!!#@*&#! PC.



Revolutionary CrossTies™ for Windows links related documents, contacts, activities, e-mail, *everything* in your PC for instant access!

You've finally found the document. Now where's the schedule that goes with it? The client's fax number? What did you name that *!!#@*&#! spreadsheet?

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Instant access to everything you need.

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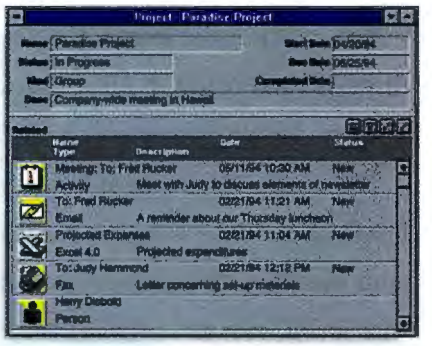
But with CrossTies, you'll be able to instantly access *anything* through a single interface that's incredibly easy to use. You'll be amazed as your productivity shifts into overdrive within *minutes* of installing CrossTies!

Say you want to knock out a quick spreadsheet. Click "new," "spreadsheet" and you're ready to go. Give it a name of up to 256 characters (no more confusing "filenames"). Then, just point and click to *link* the new spreadsheet to all related people, projects or files. The next time you access any of these related items, the spreadsheet is right there at your fingertips!

CrossTies provides an *unbeatable* way to send, receive, track and organize e-mail and faxes using your existing systems. They're all linked to related people and projects.



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Leo Laporte
Host, "On Computers" Radio Show

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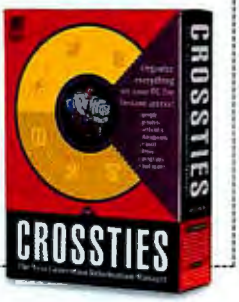
Or purchase CrossTies from your software dealer and we'll send your free copy of SnapGrafx when you return your registration card along with this coupon and your original sales receipt.



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Circle 70 on reader service card

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Not only is it the fastest double-speed CD-ROM drive around, with an ultra-quick access time of 180ms—it's also so portable it can be taken anywhere.

Take it to work, bring it home, or slip it in your briefcase and take it on the road. Reno is compatible with most notebook computers and comes equipped with an AC power adapter, rechargeable batteries, stereo headphones, a protective carrying case and a standard SCSI 2 interface.

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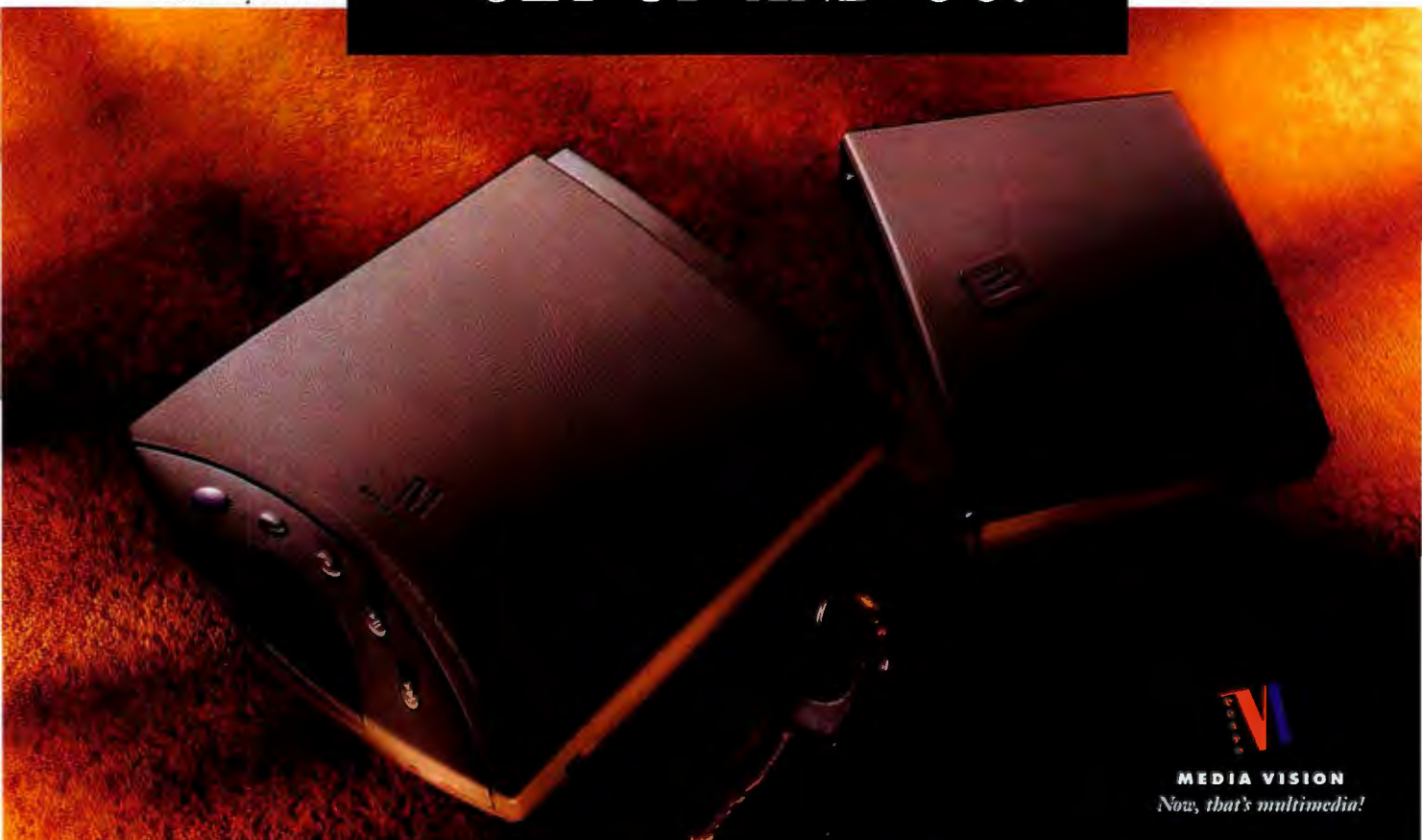

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"They said I was "green."
"They said I would save energy and money."

Here is the whole truth.

Today, having a 'green' monitor is a nice start, but it's a long way from actually running green. To be truly green, even 4-Stage VESA®-DPMS™ compliant monitors must be instructed to power down when idle, if not they stay on at full power...even with a screen-saver installed.

OPTI-GREEN

We at Optiquest have made it our goal to become the ***Complete Green Solution***. To do this, for a limited time Optiquest will include Opti-Green™ Energy Saving Software for free ($29.95 value) when you purchase any of our 14", 15", 17" or 20" Optiquest 'green' color monitors. Opti-Green™ Software will enable your monitor to automatically power down when idle after your programmed period of time.

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What if my existing hardware isn't green?

We even make an Energy Saving Adapter that can suspend power to your monitor & printer, even if none of the present hardware is green.

Above and beyond energy and cost savings, we're getting great reviews too. Our 1500D won this year's PC Magazine's Editors Choice Award for the second year in a row, calling it "an excellent buy that's very hard to pass up." And PC World picked our 4000DC for its Best Buy Award, saying "the extra-large display and on-screen controls make the Optiquest 4000DC a Best Buy."

Check out Optiquest's high quality, energy-saving monitors and power-saving accessories for yourself. You'll see that the Optiquest Complete Green Solution is the one for you. For more information, call 1-800-THE-OPTI.

PC MAGAZINE EDITORS' CHOICE

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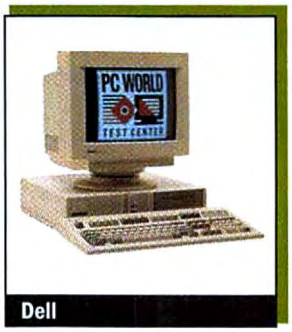
Note: 14", 15", 17", and 20" CRTs yield 13.2", 13.6", 16.1" and 18.7" diagonal viewable screens, respectively.

1280 by 1024 resolution, you'll never take advantage of its capabilities on the standard 14-inch monitor. (The display does deliver crisp, flicker-free images at 800 by 600 resolution, however.)



Dell

A relatively low number of Dell customers who responded to our Reliability and Service Monitor reported having technical problems, and most were well satisfied with Dell's support. You can call toll-free 24 hours a day, and readers reported hold times averaging less than 3 minutes. While some big vendors are providing three-year warranties these days, Dell is sticking with just one year, although that year is backed with free on-site service.

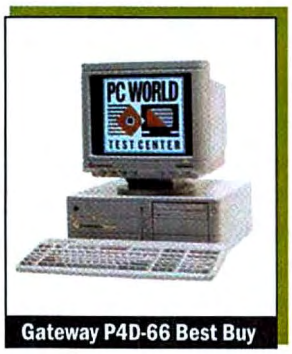
This PC is a power play for budget buyers. With more expandability and storage at this price, it would be a budget Best Buy. As it is, it still ranks 13th on our Top 20 Budget Desktops chart. *Dell Computer, 800/247-4739, 512/338-4400* **Reader service no. 725**

Gateway P4D-66 Best Buy

PC WORLD TOP 20
2 BUDGET DESKTOP
7 POWER DESKTOP

PROS: Good price, PCI slots, CD ROM drive
CONS: Long hold times for tech support

Gateway's P4D-66 Best Buy is a big winner among this month's budget desktops. This $2415 office workhorse's performance surpasses that of most DX2-66 systems that have CD ROM drives installed. Furthermore, expandability is excellent: You get three 16-bit, one 16-bit or PCI, and one PCI slot free. In addition, the Gateway's compact case provides four free storage bays.



Gateway P4D-66 Best Buy

This PC features a solid basic configuration, with 8MB of RAM expandable to 128MB, a 256K secondary cache, and a generous 540MB IDE hard drive. Graphics are driven by an ATI AX0 PCI accelerator board that has 2MB of DRAM. A 15-inch monitor rounds out the complement of Windows basics. The P4D-66 also includes an internal double-speed CD ROM drive for handling everything from entertainment titles to business reference works—though users looking for a multimedia system will have to add their own sound card or buy Gateway's $132 option.

Gateway support, once among the best, is still sound, with a year of free on-site service and toll-free tech support available 18 hours on weekdays and 5 hours on Saturdays. According to our Reliability and Service Monitor, Gateway customers wait on hold a long 8-minute average when calling tech support. We think you deserve better. But most respondents were satisfied with the way Gateway resolved their problems. This PC hits the sweet spot of our budget category. With good performance and a solid configuration, it's our number two budget desktop Best Buy *and* the number seven power desktop. *Gateway 2000, 800/846-2000* **Reader service no. 726**

Gateway P5-66

PC WORLD TOP 20
3 POWER DESKTOP

PROS: Excellent performance, great price, large monitor and hard drive, multimedia components
CONS: Long hold times for tech support

Gateway never ceases to amaze with how much PC it offers for the money. Its latest wonder is the $3995 P5-66—which just happens to earn the number three Best Buy for power desktops. The heart of this multimedia tower is the 66-MHz Pentium, amply supported by 16MB of RAM and 256K of secondary cache. Performance is excellent, besting that of a typical Pentium-60 by 15 percent overall—not bad for a multimedia system. The configuration is impressive. The 2MB ATI Mach 32 PCI video card drives a 17-inch monitor, and a 540MB hard drive is just right for a power system. Topping it all off are a CD ROM drive, a sound card, and speakers. Expandability is especially good; you get a total of six free drive bays, plus one PCI, one PCI or 16-bit, and three 16-bit slots free.

Gateway P5-66

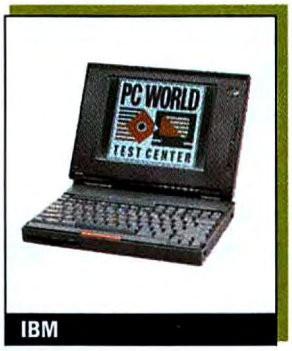
Some aspects of Gateway's service package are strong, and the vendor's reliability rating runs above average. But tech support hold times are too long. Still, when you add up everything this powerhouse gives you—including your choice of a free major application—you get a first-rate system and a high-ranking Best Buy. *Gateway 2000, 800/846-2000* **Reader service no. 727**

IBM ThinkPad 750Cs

PC WORLD TOP 20
4 POWER MOBILE PC

PROS: Built-in audio, long battery life
CONS: High price

The $3899 ThinkPad 750Cs with 4MB of RAM and a 170MB hard disk provides a classic example of a memory configuration's effect on performance. This unit, while a solid 486DX-33 performer, completed our test suite about 30 percent slower than the active-matrix color ThinkPad 750C with 12MB of RAM (and the same CPU) reviewed in April. The special RAM cards for IBM notebooks aren't cheap, and boosting memory to 12MB would have added $900 to the price at press time. But if you want top speed, the performance improvement achieved by adding the extra 8MB of RAM is dramatic; even an extra 4MB would help.



IBM

This 8-pound Energy Star model provides a long 4½-hour battery life. You also get some nice extras, such as business audio capabilities and a 2.88MB floppy drive. The 750Cs has a single PCMCIA Type III slot, which accepts two Type II cards or one Type III.

The 9½-inch color display is impressively sharp, considering that IBM provided a dual-scan passive screen to keep costs down. And the abbreviated keyboard is very good, with clicky, well-spaced

Compatibility (kəm·ˌpat·ə·ˈbil·ət·ē) *n.* 1. A feature rarely found in this category. *example:* The **TI microLaser™ Pro 600** gives you DOS, Windows,™ Mac,® PCL®5 and PostScript® *compatibility* standard; HP charges hundreds more.

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	TI microLaser Pro 600	HP LaserJet®4	HP LaserJet 4M
Memory	*6MB*	*2MB*	*6MB*
Emulations	*PCL5/Adobe® PostScript 2*	*PCL5E*	*PCL5E/Adobe PostScript 2*
40MHz Processor Upgrade	*Optional*	*Not Available*	*Not Available*
Compatibility	*DOS/Mac*	*DOS*	*DOS/Mac*
Toner Cart. Life	*15K pages†*	*6K pages*	*6K pages*
Paper Trays	*250/250 sheet*	*250/100 sheet*	*250/100 sheet*
List Price	*$1599***	*$1839*	*$2479*

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Specifications in chart are based on information as of 3/94. *Offer applies if returned in good condition. **Estimated dealer price including manufacturer's rebate is under $1,400. Dealer prices may vary.†At 4% coverage. ††Rebate applies to PS 23 and PS 65 models purchased April 1, 1994 through June 30, 1994. microLaser, PowerStep and "Extending Your Reach With Innovation" are trademarks of Texas Instruments. Adobe, PostScript and the PostScript logo are registered trademarks of Adobe Systems, Inc. Windows is a trademark of Microsoft Corporation. Mac is a registered trademark of Apple Computer, Inc. LaserJet and PCL are registered trademarks of Hewlett-Packard, Inc. © 1994 TI.

Circle 244 on reader service card

THE TOP 20

PC WORLD BUDGET DESKTOPS

1 Polywell Poly 486-40DX
AMD 486DX-40 PC costs just $1650.

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

BEST BUYS	Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus
1 ➤ Polywell Poly 486-40DX	—	1	85	51	69/71	$1650	AMD 486DX-40	8	270	ISA, VLB
2 ➤ Gateway P4D-66 Best Buy	—	1	85	60	73/77	$2415	486DX2-66	8	540	ISA, PCI
3 ▼ CompuAdd C466D	1	2	85	56	75/75	$2295	486DX2-66	8	425	ISA, VLB
4 ◀ Everex Step VL EISA DX2/66	4	2	84	58	85/68	$2379	486DX2-66	8	240	EISA, VLB
5 ▼ Acma 486DX2-66 PCMCIA System	3	2	82	54	71/81	$2142	486DX2-66	8	340	ISA, VLB
6 ▲ Polywell Poly 4586VR	10	5	82	61	69/71	$2100	486DX2-66	8	340	ISA, VLB
7 ▼ Inmac 466P	2	5	81	53	69/76	$1995	486DX2-66	8	170	ISA
8 ▲ Axik 486DX2-66PCI	9	4	81	57	69/70	$2278	486DX2-66	8	340	ISA, PCI
9 ➤ Quantex Q486DX2/66MM-4	—	1	81	55	69/69	$2305	486DX2-66	8	540	ISA, VLB
10 ▲ Shasta Prestige Desktop	35	3	81	51	69/68	$1795	486DX2-66	8	340	ISA, VLB
11 ➤ Austin Premier 486 System	—	1	81	50	69/80	$2199	486DX2-66	8	341	ISA, VLB
12 ▼ AST Bravo MT 466d	6	5	80	53	78/79	$2168	486DX2-66	8	170	ISA
13 ➤ Dell OptiPlex 4100/L	—	1	80	71	75/83	$2499	DX4-100	8	170	ISA
14 ▼ Netis N433VL	12	5	80	38	69/69	$1579	486DX-33	8	250	ISA, VLB
15 ▼ CompuAdd C433S Low Profile	11	5	80	39	75/75	$1775	486SX-33	8	210	ISA
16 ▼ IBM PS/1 Consultant DX2-66	15	5	80	42	84/78	$2329	486DX2-66	8	420	ISA
17 ▼ Netis N 466 VL Power Station	13	5	80	51	69/69	$1899	486DX2-66	4	250	ISA, VLB
18 ➤ Cornell Power Pak	—	1	79	33	63/67	$1495	486DX2-66	4	250	ISA, VLB
19 ▼ Blackship BLK 486/66LB	8	5	79	52	66/73	$1895	486DX2-66	8	244	ISA, VLB
20 ▼ NMC 486 VL-Bus Winstation	14	5	79	38	69/70	$1698	486DX-33	8	212	ISA, VLB

[1] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95); a complete month's review ($9.95 each; December 3012, January 3001, February 3002, March 3003, April 3004, May 3005, June 3006); and a

2 Gateway P4D-66 Best Buy
DX2-66 business workhorse.

3 CompuAdd C466D
Balanced budget DX2-66.

4 Everex Step VL EISA
EISA budget DX2-66.

5 Acma PCMCIA System
A PCMCIA desktop.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number [1]	Comments
14"/.28	800/999-1278	current	3104	Lowest-cost Best Buy. Based on surprisingly fast AMD 486DX-40.
15"/.28	800/846-2000	current	3096	Gateway's low-price base-level PCI DX2-66 is a great value. Also no. 7 on Power chart.
15"/.28	800/627-1961	May 94	3103	Last month's no. 1 is still a clear Best Buy.
15"/.28	800/821-0806	May 94	3105	Great reliability, EISA bus.
15"/.28	800/786-6888	May 94	3106	Minitower comes with built-in PCMCIA. Good desktop for notebook owners.
15"/.28	800/999-1278	Dec 93	3050	Fastest DX2-66 on Budget Top 20. Tower leaves plenty of expansion room.
14"/.28	800/547-5444	Feb 94	3056	Solid system would be higher, but long-term reliability is unknown.
14"/.28	800/234-2945 [2]	Mar 94	3063	All your basic desktop needs in a PCI DX2-66 at a reasonable price.
15"/.28	800/288-0566	current	3107	Best value multimedia system. Also throws in a fax-modem and gobs of software.
15"/.28	800/546-9888	Apr 94	3108	Huge $500 price drop rockets this standard DX2-66 into the Top 20.
14"/.28	800/752-1577	current	3109	Similar to the Shasta. Costs more, but you get better reliability and service.
15"/.28	800/876-4278	Feb 94	3110	Good reliability and service; needs a bigger hard drive.
14"/.28	800/247-4739	current	3111	This compact desktop is by far the fastest on the Budget Top 20. Lacks expandability.
14"/.28	800/577-7526	Dec 93	3021	Value-priced DX-33 still hangs on to Top 20 spot.
14"/.28	800/627-1961	Dec 93	3031	Only SX-33 to break the Top 20. Helped by good reliability and service record.
14"/.28	800/772-2227	Feb 94	3025	Great reliability, user-friendly features. Energy Star compliant.
14"/.28	800/577-7526	Feb 94	3022	Would do better with more RAM. Consider buying it with 8MB or more.
14"/.28	800/886-7200	current	3112	Very slow for a DX2-66 but also remarkably cheap.
14"/.28	800/531-7447	Jan 94	3023	Expandability stands out on value-priced DX2-66.
14"/.28	800/424-2983	Dec 93	3027	Low price keeps this DX-33 on the chart, but there are better deals higher up.

list of all systems tested by the PC World Test Center for the Top 20s ($4.95). Touch-tone phone required. Charges will appear on your telephone bill.

[2] In California call 408/735-1234.

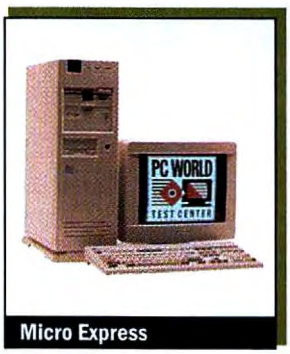
keys. The ThinkPad is backed by strong support, including a three-year warranty and optional on-site service costing $40 for the first year. Hold times on the 24-hour toll-free tech line average only about 2½ minutes. Considering this model's wealth of features, solid performance, and fine support, we're not surprised to see it enter our Power Mobile PCs chart at number four. *IBM, 800/426-7735*

Micro Express MicroFlex-VL/Pentium

PC WORLD TOP 20 15 POWER DESKTOP

PROS: Multimedia setup, good expandability
CONS: High price, 14-inch monitor

This $4750 Pentium-66's imposing tower case houses a treasure trove of components. You get a whopping 32MB of RAM expandable to 128MB and a big 512K secondary cache expandable to 2MB. In addition, the system's 540MB hard drive comes with a 2MB VL bus caching controller. There are three free 16-bit slots, one free VL bus slot, and four free drive bays. Only the video setup falls short: Micro Express gives you a top-of-the-line 2MB Diamond Viper VLB graphics accelerator, but the display is a dinky 14-inch model. You get a CD ROM drive, a sound card, and speakers. Because of the memory taken by drivers, most systems with CD ROM drives fall a little short in performance, which explains why this system runs below the level of most basic Pentium-66s that don't come with CD ROM drives.



Micro Express

Micro Express offers a solid two-year warranty, and on-site service costs just $50 for the first year. The company's 24-hour tech support is toll-free on weekdays, but on nights and weekends you must call a toll number, leave a message, and wait for a return call. Hold times run about 3½ minutes. Respondents to our Reliability and Service Monitor reported a sizable percentage of technical problems, and Micro Express's reliability rating runs midrange. In addition, *Consumer Watch* has received complaints of confused presales service and difficulties in getting through to place orders. However, there's solid indication that Micro Express performs satisfactorily in correcting problems. The strong combination of quality components makes this PC a worthy power desktop. *Micro Express, 800/989-9900, 714/852-1400* **Reader service no. 728**

Micron 4100PCI Magnum

PC WORLD TOP 20 2 POWER DESKTOP

PROS: Good performance, great service
CONS: Only two free drive bays

Micron has been doing awfully well in our reviews lately, turning high-performance processors, robust configurations, super service ratings, and reasonable prices into recurring Best Buys. Micron's 4100PCI Magnum is in the vanguard of systems showcasing Intel's 100-MHz clock multiplied DX4. This "super 486" machine features a 16K internal cache and uses a 3.3-volt design to stay cool and run at higher speeds than its 486DX2 cousins. The 4100PCI Magnum's performance is spectacular for a non-Pentium PC, and it ripped through our benchmarks, matching typical Pentium-60 performance overall. This searing speed, backed up by a great configuration and a reasonable price of $3000, helped land it the number two power desktop Best Buy.

Micron

The configuration of this compact desktop says *power* all the way: With it you get 16MB of RAM, a 256K secondary cache, a 545MB hard disk, a CD ROM drive, and a 2MB Diamond Viper PCI graphics accelerator. In addition, Micron throws in a nice 15-inch Mag monitor.

You get plenty of free slots (four 16 bit, one PCI or 16 bit, and one PCI) but just a couple of free drive bays (one externally accessible). Micron support policies are good if not outstanding: You get 11-hour-a-day toll-free tech help, including on Saturdays, and fax and BBS access. The one-year warranty is ordinary, and Micron's reliability rating is not a whole lot above average. But Micron customers faxed us glowing reports of satisfaction with the company's problem resolution in a virtually unanimous testimonial. We bet that after checking out all this beautifully set up Best Buy performer has to offer, you'll be satisfied too. *Micron Computer, 800/438-3343, 208/465-3434* **Reader service no. 729**

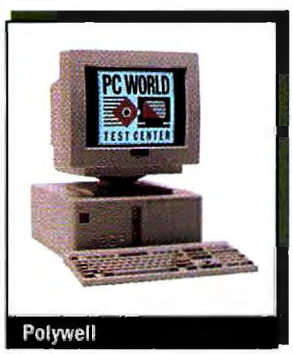
Polywell Poly 486-40DX

PC WORLD TOP 20 1 BUDGET DESKTOP

PROS: Low price, solid performance
CONS: Somewhat cluttered interior

Just when it seemed DX2-66s had a lock on the top of our Budget Desktops Top 20, the $1650 Polywell Poly 486-40DX jumps straight to the top. This is one of the first systems we've seen that uses AMD's 486DX-40 chip, and with the help of decent design it came within 10 percent of the overall performance score for a typical DX2-66 machine.

Even considering the price, this is no stripped-down system. You get 8MB of RAM, a 256K secondary cache, and a 270MB hard drive—but it comes with just a 14-inch monitor.



Polywell

The expandability is good, for a compact: You get a 238-pin CPU socket, three free 72-pin SIMM sockets, three empty drive bays, and six free slots (one VL bus, three 16 bit, and two 8 bit). The interior is a bit cluttered with cables, which is unusual for a Polywell machine.

Polywell augments its industry-typical one-year warranty with a generous five years of free labor on repairs. In addition, some components, such as the motherboard, are covered for two years. Toll-free tech support is available six days a week, and technicians picked up our calls within 3 minutes and answered our questions accurately. Here's the bottom line: The Poly 486-40DX is inexpensive, fast, and expandable. That makes it a top budget contender and a solid Best Buy. *Polywell Computers, 800/999-1278, 415/583-7222* **Reader service no. 730**

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Circle 188 on reader service card

Quantex Q486DX2/66MM-4

PC WORLD TOP 20 9 BUDGET DESKTOP

PROS: Great price for a multimedia system
CONS: No free SIMM sockets

What makes Quantex's 486DX2-66 system stand out? An attractive $2305 price along with a good multimedia configuration and a generous bundle of software. In addition, this system is an above-average performer. The unit comes with 8MB of RAM, a 256K secondary cache, a big 540MB hard drive, and a 15-inch monitor.

Quantex

Design factors are mostly well done: Everything inside this sturdy tower case is easily accessible. Even with the 3½-inch and 5¼-inch floppy drives and the CD ROM drive installed, there are still six free drive bays (three externally accessible). You get one VL bus slot, one 16-bit slot, and one 8-bit slot free. And you get a CD ROM drive, a sound card, speakers, and an internal fax-modem. On the downside, all eight 30-pin SIMM sockets are full, so you will have to discard some SIMMs if you want to add more memory.

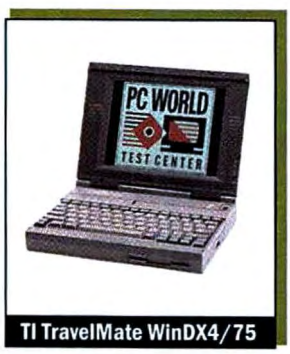
Quantex offers a one-year warranty and free on-site service. In our tests, technicians picked up toll-free calls in about 3 minutes, and answers were generally accurate. This PC is a fine fit for buyers looking for a reasonably quick multimedia system, and it ranks ninth on our Top 20 Budget Desktops chart. *Quantex Microsystems, 800/288-0566, 908/563-4166* **Reader service no. 731**

Texas Instruments TravelMate 4000E WinDX4/75 Active Color

PC WORLD TOP 20 2 POWER MOBILE PC

PROS: Fast, vivid color screen, big hard drive
CONS: Pricey, no PCMCIA slots

It's a case of the amazing shrinking desktop. Features such as a DX4-75 processor and a 455MB hard drive would be the envy of many a respectable desk-bound PC, much less an 8-pound notebook. At a $4999 vendor-estimated street price, the TI TravelMate 4000E WinDX4/75 Active Color is not cheap. But this sturdy unit is so packed with goodies that it still winds up second and a Best Buy on our Power Mobile PCs list.



TI TravelMate WinDX4/75

You expect high performance from a 75-MHz clock tripling CPU, and this is the fastest notebook we've tested—even with just 4MB of RAM installed. As with most power notebooks, however, it won't keep pace with a typical DX2-66 desktop PC. TI sells a proprietary 4MB RAM module for $279, and we suggest you buy it. It will add a healthy edge of speed to this pumped-up portable, providing more of what you expect from a hot CPU.

The WinDX4/75 features a top-notch video system that includes a large 9½-inch active-matrix color LCD. The keyboard is quiet and comfortable, with good key travel and a full complement of dedicated function and page control keys. Battery life, at 3 hours, isn't bad for a high-power notebook. And the TravelMate's power management system gives you a ton of options for customization.

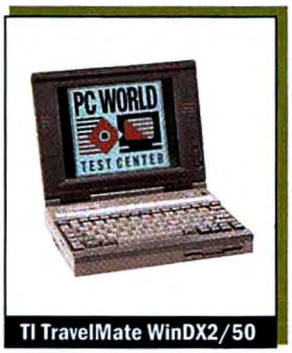
This is an elegant package, and there's not a whole lot to complain about. It's surprising, however, not to find a PCMCIA slot on a premium power notebook. Service and support is ordinary. The system comes with a one-year warranty and a 30-day money-back guarantee (if bought from TI Express, the company's direct channel). While you have to pay $120 for the first year of on-site service, you can forgo it and just take advantage of TI's two-day turnaround policy on repairs. Toll-free tech support is available 12 hours each weekday. Reliability rates average, and surveyed customers generally felt satisfied with the way TI resolved their problems. All in all, this TravelMate is fast and classy, and it earns its high standing on our Power Mobile PCs chart—even with its high $4999 price. *Texas Instruments, 800/527-3500, 512/794-5970* **Reader service no. 732**

Texas Instruments TravelMate 4000E WinDX2/50

PC WORLD TOP 20 9 POWER MOBILE PC

PROS: Nice color screen, extensive power management features, comfortable keyboard **CONS:** No PCMCIA slots

If you liked what you read about the previously reviewed TravelMate 4000E WinDX4/75 Active Color but don't have $4999 to spare, Texas Instruments offers this version for a more affordable $3300. The DX2-50 CPU is a full step down from the DX4-75, with performance about 20 percent slower in our tests. It's still quick in its class, though, even with its basic 4MB of RAM. TI cut costs by using a 10-inch dual-scan passive color display on this model, along with a modest 209MB hard drive.



TI TravelMate WinDX2/50

Everything else about this system is similar to its high-flying sibling. Despite the somewhat slower CPU, battery life ended up at about 3 hours. The WinDX2/50 is a color portable that offers snappy performance and doesn't break the bank, and it fits comfortably in our Power Mobile PCs chart. *Texas Instruments, 800/527-3500, 512/794-5970* **Reader service no. 733**

Texas Instruments TravelMate 4000E WinSX/25 Color

PC WORLD TOP 20 4 BUDGET MOBILE PC

PROS: Low price, long battery life
CONS: Slow, no PCMCIA slots

If you're budget minded, you like the features of this model line, and you're willing to give up high performance, check out the 486SX-25 version of the TravelMate 4000E. Configured with 4MB of RAM and using the slower CPU, its performance

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THE TOP 20 PC WORLD MOBILE PCs

1 Toshiba T4700CT 486 Notebook
Fast, great battery, brilliant screen.

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

POWER SYSTEMS

		Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	▲ Toshiba T4700CT 486 Notebook	4	3	84	35	67/78	$4649	486DX2-50	8	203
2	➤ TI TravelMate 4000E WinDX4/75	–	1	84	38	57/79	$4999	DX4-75	4	455
3	▼ IBM ThinkPad 750C	2	3	84	33	62/83	$5468	486SL-33	12	170
4	➤ IBM ThinkPad 750Cs	–	1	82	25	62/83	$3899	486DX-33	4	170
5	➤ Toshiba Portégé T3400	–	1	80	29	67/78	$2748	486SX-33	8	120
6	▼ IBM ThinkPad 750P	1	2	80	31	62/83	$4518	486SL-33	12	170
7	▼ Compaq Concerto 4/33 Model 250	3	3	80	24	69/89	$2449	486SL-33	4	250
8	▼ Austin 466T	5	3	80	30	51/76	$4299	486DX2-66	8	340
9	➤ TI TravelMate 4000E WinDX2/50	–	1	80	32	57/79	$3300	486DX2-50	4	209
10	▼ Toshiba Portégé T3400CT	6	3	78	23	67/78	$3499	486SX-33	4	120

BUDGET SYSTEMS

		Last month	Months on list	Overall rating	Performance rating	Reliability/ service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	▲ Compaq Concerto 4/33 Model 250	16	3	87	24	69/89	$2449	486SL-33	4	250
2	➤ Toshiba Portégé T3400	–	1	84	29	67/78	$2748	486SX-33	8	120
3	▼ ZDS Z-Lite 486-25	2	3	82	17	56/80	$1799	486SL-25	4	170
4	➤ TI TravelMate 4000E WinSX/25 Color	–	1	82	19	57/79	$1800	486SX-25	4	129
5	➤ AST Bravo NB 4/33s	–	1	81	23	55/74	$2335	486SX-33	8	200
6	▼ Packard Bell Diplomat 170M	3	2	81	18	58/70	$2000	486SL-25	4	170
7	▼ Toshiba T4600	1	2	81	20	67/78	$1995	486SL-33	4	120
8	▼ WinBook 486SX/25 Color	7	2	80	23	51/69	$2299	486SX-25	8	200
9	▼ Packard Bell Statesman 200M	6	3	79	14	58/70	$1500	486SLC-33	4	200
10	▼ AST Bravo NB	5	3	78	16	55/74	$2350	486SX-25	4	120

■ Best Buy

[1] CA = color active, CD = color dual-scan, CP = color passive, MP = mono passive.

[2] Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports ($4.95); a complete month's

2 TI TravelMate WinDX4/75
Clock tripled notebook has it all.

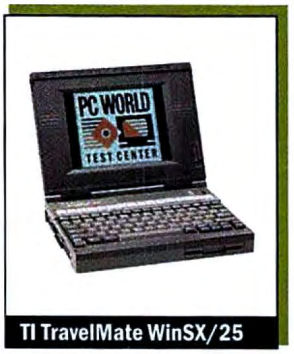
1 Compaq Concerto 4/33
Affordable pen-based Compaq.

2 Toshiba Portégé T3400
Speedy, great battery.

Weight (pounds)	Battery life (hours)	Screen type/size[1]	Vendor contact number	Issue reviewed	Fax reprint number[2]	Comments
8.8	4:02	CA/9.5"	800/334-3445	Apr 94	3603	Fast all-rounder with built-in sound, excellent battery life, and great service and reliability.
8	3:02	CA/9.5"	800/527-3500	current	3625	First DX4 we've tested is also the fastest notebook yet. Huge hard drive, great active color.
8.2	3:52	CA/10.5"	800/426-7735	Apr 94	3601	Past two-time Best Buy power notebook with great screen and built-in sound.
8	4:31	CD/9.5"	800/426-7735	current	3626	Dual-scan version of the successful IBM power notebook.
5.8	6:31	MP/8.5"	800/334-3445	current	3627	Best performance in a subnote, also no. 2 budget notebook.
8.6	5:29	MP/9.5"	800/426-7735	May 94	3628	Another version of the IBM, this one pen based.
8.2	6:31	MP/9.5"	800/345-1518	Apr 94	3602	Light; long battery life. Pen lets you leave your keyboard behind.
7.8	3:30	CA/9.5"	800/443-7914	Apr 94	3604	Slow for a DX2-66 but still speedy; large hard drive.
8	3:07	CD/10"	800/527-3500	current	3629	Dual-scan version of the TI 4000E. A great value.
6	5:30	CA/7.4"	800/334-3445	Apr 94	3606	Best color subnote, but get it with more RAM.
8.2	6:31	MP/9.5"	800/345-1518	Apr 94	3602	Price drop plus weight, battery life, and features make it the budget first place.
5.8	6:31	MP/8.5"	800/334-3445	current	3627	Easily the fastest budget notebook. Light weight, great battery life. Also no. 5 on Power chart.
6.2	4:16	MP/8.5"	800/553-0331	Apr 94	3612	Good all-around subnote. Twin of no. 6 Packard Bell.
8	4:40	CD/8.2"	800/527-3500	current	3630	Best value color budget notebook.
7.8	3:08	CD/9.5"	800/876-4278	current	3631	Good value color notebook with solid performance.
6.2	4:40	MP/8.5"	800/733-5858	May 94	3632	Physical twin of ZDS Z-Lite, falls behind on service.
8.2	5:02	MP/9.4"	800/334-3445	May 94	3633	Good all-around mono notebook at a decent price.
7.8	3:01	CD/10.5"	800/468-2162	May 94	3634	Nice design with Apple Powerbook-like pointing device, nice big screen.
7.4	3:50	MP/9.5"	800/733-5858	Apr 94	3613	Low price, sizable hard drive, but screen could be sharper.
6.8	3:48	CP/9.5"	800/876-4278	Apr 94	3611	Passive screen, slower version of no. 5 budget notebook.

review ($9.95 each; December 3012, January 3001, February 3002, March 3003, April 3004, May 3005, June 3006); and a list of all systems tested by the PC World Test Center for the Top 20s ($4.95). Touch-tone phone required. Charges will appear on your telephone bill.

was predictably sluggish, about half again slower than the DX2-50 and almost two times slower than the DX4-75. You get just a 129MB hard drive and an 8.2-inch dual-scan passive color screen. But the vendor-estimated street price is a mere $1800, a price that's bound to make budget hounds prick up their ears. Furthermore, the nickel-cadmium (NiCd) battery delivered 4¾ hours of AC-free operation in our tests. That's just about enough to get from coast to coast if you have a strong tailwind. The WinSX/25 Color completes the TravelMate hat trick this month by snagging the number four slot on our Budget Mobile PCs chart. *Texas Instruments, 800/527-3500, 512/794-5970* **Reader service no. 734**



TI TravelMate WinSX/25

Toshiba Portégé T3400

PC WORLD TOP 20 2 BUDGET MOBILE PC

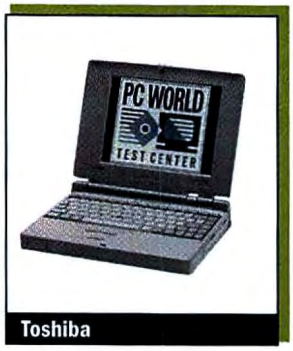
PC WORLD TOP 20 5 POWER MOBILE PC

PROS: Small, light, long battery life, three-year warranty **CONS:** No hard drive options

Here's our number two budget mobile PC Best Buy. Less than 2 inches thick, a full inch narrower than a standard notebook, and with a total traveling weight of less than 6 pounds—this sturdy little unit is one of the smallest and lightest Windows systems you can find. And with its power-packed lithium-ion battery pack and power-sipping CPU, Toshiba's latest Portégé provides a phenomenal 6½ hours of computing per charge.

For a subnote, the Portégé T3400 is comfortable to use, although the keyboard is a little more cramped than a typical notebook's. The monochrome screen is quite sharp for a passive display. Toshiba also found room to put in a PCMCIA Type II slot.

Performance is respectable, and this subnote has the conveniences you expect in a quality portable. Aided by its 486SX-33 CPU and 8MB of RAM, the T3400 outpaced most notebooks in our test suite and fared better than a typical notebook of its CPU class. The auto-resume feature lets you turn the unit on and off without exiting an application, and you can hot-swap battery packs. Toshiba offers solid support, including a generous three-year warranty. Few of the hundreds of Toshiba notebook owners who responded to our Reliability and Service Monitor reported any problems getting the help they needed from the company, and Toshiba earns a good reliability rating and a solid service score.



Toshiba

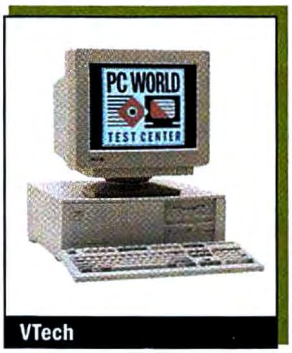
Unfortunately, the 120MB hard drive is the largest offered. But the Portégé T3400's long battery life, ultracompact size, and good performance, coupled with a reasonable $2748 street price and solid support, make this our number two Best Buy budget notebook *and* our number five power notebook. *Toshiba, 800/334-3445, 714/583-3000* **Reader service no. 735**

VTech Platinum 486DX2/66

PC WORLD TOP 20 17 POWER DESKTOP

PROS: Fast, dual-processor option, three-year warranty **CONS:** High price, limited expandability

This is a fast 486DX2-66 power system with 16MB of RAM, a 256K secondary cache, a 500MB hard disk, a CD ROM drive, and a 15-inch monitor. The first time we reviewed this PC line, in March (it was configured as a symmetrical multiprocessing system with two DX2-66 CPUs), we were impressed with its speed and ingenious design. But since applications that are run under DOS or Windows—including the business apps composing our test suite—can't take advantage of more than one processor, we asked VTech to send us its single-CPU version. At a lower $2998 direct price, this is the same PC we first tested—except it has a slightly smaller and newly reconfigured hard disk and lacks the original's second CPU. It raced through our test suite 15 percent faster than a typical DX2-66. If you later decide you want the second processor, VTech will sell you the DX2-66 daughtercard for $1000. Expandability is moderate, with four free 16-bit slots, a free VL bus slot, and just one free drive bay (externally accessible).



VTech

VTech support is a mixed bag. You get a three-year warranty and a year of free on-site service, but the company's showing on our Reliability and Service Monitor gives us pause. Although this vendor delivers a remarkably low number of initially defective units, a large percentage of VTech respondents reported dissatisfaction with the company's problem resolution. Still, this is a quick and uniquely upgradable PC. *VTech Computers, 800/815-0070, 708/540-8086* **Reader service no. 736**

Zeos 486DX2-66

PC WORLD TOP 20 6 POWER DESKTOP

PROS: Fast performance, CD ROM drive, 24-hour tech support **CONS:** Long hold times for tech support

With Pentium systems storming the Power Desktops Top 20, it's impressive to see such a powerful 486DX2-66 from Zeos. This PC outruns a typical DX2-66 by an outstanding 20 percent, even with just 8MB of RAM installed and its CD ROM driver loaded. Zeos provides a finely tuned setup, with the driver loaded in high memory to minimize the hit on performance. This compact also comes with a generous 528MB hard drive. Two free 72-pin SIMM sockets give you the flexibility to add SIMMs with different configurations, and you get six free slots, including one VL bus slot. The Zeos also gives you enough free bays to add three drives. The company provides a high-performance 2MB Diamond Viper VLB graphics accelerator, but if you plan to use any resolution above standard VGA (640 by 480), you'll want to order a monitor larger than the standard 14-inch model.

Zeos's 24-hour tech support comes with a one-year warranty, on-site service for $49 for the first year, and a two-day turnaround on service center repairs. Readers responding to our Reliability and Service Monitor gave Zeos a thumbs-up on problem resolution.

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FEATURES COMPARISON: THIS MONTH'S CONTENDERS–DESKTOPS

Pentium-66, DX4-100 CPUs Pump Up the Desktop

● Yes
○ No
n/a = not applicable

	ALR Evolution V ST/66	Austin Premier 486 System	Azik Ace Cache 586-66PCI/MPC	CompuAdd C466D Mini-Tower	Comell Power Pak	Dell OptiPlex 4100/L (BEST BUY)	Gateway P4D-66 Best Buy (BEST BUY)	Gateway P5-66	Micro Express MicroFlex-VL/ Pentium
Standard features									
Selling price as of 3/14/94[1]	$4908	$2199	$4498	$3065	$1495	$2499	$2415	$3995	$4750
CPU	Pentium-66	486DX2-66	Pentium-66	486DX2-66	486DX2-66	DX4-100	486DX2-66	Pentium-66	Pentium-66
CPU/upgrade socket	273-pin	238-pin ZIF	273-pin	238-pin ZIF	169-pin	238-pin ZIF	238-pin ZIF	273-pin ZIF	273-pin ZIF
BIOS	Phoenix 1.02.04M	AMI 8/8/93	Award 12/27/93	Phoenix 1/15/88 Plus	Diamond 11/30/87	Phoenix 80486 RBP	Phoenix 1.03 4/19/90	Phoenix 1/24/94	AMI 2.2 12/17/93
Installed/maximum RAM (MB)	16/128	8/64	16/192	8/64	4/128	8/64	8/128	16/128	32/128
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	8/4	2/0	6/4	4/2	4/3	4/2	4/2	4/0	4/0
Secondary RAM cache installed/maximum (K)	256/256	256/256	256/512	256/256	256/256	128/128	256/256	256/256	512/2048
Case style	tower	compact	tower	minitower	compact	compact	compact	tower	tower
Free externally accessible 3½-inch/5¼-inch drive bays	0/3	0/2	0/2	0/3	1/3	0/1	0/2	0/3	1/1
Free internal 3½-inch/5¼-inch drive bays	1/0	1/0	3/2	2/0	1/0	0/0	2/0	3/0	1/1
Free 32-bit EISA/16-bit ISA/8-bit ISA slots	0/5/0	0/5/0	0/3/0	0/5/0	0/5/0	0/3/0	0/4/0	0/4/0	0/3/0
PCI or VL slots/number free[2]	3 VLB/1	2 VLB/1	3 PCI/1	2 VLB/1	2 VLB/1	0/0	3 PCI/2	3 PCI/2	3 VLB/1
Hard disk	WD Caviar 2540	WD Caviar 2340	Quantum LPS 525S	Quantum LPS 525AT	Conner CP30254H	WD Caviar 1170	WD Caviar 2420	WD Caviar 2540	Maxtor MXT-540A
Size (MB)	540	341	525	525	250	170	540	540	540
Adapter	Alpha Research S475I VLB	integrated	OEM/PCI-SC200 SCSI	integrated	integrated	integrated	integrated	integrated	2MB Promise DC4030VL-2
Floppy drives (MB)	1.44	combo	1.44	1.44	1.44	1.44	1.44	1.44	1.2, 1.44
Graphics adapter	Matrox MGA Ultima VL/2	Austin W32P	Diamond Viper PCI	Diamond Viper VLB	WD Paradise Accelerator VL Plus	integrated local bus	ATI AX0 PCI	ATI Mach 32 PCI	Diamond Viper VLB
Installed VRAM/DRAM (MB)	2/0	0/2	2/0	2/0	0/1	0/2	0/2	0/2	2/0
Monitor	ALR TE1564G	Austin 1420N	ADI MicroScan 4G	CompuAdd TE 1564M	ADI MicroScan 3E	Dell Ultra-Scan 14ES	Gateway CSI572 FSG	Gateway CS1776LE	Micro Express FM370
Screen diagonal (inches)/dot pitch (mm)	15/.28	14/.28	15/.28	15/.28	14/.28	14/.28	15/.28	17/.26	14/.28
Modem fax/data speed (kbps)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sound board	○	○	Creative Labs SoundBlaster 16 SCSI-2	○	○	○	○	Gateway 2000 Soundcard	Media Resources Spectrum 16
CD ROM drive	○	○	Toshiba XM-3401B	○	○	○	Mitsumi CRMC-FX001D	Mitsumi CRMC-FX001D	Toshiba XM-3401B
Data transfer rate (K/sec)	n/a	n/a	300	n/a	n/a	n/a	300	300	330
Parallel/serial/mouse ports	1/2/1	1/2/1	1/2/0	1/2/0	1/2/0	1/2/1	1/2/1	1/2/1	1/2/0
Service and support									
Warranty (years)	5/1.25[3]	2	1	1	3	1	1	1	2
30-day money-back guarantee	●	●	●	●	●	●	●	●	●
On-site service first-year price	$9.95	free	free	free	free	free	free	free	$50
Service center turnaround (days)	3	1	2	3	2	○	○	○	2
Daily toll-free phone support (hours)	12	18	12	15	10	24	18[5]	18[5]	24
Weekend support	●	●	●[4]	○	●[6]	●	●[6]	●[6]	●[7]
BBS	●	●	●	●	●	●	●	●	○
Fax	●	●	●	●	●	●	●	●	●

[1] All systems priced as configured with DOS 6.0 or later, 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 slots also accept 16-bit ISA peripherals.

[3] Five years parts, 15 months labor.

[4] One year parts, five years labor.

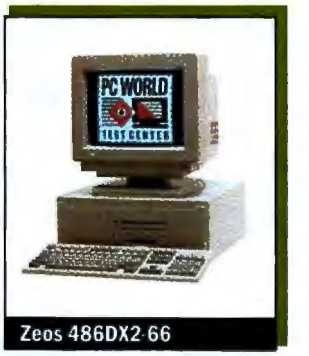
[5] Only 5 hours on Saturdays.

	BEST BUY Micron 4100PCI Magnum	BEST BUY Polywell Poly 486-40DX	Quantex Q486DX2/66MM-4	VTech Platinum 486DX2/66	Zeos 486DX2-66	BEST BUY Zeos Pantera 66
	$3000	$1650	$2305	$2998	$2539	$3595
	DX4-100	AMD 486DX-40	486DX2-66	486DX2-66	486DX2-66	Pentium-66
	238-pin ZIF	238-pin	238-pin ZIF	238-pin ZIF	238-pin ZIF	273-pin ZIF
	Phoenix 1.03 M4P-01	Phoenix 4.01	AMI 11/11/92	SystemSoft 8/19/93	Quadtel 12/31/93	Phoenix 1/12/94
	16/128	8/64	8/32	16/128	8/64	16/192
	72-pin	72-pin	30-pin	72-pin	72-pin	72-pin
	4/2	4/3	8/0	4/3	4/2	6/2
	256/256	256/256	256/256	256/256	256/256	256/512
	compact	compact	tower	tower	compact	tower
	0/1	0/3	0/3	0/1	0/1	0/2
	1/0	0/0	2/1	0/0	1/1	3/2
	0/5/0	0/3/2	0/1/1	0/4/0	0/4/1	0/4/0
	3 PCI/2	3 VLB/1	3 VLB/1	2 VLB/1	2 VLB/1	3 PCI/2
	Conner CP30544	Quantum LPS 270AT	WD Caviar 2540	Conner CP30544	Seagate ST3655A	Seagate ST3655A
	545	270	540	500	528	528
	Integrated	Morse IDE Blazer VLB	Gigabyte VLB	Integrated	Integrated	Integrated
	1.44	1.44	1.2, 1.44	1.44	1.44	1.44
	Diamond Viper PCI	Actix VLB	WD Paradise Accelerator VL Plus	Diamond Stealth 24 VLB	Diamond Viper VLB	Diamond Viper PCI
	2/0	0/1	0/2	0/1	2/0	2/0
	Mag LX1564L G	CAD 14NF	Goldstar 1510	OEM/N-1528	Zeos 14" Color SVGA	CTX CMS-1561
	15/.28	14/.28	15/.28	15/.28	14/.28	15/.28
	n/a	n/a	14.4/14.4	n/a	n/a	n/a
	○	○	Axtech Labs Audio 16	○	○	Integrated
	Mitsumi CRMC-FX001D	○	Sony CDU33A-01	Chinon CDS-535	Mitsumi CRMC-FX001D	Mitsumi CRMC-FX001D
	300	n/a	300	300	300	300
	1/2/0	1/2/0	1/2/0	1/2/1	1/2/0	1/2/0
	1	1/5[4]	1	3	1	1
	●	●	●	●	●	●
	free	$75	free	free	$49	$49
	2	3	1	○	2	2
	11	9	11	11	24	24
	●[6]	●[6]	○	●	●	●
	●	●	○	●	●	●
	●	●	●	●	●	●

[6] Saturdays only.

[7] Toll call with call-back in the evenings and on weekends.

Zeos has one of the highest rankings as a company that readers would recommend to others. The main drawback in the support area: the long hold times, averaging in excess of 6 minutes.



Zeos 486DX2-66

The unit comes with a nice Microsoft Mouse and a clicky keyboard. You get Windows for Workgroups preinstalled, and you can select one of the following Lotus applications free with your purchase: 1-2-3, Ami Pro, Approach, Improv, or Organizer. The $2539 Zeos 486DX2-66 is a fine solution for those wanting a fast DX2-66 with a CD ROM drive—at a price that nearly qualifies it for the budget PC category and helps it to the number six spot on the Power Desktops Top 20. *Zeos Int'l, 800/554-5220, 612/633-4591* **Reader service no. 737**

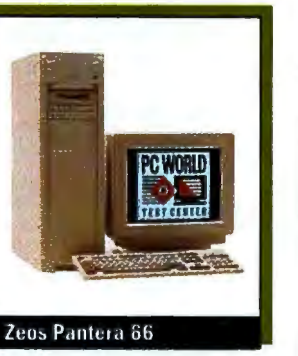
Zeos Pantera 66

PC WORLD TOP 20 **1** POWER DESKTOP

PROS: Fastest system yet, good price

CONS: Long hold times for tech support

The $3595 Zeos Pantera 66 shoots to the top of our Power Desktops chart like a bullet. How did Zeos pull off this feat in an arena crowded with Pentium contenders? For starters, this Pentium-66 is the fastest PC we've ever tested. It ran our benchmark suite over 20 percent faster than a typical Pentium-60 and over 60 percent faster than a typical DX2-66. That's a solid edge if you're looking for maximum power. And Zeos didn't skimp on the configuration: You get 16MB of RAM (192MB max), a 256K secondary cache, a 528MB IDE hard drive, and a double-speed CD ROM drive. You also get a first-class graphics accelerator—the 2MB Diamond Viper PCI card—and a 15-inch monitor.



Zeos Pantera 66

The big tower case gives you plenty of room for drives—seven bays (two externally accessible) are free. You can install up to five expansion cards, two of which can be PCI boards. The motherboard offers six 72-pin SIMM sockets, leaving two free in the 16MB configuration. Zeos provides an integrated SCSI adapter to help keep costs in line if you decide to add a SCSI hard disk. In addition, you get integrated business audio, a set of headphones, and a microphone. You even get to select a Lotus application.

Zeos offers a one-year warranty and seven-day, 24-hour toll-free tech support. On-site service costs $49 a year. Our one complaint: the long hold times for tech support, running upwards of 6 minutes according to our Reliability and Service Monitor. But the system's service and reliability both get passing grades, primarily because of Zeos's good problem-solving record and reasonable rate of reported equipment problems. Stack up the cards, and you get a full deck for a reasonable price—and a number one power desktop Best Buy. *Zeos Int'l, 800/554-5220, 612/633-4591* **Reader service no. 738**

FEATURES COMPARISON: THIS MONTH'S CONTENDERS–MOBILE PCs

TI Pushes Up Notebook Power With a DX4-75

● Yes
○ No
n/a = not applicable

	AST Bravo NB 4/33s	IBM ThinkPad 750Cs	BEST BUY Texas Instruments TravelMate 4000E WinDX4/75 Active Color	Texas Instruments TravelMate 4000E WinDX2/50	Texas Instruments TravelMate 4000E WinSX/25 Color	BEST BUY Toshiba Portégé T3400
Standard features						
Selling price as of 3/14/94[1]	$2335	$3899	$4999	$3300	$1800	$2748
CPU	486SX-33	486DX-33	DX4-75	486DX2-50	486SX-25	486SX-33
Traveling weight (pounds)	7.8	8	8	8	8	5.8
Width x depth x height (inches)	11.7 x 8.8 x 1.7	11.7 x 8.3 x 2	11 x 8.5 x 2.1	11 x 8.5 x 2.1	11 x 8.5 x 2.1	9.9 x 7.9 x 1.7
Installed/maximum RAM (MB)	8/20	4/20	4/20	4/20	4/20	8/20
Secondary RAM cache installed/ maximum (K)	0/0	0/0	0/0	0/0	0/0	0/0
Installed/maximum hard disk (MB)	200/200	170/340	455/455	209/209	129/129	120/120
Removable hard disk	○	●	○	○	○	○
Display type	color dual-scan	color dual-scan	color active	color dual-scan	color dual-scan	mono passive
Screen diagonal (inches)	9.5	9.5	9.5	10	8.2	8.5
Maximum colors or gray shades of LCD	256 colors	256 colors	256 colors	16 colors	64 colors	64 gray
Simultaneous LCD and CRT	○	●	●	●	●	●
Highest resolution of external CRT	1024 x 768	1024 x 768	1024 x 768	1024 x 768	800 x 600	640 x 480
Mouse/keyboard ports	1/1	1/0	0/1	0/1	0/1	0/0
Cursor keys in inverted T	●	●	●	●	●	●
Dedicated page control keys	○	●	●	●	●	●
All 12 function keys dedicated	○	●	●	●	●	●
Standard <Ctrl> and <Alt> layout	○	●	○	○	○	○
Built-in pointing device	●	●	●	●	●	●
Modem fax/data speed (kilobits per second)	n/a	n/a	n/a	n/a	n/a	n/a
Docking station available	○	●	●	●	●	○
PCMCIA slot Type I/II/III	0/0/1	0/0/1	0/0/0	0/0/0	0/0/0	0/1/0
Power management						
Supports APM	●	●	●	●	●	●
Type of battery	NiMH	NiMH	NiCd	NiCd	NiCd	lithium-ion
Suspend button	●[2]	●[2]	●	●[2]	●[2]	○
Suspends when case closed	○	●	●	●	●	●
Service and support						
Warranty (years)	1	3	1	1	1	3
30-day money-back guarantee	○	●	●[3]	●[3]	●[3]	○
On-site/replacement service price for first year	○	$40	$120	$120	$120	$49.95
Turnaround policy (days at service center)	2[4]	3	2	2	2	3
Daily toll-free phone support (hours)	24	24	12	12	12	10
Weekend support	●	●	○	○	○	○
BBS	●	●	●	●	●	●
Fax	●	●	●	●	●	○

[1] All notebooks priced as configured with DOS 6.0 or later, Windows 3.1, VGA monochrome or better display, mouse or other pointing device. Selling price is direct or based on vendor estimate.

[2] Suspends with key combination.

[3] Only if bought direct.

[4] Optional one-day turnaround for additional $45. Additional year of two-day turnaround $99.

Superior In Every Detail.

Comdex Spring
Booth #1906

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At Nanao, details make all the difference in creating our family of professional display monitors. From the product design and manufacturing that takes place in our factory to the end user's working environment, Nanao pays attention to every detail. In engineering. Assembly. Product testing. Quality control. Shipping. Customer support. From the very first days of the company, we set out to be an innovator in monitor technology. And, in a few short years, we have achieved that goal. Today, Nanao has the lowest repair rate in the monitor industry, the highest product reliability, and a fast-growing number of enthusiastic customers. So if you're looking for a superior monitor, start with the details. We do.

Nanao monitors feature protective coatings and panels that reduce glare and eliminate static electricity.

Nanao T Series and F Series monitors have captured every major award from the industry's leading publications.

Nanao was the first monitor company to join in partnership with the EPA Energy Star Program.

3 YEAR WARRANTY

Model	Size	Dot Pitch	Scan Frequency	Recommended Resolution
T660i	20"	0.30mm	H:30-82kHz V:55-90Hz	1280x1024
T560i	17"	0.25mm	H:30-82kHz V:55-90Hz	1280x1024
F780i-W	21"	0.26mm	H:45-100kHz V:55-120Hz	1600x1200
F760i-W	21"	0.28mm	H:30-78kHz V:55-90Hz	1280x1024
F560i-W	17"	0.26mm	H:30-82kHz V:55-90Hz	1280x1024
F550i-W	17"	0.28mm	H:27-65kHz V:55-90Hz	1024x768
F340i-W	15"	0.28mm	H:27-61.5kHz V:55-90Hz	1024x768

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Circle 194 on reader service card

System Snapshots

These systems, while very capable, don't match the preceding group for overall value in a business environment. However, many of them present unique and valuable solutions to end-user needs.

Compaq LTE Lite 4/25E Model 120/w

PROS: Excellent mono screen, battery life, and support
CONS: High price for a mono notebook

We don't often come across a notebook with an active-matrix monochrome screen, but this latest LTE has one. Its crisp 9½-inch display, very readable in changing light, is ideal for those who do a lot of word processing on the road, and the great screen is this notebook's finest feature. Battery life is excellent, and you can compute for more than 5 hours using just the battery. Above all, reliability and service both rank as outstanding on Compaq notebooks. You get a three-year warranty, a two-day turnaround on service center repairs, and 24-hour toll-free technical support.

What keeps this Compaq LTE off our charts is the high $3259 price. That's a lot to pay these days for a 25-MHz 486SL-based monochrome notebook with a 120MB hard disk. *Compaq, 800/345-1518, 713/378-8820* **Reader service no. 739**

Dell OptiPlex 433/LV

PROS: Great service and support
CONS: High price for a 486DX-33

No question about it—when you buy a Dell system, you're buying a connection to good service, high reliability, and some of the best documentation going. But the cost is a bit too high for the OptiPlex 433/LV to be a winning package. Today prices on some 486DX2-66 systems are under $2000, and the OptiPlex is a 486DX-33 system with a $2289 price.

This PC's performance is excellent for its class, outperforming that of a typical 486DX-33 by about 20 percent. Even taking that into account, however, the system just doesn't measure up to its clock doubled siblings. In addition, the 170MB hard drive and 14-inch monitor are not standouts for Windows machines these days. Expandability winds up on the short side too, with just three free slots and only one free drive bay. In fact, just $210 more will buy you the very similarly configured Dell OptiPlex 4100/L with a DX4-100 installed. Need we say more? *Dell Computer, 800/247-4739, 512/338-4400* **Reader service no. 740**

Hewlett-Packard Vectra VL2

PROS: Three-year warranty, high customer satisfaction, Energy Star compliant
CONS: Small hard drive, small monitor

Hewlett-Packard produces very well designed systems, and this DX2-50 is a competitive performer in its class. However, this compact desktop doesn't provide the price-and-performance balance necessary to make the hit parade. The $2187 price is attractive, and this is a "green" PC. But the Vectra simply can't compete with the hordes of DX2-66s flooding the budget desktop market.

This compact desktop Hewlett-Packard Vectra VL2 DX2-50 simply can't compete with the hordes of DX2-66s flooding the budget desktop market.

You get just a 14-inch monitor (although it does provide a high-quality display), 8MB of RAM, and a 211MB hard drive. Expandability is good, however, with four free 16-bit slots and three free drive bays. If support tops your list, note that Hewlett-Packard's service and reliability are good: You get a three-year warranty and 24-hour toll-free technical support, and customers responding to our Reliability and Service Monitor gave Hewlett-Packard high ratings. Trust is an intangible that HP has done a super job of developing with its customers. *Hewlett-Packard, 800/752-0900* **Reader service no. 741**

Tri-Star DesignBook

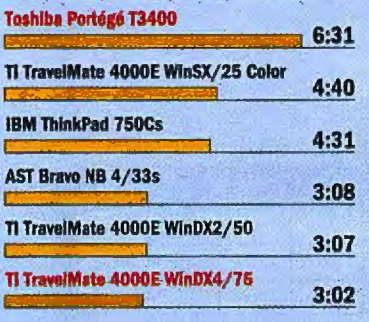
PROS: Fast, good screen, expandable
CONS: High price, heavy

A fast glance at this PC's specs—DX2-66 CPU, 8MB of RAM, 340MB hard drive, local bus video—and you'd think we were talking about a desktop system. There *is* a lot of office-system power in this notebook, and it's a very good performer. The Tri-Star benefits from good construction, with thick plastic hinges on the port doors and a firm hinge for the display. Furthermore, this unit has a great active-matrix color display. So why doesn't it make our Power Mobile PCs chart? It's unusually heavy, for one thing—weighing a full 9 pounds—and its battery life is less than 3 hours. We also found the keyboard, with its flat keys, hard to type on. Finally, the $4133 price is high, although by no means exorbitant considering the strong features.

Tri-Star's service and support features a standard one-year warranty with toll-free technical support and a 30-day money-back guarantee—a decent package, though some companies offer longer warranties. When we called Tri-Star, we had little trouble getting through to technical support. In addition, the company's support staff was able to answer our questions with an acceptable level of accuracy. If you want fast performance and a fine screen and can live with the added cost and weight, take a look. *Tri-Star Computer, 800/800-7668, 602/961-3401* **Reader service no. 742**

BATTERY LIFE TEST REPORT

Toshiba Portégé Goes the Extra Mile



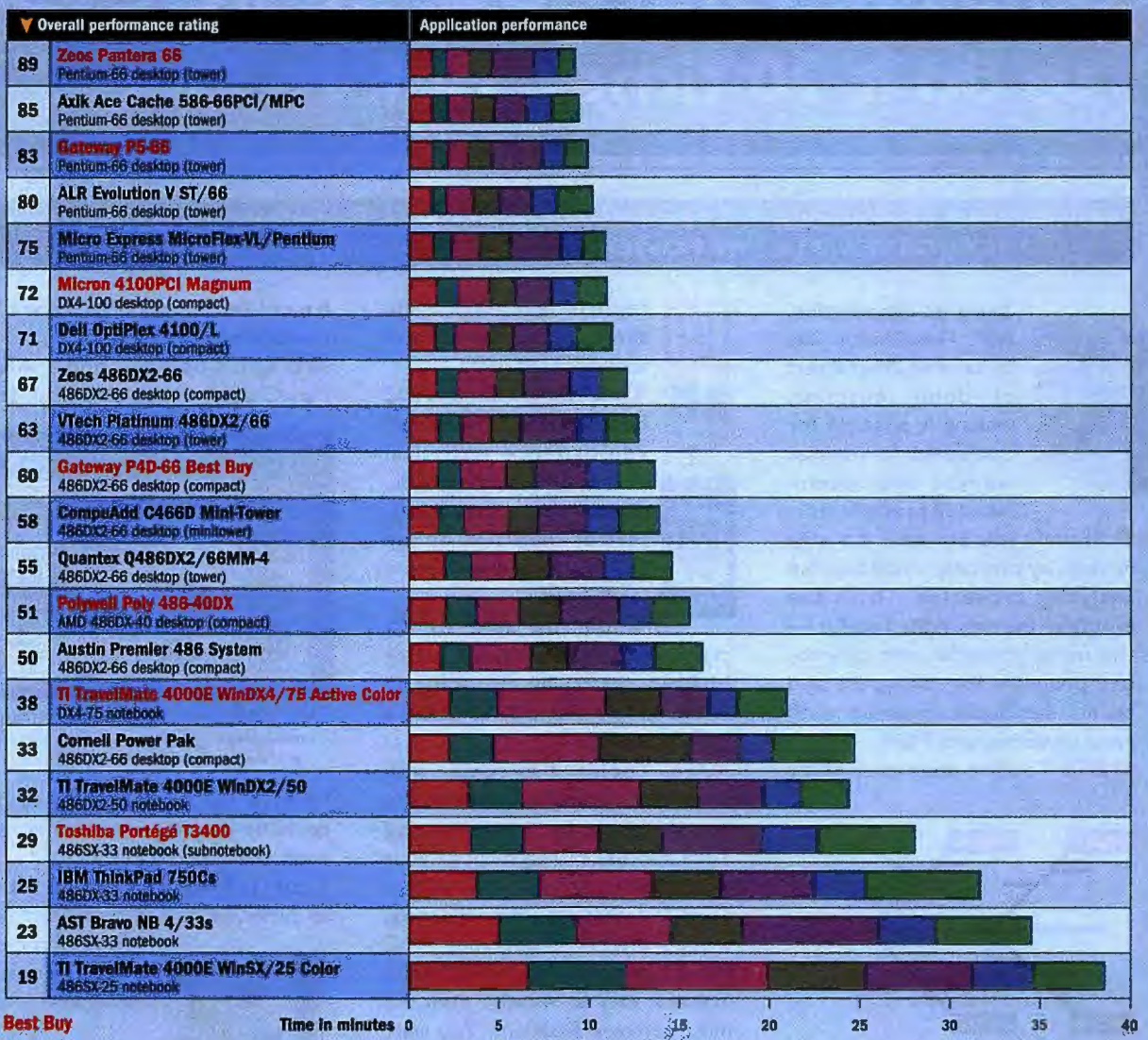
Best Buy

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 work loads. 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.

66-MHz Pentiums and DX4-100s Shoot to the Top



Machines ordered by overall performance from best to worst.

Methodology
We tested each system as supplied by the manufacturer. 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 and printed, and saved.

Paradox 1.0 for Windows
We used a custom form to add a 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; previewed and saved it.

WordPerfect 6.0 for DOS
We performed a variety of editing, formatting, preview, 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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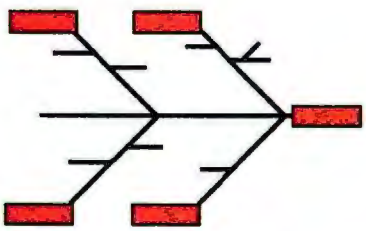


The new ABC ToolKit is the ultimate program for re-engineering and TQM.

ABC FlowCharter does, *and* provides a full range of analysis tools for Total Process Management™.

First, ToolKit includes ABC ProcessAnalyzer™, which helps you visualize and model business processes. You can create user-defined data fields and reports that track cycle times, task times and activity-based costs.

PC MAGAZINE EDITORS' CHOICE December 21, 1993

1994 WIN AWARD W 100 WINDOWS MAGAZINE

ToolKit also includes ABC DataAnalyzer™, which lets you produce statistical charts like histograms, control charts, run charts, scatter diagrams or pie charts, using data from a worksheet.

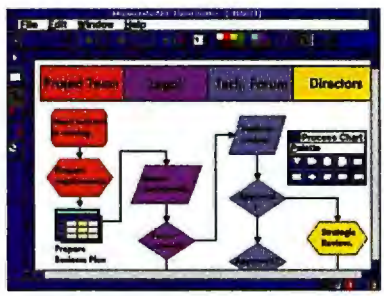
You'll be able to do cause-and-effect analyses (using Ishikawa charts) by examining all of the factors that may influence a given situation.

ABC ToolKit also comes with *Eating the Chocolate Elephant*, the how-to guide for implementing Total Process Management in your organization.

And for everyday flowcharting, there's the newly upgraded ABC FlowCharter 3.0. ABC FlowCharter makes it easy to visualize even the most complex situations. You start by choosing a shape from the shape palette. From then on, just click and drag shapes, and lines automatically connect for you.

If you have revisions (and you're sure to have plenty), you won't believe how easy they are to make. Whenever you move a shape, lines reconnect automatically. And you can enter and edit text directly in your chart. It's no wonder that ABC FlowCharter has become the best-selling Windows™ flowcharting program.

ABC ToolKit and ABC FlowCharter — so powerful, and



ABC ToolKit and ABC FlowCharter share a common interface. They're so simple you can give them to anyone in your company.

so easy, the hardest thing to do could be deciding where to go for your nice, relaxing lunch.

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"If flowcharting is vital to your corporate existence, [ABC FlowCharter] is the one to choose."

- PC Magazine, December 21, 1993

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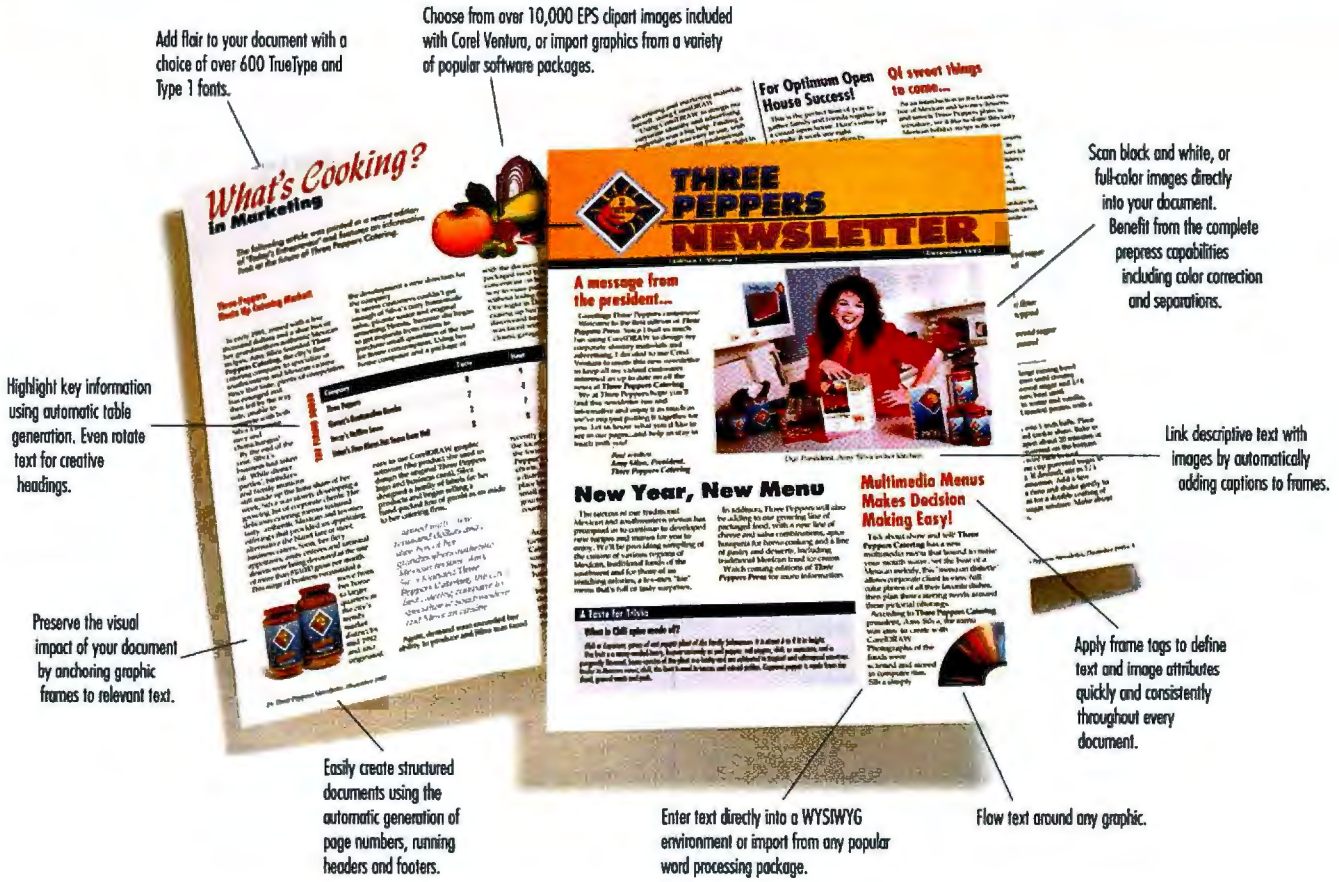

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Win a Micron 4100PCI Magnum

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 Micron 4100PCI Magnum, a Best Buy DX4-100 featured in this month's PC World Top 20.

HOW TO ENTER: Fax your completed questionnaire to *PC World* at 415/974-7367. If you have trouble connecting to this number, fax your survey to 415/974-7404 or 415/442-1891. Do NOT fax a cover page. If you don't have a fax machine, you can mail your survey to Fax Survey, Box 6-SS, *PC World*, 501 Second St. #600, San Francisco, CA 94107. Send your survey in no later than June 30.

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! One entry per person per month. Void where prohibited by law.

LAST, FIRST NAME

FAX NUMBER ( ) – –

ZIP CODE

Please fill in your daytime phone number below.

1	○	○	○	○	○	○	○	○	○	○
2	○	○	○	○	○	○	○	○	○	○
3	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	○	○	○	○	○	○
5	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○
8	○	○	○	○	○	○	○	○	○	○
9	○	○	○	○	○	○	○	○	○	○
0	○	○	○	○	○	○	○	○	○	○

ABOUT YOUR PC

Who is the manufacturer of the PC you use most frequently?

- ○ Acer
- ○ Acma
- ○ ALR
- ○ Ambra
- ○ Apple
- ○ Ares
- ○ AST
- ○ AT&T (NCR)
- ○ Austin
- ○ Axik
- ○ Blackship
- ○ CAF
- ○ Canon
- ○ Compaq
- ○ CompuAdd
- ○ Compudyne
- ○ Comtrade
- ○ Cornell
- ○ CSP
- ○ DEC
- ○ Dell
- ○ Diamond
- ○ DTK
- ○ Dual
- ○ Eltech
- ○ Epson
- ○ Ergo
- ○ Everex
- ○ Gateway 2000
- ○ Hertz
- ○ Hewlett-Packard
- ○ Hyundai
- ○ IBM
- ○ Image
- ○ Inmac
- ○ Insight
- ○ Leading Edge
- ○ Micro Express
- ○ Micron
- ○ MIS
- ○ Mitac
- ○ NEC
- ○ National Micro
- ○ Netis
- ○ Northgate
- ○ Packard Bell
- ○ Panasonic
- ○ PC Brand
- ○ Pionex
- ○ Polywell
- ○ Quantex
- ○ Samsung
- ○ Other (Specify first 7 letters)
- ○ Sharp
- ○ Shasta
- ○ Swan
- ○ Tagram
- ○ Tandy
- ○ Tangent
- ○ Texas Instruments
- ○ Toshiba
- ○ Tri-Star
- ○ Twinhead
- ○ USA Flex
- ○ VTech (Expotech, Laser)
- ○ Zenith
- ○ Zeos
- ○ No-name clone

Is this PC a...?

- ○ Desktop
- ○ Notebook/laptop
- ○ Hand-held

Is the CPU a...?

- ○ Pentium/586
- ○ 80486
- ○ 80386
- ○ 80286
- ○ Other (specify): _____

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 (specify): _____

When did you buy this PC?

- ○ This month
- ○ 1–3 months ago
- ○ 4–6 months ago
- ○ 7–12 months ago
- ○ More than 12 months ago
- ○ Not sure

Would you buy this brand of PC again?

- ○ Yes
- ○ No

If you bought your PC by mail or phone, how long after you ordered it did it arrive?

○ Less than 1 week ○ 1–2 weeks ○ 3–4 weeks ○ More than 4 weeks

WHAT ARE YOU REPORTING? (Check only one.)

- ○ No problems ever
- ○ No problems since last responded to survey
- ○ A problem since last responded to survey
- ○ An older problem not previously reported in survey

If you're NOT reporting a problem, please fill out the Uptime Report (below).

To REPORT a problem, fill out the Problem Report (right column).

UPTIME REPORT

How many consecutive months has your PC been trouble-free?

○ 3 months ○ 6 months ○ 9 months ○ 12 months ○ 15 months ○ 18 months ○ More than 18 months

■ **STOP HERE If you're not reporting a problem.**

PROBLEM REPORT

When you first received your NEW PC, was any component "dead on arrival"?

○ Yes ○ No ○ Don't know

If so, which one was it? (Check all that apply.)

- ○ Battery
- ○ CD ROM
- ○ CPU
- ○ Floppy drive
- ○ Graphics/video board
- ○ Hard drive
- ○ Keyboard
- ○ Memory
- ○ Modem/fax board
- ○ Monitor/screen
- ○ Motherboard
- ○ Mouse
- ○ Power supply
- ○ Sound board
- ○ Other

■ **For the following questions, describe your most recent HARDWARE-related problem with this PC.**

Did you contact the manufacturer for repair service or technical support?

- ○ Yes
- ○ No
- ○ Not sure

What was this problem finally identified as?

- ○ Faulty component
- ○ Incorrectly installed software
- ○ Wrong configuration
- ○ Faulty peripheral
- ○ Device conflicts
- ○ OS problem
- ○ Other
- ○ Don't know

If a component failed, which one was it? (Check all that apply.)

- ○ Battery
- ○ CD ROM
- ○ CPU
- ○ Floppy drive
- ○ Graphics/video board
- ○ Hard drive
- ○ Keyboard
- ○ Memory
- ○ Modem/fax board
- ○ Monitor/screen
- ○ Motherboard
- ○ Mouse
- ○ Power supply
- ○ Sound board
- ○ Other

How many times have you had a problem with this PC?

- ○ This was first time
- ○ Two
- ○ Three
- ○ Four
- ○ More than four

Did the problem occur under warranty?

- ○ Yes
- ○ No
- ○ Not sure

How recently did this problem occur?

- ○ This month
- ○ 1–3 months ago
- ○ 4–6 months ago
- ○ 7–12 months ago
- ○ More than 12 months ago
- ○ Not sure

How long after PURCHASE did this problem occur?

- ○ Less than 1 month
- ○ 1–3 months
- ○ 4–6 months
- ○ 7–12 months
- ○ More than 12 months
- ○ Not sure

■ **For the following questions, describe your most recent SERVICE or SUPPORT experience.**

What type of service/support did you receive?

- ○ Phone
- ○ On-site
- ○ In-store help
- ○ Express system swap
- ○ Express component swap
- ○ Factory return

If phone service, how long were you on hold?

- ○ Not at all
- ○ Less than 1 min.
- ○ 1–2 min.
- ○ 2–5 min.
- ○ 5–10 min.
- ○ 10–20 min.
- ○ More than 20 min.

How long did it take before you talked to the person who finally helped you?

- ○ Less than 1 hour
- ○ 1–24 hours
- ○ 1–2 days
- ○ 3–5 days
- ○ 1 week
- ○ More than 1 week

How long did it take to resolve the problem completely?

- ○ Less than 1 week
- ○ 1–2 weeks
- ○ 3–4 weeks
- ○ More than 1 month
- ○ Never resolved

Was the problem resolved to your satisfaction?

○ Yes ○ No

Based on the service and support you received, would you buy this brand of PC again?

○ Yes ○ No

On the whole, how satisfied were you with the service and support you received?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Not at all — Satisfied — Extremely satisfied

How likely is it that you would recommend this brand of PC to a friend or colleague?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Not at all — Likely — Extremely likely

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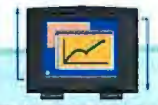

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MAG

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Top 10 Windows Accelerators: Diamond Steals No. 1 Spot

This month we tested 14 graphics boards, adding them to the products reviewed in March in our first roundup. The effect of the new boards on our Top 10 list of accelerators? The average value score jumped more than 11 percent—from 71 points to 79. Gains in overall performance were strong—a 9 percent average improvement—while the average street price held firm.

New board technology lies behind these gains. Five of the boards in this month's group use processors with wide, 64-bit data paths: the $275 Number Nine #9GXE64 and $625 #9GXE64 Pro, the $275 Orchid Kelvin 64, and the PCI and VL versions of the $475 Matrox MGA Ultima. While new VRAM-based 64-bit boards excelled in *PC World*'s Windows Integrated Test Suite—the #9GXE64 Pro and the Matrox MGA Ultima PCI are simply the fastest boards that we've ever seen—their high prices limit their overall value. DRAM-based 64-bit boards feature low prices and competitive performance, with both the #9GXE64 and the Kelvin 64 enjoying higher value rankings than the Ultima PCI.

Gains in overall performance were strong, while the average street price held firm.

We also tested five DRAM boards that use a process called memory interleaving to boost speed. The PCI and VL versions of the $249 Diamond Stealth 32 and the Genoa Phantom 32i ($260 PCI, $245 VL) outpaced many VRAM boards. And the top boards from March—the Hercules Dynamite Pro ISA and VL—use interleaving (these are now combined under one chart listing with a revised $210 estimated street price). Boca Research is also tinkering with DRAM. The $160 Voyager VLB—which missed our Top 10—frees DRAM from screen refresh duties by using a small memory cache.

We're also seeing the first rush of boards based on the PCI bus. While our testing shows that VL and PCI boards perform similarly, boards optimized for PCI may realize significant gains. The PCI versions of the Diamond Stealth 32 and Genoa Phantom 32i enjoy only a slim performance edge over their VL twins, but the Matrox MGA Ultima PCI outraced its VL sibling by more than 15 percent. In our Top 10 list, we display only the better score for cards tested in multiple bus configurations. Generally, different versions of the same board share similar value scores—look for the footnoted products.

WITS was developed by Jon Peddie Associates, a consulting firm specializing in PC graphics technology. Jon Peddie and Fred Dunn are the principal officers of Jon Peddie Associates.

TOP 10 ACCELERATORS

		Overall value	Estimated street price	Windows Integrated Test Suite scores: for Windows	Word 2.0	Excel 4.0	CorelDraw 3.0	Photostyler 1.1	QuarkXPress 3.11	Freelance Graphics 2.01	Bus	RAM (MB/type)	Driver date	Chip	Qgadder service number
1	Diamond Stealth 32 [1] 408/736-2000	87	$249	13.6	15.5	13.3	11.5	12.2	6	PCI	2 / D	12/29/93	ET4000/W32p	601
2	Number Nine #9GXE64 617/674-0009	86	$275	11.8	13.8	8.9	11.7	13.2	5.7	PCI	2 / D	2/2/94	Vision864	602
3	Genoa Phantom 32i [1] 408/432-9090	85	$245	12.9	14	11.3	11.4	13.9	5.8	VL	2 / D	11/16/93	ET4000/W32p	603
4	Hercules Dynamite Pro VL [1] 510/623-6030	82	$210	12.3	13.8	12.6	11.5	15.3	5.7	VL	2 / D	9/14/93	ET4000/W32i	604
5	miro miroCrystal8S 800/249-6476	82	$195	10.7	11	9.2	11.1	13	3.1	VL	1 / D	11/19/93	86C805	605
6	Orchid Kelvin 64 510/683-0300	75	$275	12.2	13.4	13.1	11.9	14.1	4.3	VL	2 / D	1/24/94	GD5434	606
7	Hercules Graphite Power VL 510/623-6030	73	$335	12.5	14.3	12.5	11.5	14.1	4	VL	2 / V	2/13/94	AGX016	607
8	Matrox MGA Ultima PCI 514/685-2630	73	$475	14.6	18.8	12.3	11.2	14.2	3.7	PCI	2 / V	1/11/94	MGA 64-bit	608
9	Hercules Dynamite Power VL 510/623-6030	72	$237	12.8	14.2	12.9	11.5	14.2	5.8	VL	2 / D	12/1/93	ET4000/W32p	609
10	Paradise Ports o' Call 714/932-5000	72	$235	10.9	10.5	11.7	11.6	13.5	2.7	VL	1 / D	5/11/93	90C33	610

Methodology Boards were tested on a 486DX2-66 system 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 combines ratings of overall performance, estimated street price, and product features. For all scores, higher is better.

[1] Similar value offered by other bus version (respectively, the VL-based Diamond Stealth, PCI-based Genoa Phantom, and ISA-based Hercules Dynamite Pro).

For more information about all products in this table, circle reader service no. 901.

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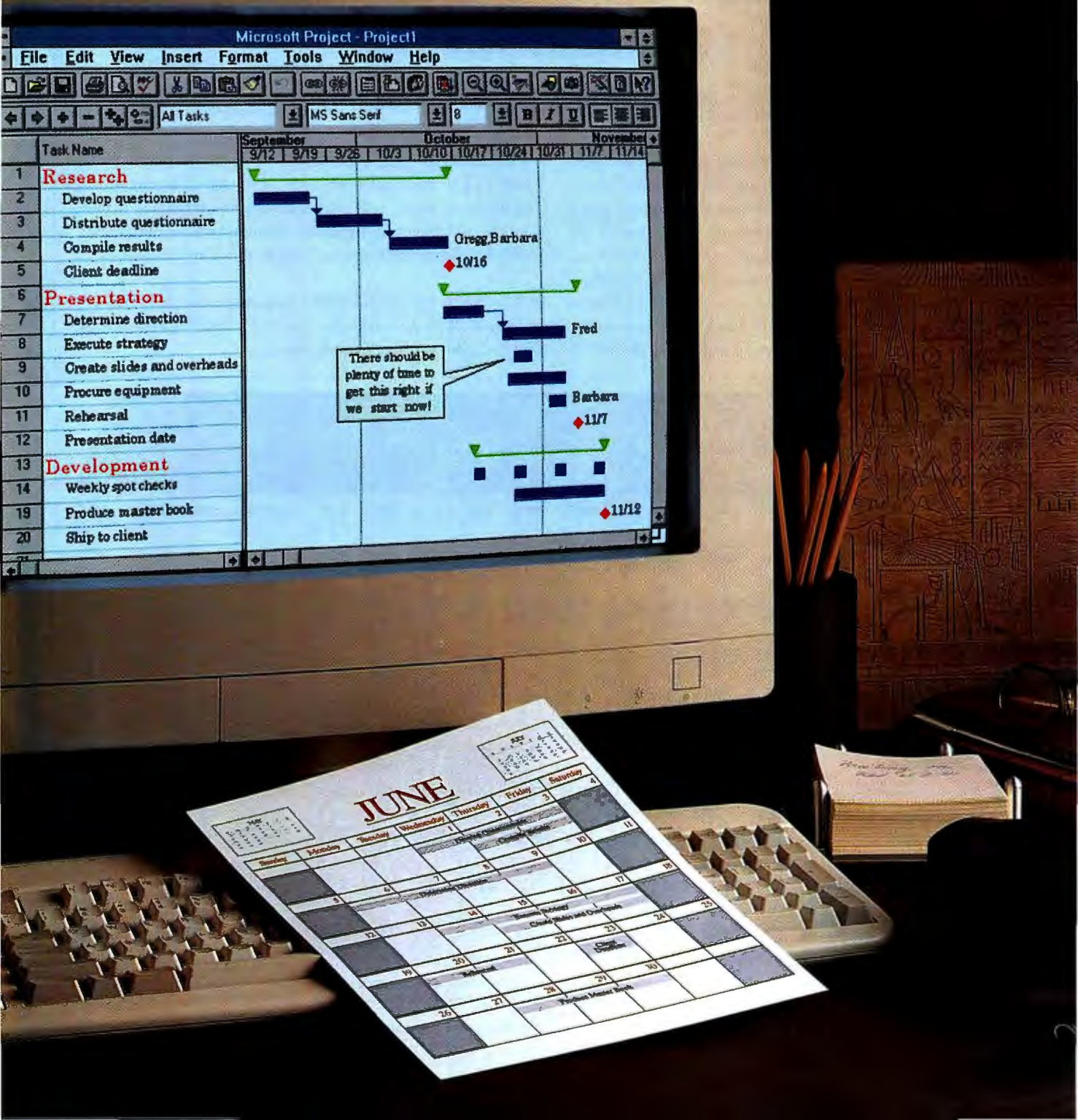

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Where Have All the Profits Gone?

It's every business's logistical nightmare: the information logjam. We asked three consultants how they would use PCs to solve one office's real problem.

By Alice LaPlante

ILLUSTRATIONS BY GARY BASEMAN

It's an intolerable way of working, but it's all too common. Information you desperately need—information you're entitled to—is beyond your reach until someone gets around to issuing a report. And that someone can't issue the report until a certain folder arrives on his or her desk. Where's that folder? Good question. It's on any one of 100 desks, waiting to be signed off and sent to desk 101.

"A logistical nightmare" is how Robert Hughes of Meridian Oil describes his company's paper- and mainframe-based system for tracking expenses. As the senior regional operations accountant at Meridian's Englewood, Colorado, office, Hughes tracks the costs of all Meridian activities in Colorado, Montana, North Dakota, Utah, and Wyoming, staying on top of an ever-increasing pile of purchase orders, sales slips, and invoices. If engineers at a Montana drilling site demand a dozen flashlights, or a North Dakota branch office buys a case of paper clips, Hughes and his staff must find the right set of paperwork.

Before any Meridian project gets the green light, a manila folder must move through the drilling, production, facilities, reservoir, accounting, and purchasing departments, before finally arriving in Hughes's group. Nor does the folder get to sit still once it's been approved, as clerks add and track one expense after another. With 300 to 400 projects open at a time—including many that should be closed—it's almost impossible to get a reliable snapshot of a given project's current cost.

The center of all this activity is a paper document called an Authority For Expenditure (AFE) form. Through the AFE, Meridian authorizes new projects and tracks their expenses over time. In theory, AFEs keep Meridian's central office informed as to whether engineers and managers are estimating the cost of their projects accurately. Hughes is supposed to close an AFE within 120 days of its project's completion, then compare the actual costs to the original estimate of costs.

Reviewing costs is much too complex and cumbersome; there's no way to adequately track when a project is finished.

In practice, "no one ever gets around to reviewing AFE costs," says Hughes. It's much too complex and cumbersome, and there's no way to adequately track when any one of the 300 to 400 projects is finished. As a result, it's virtually impossible to get useful, timely information from an AFE. If a project is costing more than anticipated, the person in charge may not know that there's a problem until months after something should have been done about it.

Hughes is looking for a solution to these problems, and he has an important ally in Mark Hummel, a senior staff analyst who maintains about 120 386- or 486-based PCs at the Englewood site. "People want to know if we've completed the requirements for drilling," Hummel points out. "Have we got the property staked? Have we got the drilling permit? All these things fall within the AFE tracking process, but there's no way to get a quick answer. The AFE could be sitting on a desk in operations and no one would know."

Luckily, Meridian gives Hummel the freedom to find the best solutions for his users' problems. The PCs under his care—all 386s and 486s—run several popular Windows applications, including Microsoft Word, Excel, PowerPoint, and BeyondMail. They are connected through a Banyan VINES network, which also keeps them in touch with the firm's IBM 3090 host mainframe in Fort Worth, Texas.

But finding a solution to this sort of problem is a lot harder than picking the right word processor or spreadsheet. The issues are complex, the testing is difficult, and the experts charge—quite steeply—by the hour. Three of those experts agreed to talk with us about Meridian's problem. Their suggested solutions follow.

Meridian's Problem: Moving a Manila Folder Across Many Desks

1. A drilling engineer writes a geological report on the chances of drilling successfully at a particular site.
Time: 2 to 5 days, not counting research.

2. The report goes to designated employees in drilling, production, and facilities.
Time: 2 hours, but can sit for days.

3. The engineer creates a drilling plan with preliminary cost estimates.
Time: 2 to 5 days.

4. A secretary types a 4-page Authority For Expenditure (AFE) form.
Time: About 30 minutes, but can sit for days.

5. The drilling operations manager reviews and signs the AFE, which is sent to the reservoir department.
Time: About 1 hour, but can sit for days.

SOLUTION 1

Take Time, Watch Closely, and Be Skeptical

Experts

Jeff Alvis
Director of Business Development
Marc Gusmano
Director of Consulting
Lante Corporation, Chicago

Basic Recommendations

Go slow. Don't jump at a complex solution to what may be a relatively simple problem.

"I wouldn't necessarily throw a lot of technology at something like this—especially when the problem isn't well defined," cautions Jeff Alvis, who sees the main concern as one regional accountant who can't complete AFE audits on time. "So what? Why is this so bad?" Before even thinking about a complex solution, Meridian needs to ascertain the problem's actual impact on its business, in terms of both day-to-day and long-term operations.

For instance, do projects typically cost a lot more than anticipated? Or is the company wasting valuable time while AFEs sit on various desktops? "Are there missed opportunities because they can't shorten that cycle? Is the time that the AFE is in circulation necessarily dead time, causing Meridian's competitors to get a jump on it?" Hughes and Hummel must think about these questions before jumping into a possibly expensive technological solution.

"Maybe Hughes just needs more timely access to mainframe data," suggests Marc Gusmano. "In that case, a simple tool like Wall Data's Rumba or one of Attachmate's 'screen-scraper' products—which can save mainframe-produced text as ASCII files—will help him bang up against the 3090 and get more useful reports."

"And it might be that Meridian simply needs a good project management tool," says Alvis. "Microsoft Project might be worth investigating, especially since Meridian has already invested in other Microsoft applications. Microsoft is embedding intelligent E-mail capabilities in all its Windows applications. If this is done well, Meridian could route the AFE from employee to employee automatically without the major investment—and cultural change—of setting up a fancy new system."

Meridian's employees might also want to look at a program to help them figure out how to improve the current situation. "ActionWorkflow System [from Action Technologies] is a good product to start with because it lets you explore your company's current work-flow process—mapping it out, step by step, in a graphical form—and helps you come to some conclusions about how well it's working," says Alvis.

Many practical solutions involve middleware, application layers that transform host data into something a user can work with. If Meridian's employees work largely with spreadsheets, for instance, they might consider Arbor Software's Essbase, a data consolidation, analysis, and sharing tool that uses Excel or 1-2-3 as a front end and just about any host database as a back end. An Essbase application can slice and dice mainframe data, massaging it into whatever form you want. On the downside, Essbase doesn't come cheap—starting at $35,000—and it requires a programmer to set it up.

We asked Alvis and Gusmano for price estimates, but the number of unanswered questions made them reluctant to offer any. They did say that an analysis, including a detailed strategy, would probably cost $10,000 to $40,000 and take anywhere from two weeks to two months. Actually bringing a system up, even to a pilot test stage, would cost considerably more.

6. The reservoir department handles drilling permits and other paperwork, and notates the AFE form.
Time: 2 days to 2 months.

7. The reservoir manager signs the completed AFE and sends it back to drilling.
Time: About 1 hour, but can sit for days.

8. The drilling engineer checks the estimates, signs the AFE again, and sends it to accounting.
Time: About 1 hour, but can sit for days.

9. The accountant logs the AFE into the mainframe accounting system, which assigns the project an ID number.
Time: About 20 minutes, but can sit for days.

10. The accountant routes copies of the completed AFE to all departments. The project is open.
Time: 2 to 3 days.

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SOLUTION 2

Staying in Form

Expert

James A. Moyer
Director of Product Development
SmartFiller, Kitchener, Ontario

Basic Recommendations

Delrina's FormFlow, with a modicum of expert help for setup.

Meridian's AFEs, geologic prognosis reports, drilling permits, invoices, and purchase orders are, quite literally, forms—forms that already define how information flows from one desk to another. For that reason, James Moyer believes that Meridian can solve many of its current problems relatively cheaply and quickly with a basic forms automation package, such as Delrina's FormFlow. "The great thing about FormFlow is that it works with the major E-mail and database packages, so people get going on it right away," he comments.

As Moyer points out, "filling in forms is something most employees have been doing for years," and doing it on screen is no huge leap. It's easier, since electronic forms can tie drop-down lists and dialog boxes to related databases. Automated forms can supply answers to routine questions and insert ballpark figures based on past experiences, doing wonders to ease data entry.

If properly set up, FormFlow can also make it easier to get data out of the AFEs, with the click of an on-screen button bringing up a project's information. And Delrina's Intelligent Forms Language can route both forms and attendant data selectively across the existing Banyan VINES network via E-mail. "This ensures that Meridian's investment in LAN and E-mail technology is not only protected but enhanced," Moyer says.

FormFlow can also route the forms automatically from person to person, accumulating electronic signatures—another FormFlow feature—along the way. And it's easy to see who's sitting on the form rather than doing their thing and passing it on to the next point. "This should address the AFE 'black hole' problem nicely."

FormFlow isn't always the best program for queries and reports, but it can work with other programs that do those jobs better. For instance, although FormFlow has triggers to warn you when something requires your attention (for instance, when a project approaches its budget limit), they won't go off if the database is changed by a program other than FormFlow. But Trinzic Corporation's Forest & Trees can run in the background, checking at preset intervals for certain conditions, and send you a message via E-mail if something needs your attention. FormFlow can also pass variables directly to Concentric Data Systems' R&R Report Writer, seamlessly generating reports. "The end users may not even know they're running a separate application."

How much would a FormFlow solution cost? Moyer estimates that Meridian would spend about $9000 on FormFlow licenses, plus $5000 on consulting services. It would take about two weeks to prepare a pilot application for testing. Including Forest & Trees would add a substantial $55,000—enough to make one consider whether such dependable triggers are worth the money. On the other hand, R&R wouldn't add much to the cost, since a single-user copy allows one person to design reports and everyone else on the network to use them.

All and all, forms offer an easy fix for Meridian's problem, says Moyer: "Forms software can mimic the paper forms employees are already using, while making the task of filling out the forms much easier. And by using the existing E-mail system, forms provide an efficient and cost-effective solution with minimal effort by merely sliding in on existing technology."

The Forms Approach: James Moyer's Solution to Meridian's Problem

1. A drilling engineer writes a geological report as an electronic form; FormFlow automatically routes it.
Time: 1 day.

2. The engineer enters the drilling plan and initial cost estimates into an electronic AFE form, which uses menu prompts and historical database links to ease the job.
Time: 3 hours.

3. The AFE sends itself to the drilling operations manager for approval. The manager responds promptly to avoid triggering alarms.
Time: 1 working day.

4. After the manager electronically signs the AFE, FormFlow copies the information onto various forms and routes them to the reservoir department.
Time: 10 seconds.

SOLUTION 3

The Corporate, and the Human, Point of View

Expert

Susanna Opper
President
Susanna Opper and Associates,
New York and Alford, Massachusetts

Basic Recommendations

Lotus Notes, with setup help from Quality at Work. Keep employees' needs in mind.

"Denver's worrying about Denver; other regional offices are worrying about their specific problems. No one is taking a corporate point of view," observes Susanna Opper. She also warns that a workable solution will be neither cheap nor easy to implement. Her recommendation: Lotus Notes.

Along with routing information and setting triggers, Notes can give Meridian employees a virtual meeting room where people can "chat" about the difficulties of getting drilling permits in certain geographic areas, pose questions, or coach each other through technical or bureaucratic problems. "Hughes could purchase a forms-processing package that would route the work to appropriate people, but it wouldn't help employees work together collaboratively."

But Notes is an expensive proposition. The software itself costs around $15,000 for 50 licenses. And you need an expert programmer to set it up, running up the cost—and time—still further. Third-party Notes applications, however, can help lower the price. One such package is Quality Decision Management's Quality at Work, which asks the system administrator a number of questions, then sets up a Notes-based solution. But software can only do so much—you'll still probably need a Notes programmer to finish the system. It would take about two months to ready a pilot program for testing. Opper estimates that Meridian will spend upward of $100,000—$30,000 for Notes, $15,000 for Quality at Work, and at least $55,000 for consulting, programming, and training services.

When you spend that much money, you'd better be sure people like the results. Therefore, before doing anything else, Hughes should ask interested employees and managers what they think needs to be changed. Opper suspects, for instance, that what people really hate most about preparing an AFE form is gathering numbers and estimating costs: "If the process gets bogged down, it's because people are avoiding the difficult jobs, not because they don't want to write something down on a piece of paper." Tricks like pull-down menus of common choices and automatically inserted ballpark figures can do wonders to make the job easier.

So how should Meridian improve its information flow? First, it needs to appoint an owner, or sponsor, to the problem—Robert Hughes being the natural candidate. Opper then recommends that the sponsor pick a prepilot team of business and technical people to solicit input from other employees and collect possible solutions. Eventually, the prepilot team will learn what it needs and find out who can build it. Then they'll be in the perfect position to teach their co-workers.

"Go slow," cautions Opper. "Keep evolving and refining the process by building little chunks of it, testing and refining repeatedly. Do things in a modular fashion." Always make sure each successive piece can stand independently before moving on. "Meridian won't be able to build the entire system at once. Don't even try."

5. Reservoir employees research and fill out the forms, some of which may require that other forms be completed first.
Time: One or two weeks.

6. The reservoir manager signs the form electronically.
Time: Completed within 1 working day to avoid triggering alarms.

7. The form sends itself back to the drilling engineer, who reviews and signs it.
Time: Completed within 1 working day to avoid triggering alarms.

8. The form sends itself to accounting.
Time: 10 seconds.

Where Does It All Flow to?

Fixing a company or department work-flow problem is like wrestling an octopus. It's slippery, hard to get a hold of, and has more arms than you do. And while you could probably hire someone to wrestle the octopus for you, that kind of work doesn't come cheap.

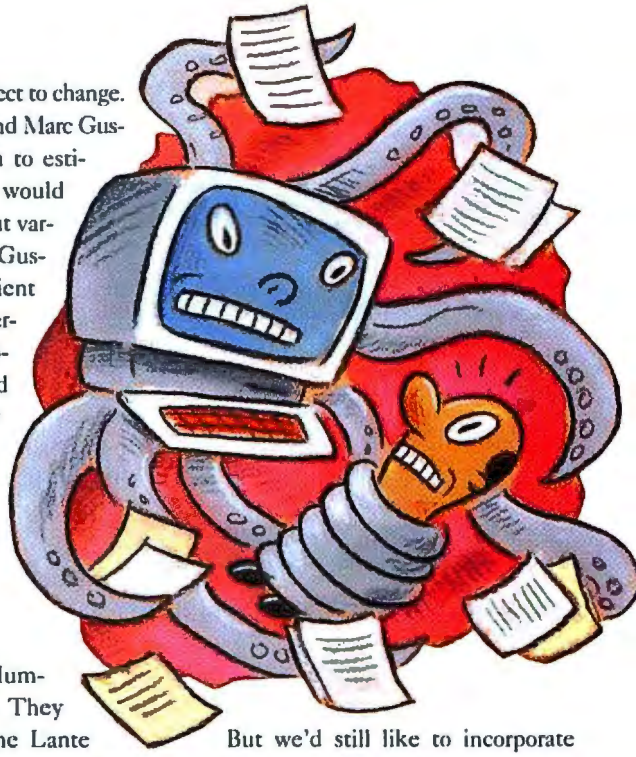
Our three experts offered workable, if divergent, suggestions. As Jeff Alvis and Marc Gusmano pointed out, you should think very carefully about what your problems are costing before you spend a lot of money trying to solve them. The solution can sometimes be worse than the problem. James Moyer recommended creating an automated version of the current system through forms software, offering perhaps the fastest and least expensive route to speed and dependability. Susanna Opper pointed out that Lotus Notes would provide an in-depth solution, but that listening to your employees is more important than any software you buy.

What Are the Costs?

Any solution you choose is likely to cost a great deal of money. What's worse: You can't even get a useful estimate at the early stages of a job.

SmartFiller's James Moyer offered the lowest estimate: about $14,000 for the bare-bones minimum. Susanna Opper's more extensive solution came closer to the $100,000 mark. But these costs, like those of renovating a house, are subject to change.

Understandably, Jeff Alvis and Marc Gusmano of Lante refused even to estimate costs beyond what it would take to do an analysis, and that varied from $10,000 to $40,000. Gusmano said it best: "If a client could tell us—with absolute certainly—exactly what the problem was, we could recommend an exact solution, which may well cost only $5000. But the main challenge in most of these situations is figuring out exactly what the problem is."



The Final Analysis

And what did Hughes and Hummel think about all this? They agreed that Jeff Alvis (of the Lante team) had a good suggestion about using ActionWorkflow Analyst as a modeling tool to diagram the current work-flow patterns. That package would be a reasonable investment for Meridian, because the company could use the same tool in a number of other situations.

They are now considering a forms solution, although Notes is also in the running. "We liked Jim Moyer's FormFlow ideas. We'd been thinking about some sort of forms-based solution tied in with our E-mail, and if we could have it send alarms over BeyondMail, that would be terrific. But we'd still like to incorporate Lotus Notes into the solution somehow, as we like Notes' free-form querying and data sharing," says Hummel.

"Susanna Opper showed us a way to use Notes without spending too much. We'll investigate Quality at Work and other off-the-shelf Notes applications." Hughes and Hummel still have a lot of work ahead of them, but in the end they may have a more efficient office and easier lives.

Alice LaPlante is a freelance business and technical writer based in the Palo Alto, California, area.

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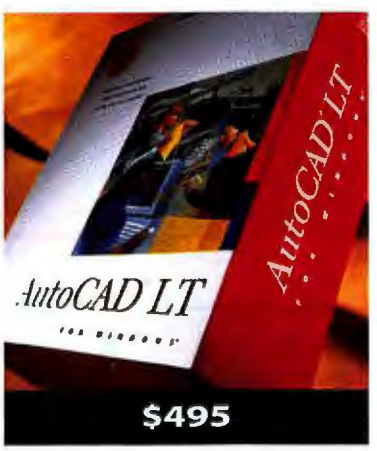

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Solving the Memory Shortage

PHIL MARDEN

DOS's built-in memory manager frees up scarce memory for your applications. But can other programs eke out more? We compare four packages. By Scott Spanbauer

Windows 4.0 may eventually nudge DOS out of your computer, but for the moment this 13-year-old operating system is still the foundation of most PC-based business computing. Even if you use Windows 3.1, you have to deal with DOS and its quirky memory limitations. Therefore, you'll likely benefit from a memory manager, especially if your PC is loaded with RAM-resident programs such as device drivers or TSRs.

We looked at the memory managers in Microsoft's MS-DOS 6.2, Novell's DOS 7 (the descendant of DR DOS), and IBM's PC-DOS 6.1. We also examined the latest versions of the four third-party memory managers on the market—386Max 7.0, Memory Commander 4.0, Netroom 3.03, and QEMM 7.03—which retail for $100 each and promise to do a better job with less effort. The big question: Are the added benefits of third-party managers worth the extra expense? First, a little background.

Sleight of RAM

Once upon a time, your computer's conventional, or *lower*, memory—the lower 640K of RAM—was as empty as a conjurer's top hat. Now, with device drivers, RAM-resident utilities, and memory-hogging applications multiplying like rabbits, lower memory fills up fast. By the time you network your system, add a CD ROM drive, and load essential utilities such as DOSKEY, antivirus software, and a disk cache, you can end up having as little as 400K of free conventional memory—too little room for many of the more powerful DOS applications.

Enter memory managers. They work their magic by freeing up as much conventional RAM as possible. These behind-the-scenes utilities whisk drivers and TSRs out of conventional memory and into the space between 640K and 1024K (1MB)—called *upper memory*. Memory managers also give DOS access to the High Memory Area (HMA), a 64K area between 1024K and 1088K into which you can shunt a large portion of DOS

or another program, further lightening conventional memory's load. Finally, memory managers let you configure extended memory (RAM above 1024K) as expanded memory. Expanded memory is a different method some programs use to access memory beyond the 640K barrier. All of these approaches, with the exception of using the HMA, require at least a 386 system.

Putting the Managers Through Their Paces

We evaluated each of the third-party managers and MS-DOS 6.2's memory manager on a common test-bed PC running MS-DOS 6.2. We tested the managers in Novell DOS 7 and PC-DOS 6.1 in their host operating systems. We ran two sets of tests for each memory manager—one set to see how much memory each manager could free up, and the other to judge its effect on system speed. For the latter test, we used the PC World Test Suite.

We were able to install PC-DOS 6.1 and configure its memory management features, but an incompatibility with its disk compression utility prevented our system performance tests from running. Likewise, a hardware incompatibility between the test-bed system and Memory Commander kept us from evaluating system performance with the memory manager installed.

Not surprisingly, all the managers moved most or all of our drivers, TSRs, and DOS out of lower memory. They varied dramatically, though, in the amount of total upper memory created, ease of installation and use, and bundled utilities. And while memory managers aren't supposed to hinder performance, a couple of the products slowed application execution by as much as 10 percent.

We also looked at the effect memory managers had on Windows operation—with inconclusive results. In certain system setups, a memory manager allowed us to open more Windows applications before running out of memory. On other systems, however, varying the amount of free conventional memory had no effect on the number of Windows applications we could run simultaneously.

BEST BUY

386Max is the sole Best Buy recipient—and small wonder. It's full featured, it's exceptionally easy to use, and it frees up almost as much conventional memory as QEMM, yet doesn't affect system performance.

After installing, exploring, and testing each memory manager, we awarded Qualitas's 386Max the sole Best Buy. This package provided the optimal combination of easy installation and configuration, as well as the most free memory without performance degradation.

Optimization—Automatic Versus Manual

Getting the most memory out of your system can be a laborious undertaking if you install everything manually. After all, setting up the memory manager is only the first step—you may need to tell the memory management driver how and where to find upper memory blocks (UMBs), and whether to enable additional features such as expanded memory. In addition, you must tell the driver which programs to load high, which to leave low, and the order in which to move them into upper memory.

Most of us don't want to deal with all that juggling. That's why memory managers contain an optimizer along with the memory management driver. The optimizer offers set-and-forget convenience, blazing through memory management tasks. It also lets you control many of the product's advanced options, such as detecting unused ROM areas and using the monochrome video area for UMBs.

All the reviewed products except Novell DOS's memory manager have optimizers. Furthermore, all optimizers have both a default setup, in which you let them pick the optimization, and a custom setup. Whichever you choose, you'll find that optimization usually yields better results than an uninformed approach to moving and packing drivers and TSRs in upper memory. The optimizer quickly tests thousands of loading combinations and picks the best one.

The memory managers in MS-DOS and PC-DOS make the job a cinch, thanks to easy-to-understand optimizers that do their work quickly and require minimal user intervention. MemMaker, the optimizer in MS-DOS's memory manager, asks only if you need expanded memory before it optimizes your system. RAMBoost, the

QEMM and 386Max Lead the Struggle to Free More Memory

Numbers list memory freed for DOS/Windows DOS sessions. n/a = not available	Optimizer's default installation	Best configuration using optimizer's custom setup		Best manual configuration	
	graphics mode	graphics mode	text mode	graphics mode	text mode
386Max 7.0	606K/577K	628K/609K	628K/673K	n/a	n/a
Memory Commander 4.0	521K/489K	585K/553K	705K/553K	n/a	n/a
Netroom 3.03	619K/601K	619K/601K	619K/601K	619K/601K	714K/701K
QEMM 7.03	634K/605K	634K/605K	634K/605K	634K/605K	698K/669K
HIMEM/EMM386 (MS-DOS 6.2)	567K/541K	608K/589K	608K/589K	614K/597K	711K/597K
HIMEM/EMM386 (Novell DOS 7)	486K/466K[1]	486K/470K[1]	486K/470K[1]	594K/566K	678K/566K
HIMEM/EMM386 (PC-DOS 6.1)	523K/493K	580K/557K	580K/557K	614K/597K	711K/597K

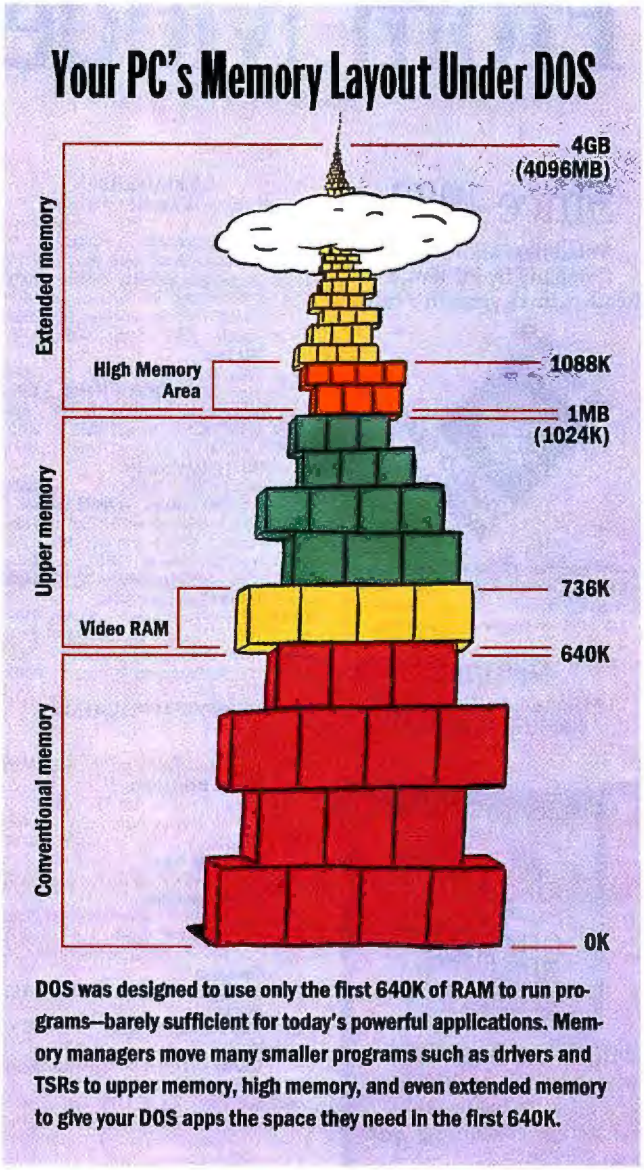
Best Buy [1] Tests performed using Novell DOS's memory management utility; Novell DOS's memory manager lacks a full optimizer.

optimizer in PC-DOS's memory manager that IBM licensed from Central Point Software, also installs quickly. An accompanying setup utility lets you enable options such as expanded memory before RAMBoost allocates the UMBs and loads programs into them.

Because Novell DOS 7's manager lacks an optimizer, you must use a third-party memory manager to figure out the optimal load locations and load sequence, and to load programs high automatically. However, the Novell manager lets you create UMBs and gives you control over a few critical features, such as whether to create expanded memory.

The optimizers in the third-party memory managers give you more setup options than the DOS optimizers. All four—Netroom's Customize, QEMM's Optimize, 386Max's Maximize, and Memory Commander's integrated optimizer—let you choose whether to create expanded memory and whether to do a quick or a thorough optimization before testing for the best load configuration. Using each optimizer's advanced settings and features requires an education in DOS memory, or at least some pointers. Fortunately, all four come with thorough online help, as do the optimizers in the three DOSes. You may also want to investigate RYBS Electronics's optimizer, called ATLast, which is designed to work with any memory manager. We did not test it for this article, however, since it isn't a full memory manager.

Today, many people use multiconfiguration setups on their PCs—which allows them to load different sections of their initialization files depending on their specific needs at the time. An example is the notebook user who works on the road but also needs to connect to the office network using a docking station. In this case, she needs to use a configuration file that contains network drivers. While a good memory manager should free enough memory to eliminate the need for multiple boot-file configurations, you may still want to use multiconfiguration for other reasons. All of the third-party managers support multiconfiguration, but unfortunately, neither MS-DOS 6.2 nor PC-DOS 6.1 optimizes CONFIG.SYS and AUTOEXEC.BAT files that are set up for multiconfiguration. IBM has promised to add this feature to PC-DOS 6.3, which should be available by the time you read this review.



DOS was designed to use only the first 640K of RAM to run programs—barely sufficient for today's powerful applications. Memory managers move many smaller programs such as drivers and TSRs to upper memory, high memory, and even extended memory to give your DOS apps the space they need in the first 640K.

The Art of Freeing Up Memory

No one tops QEMM for freeing memory. Quarterdeck's product saved more memory in DOS graphics mode than any competitor's best configuration, whether default or custom. Netroom and 386Max also have excellent default optimizations—each shook loose over 600K in DOS. The custom installations for Memory Commander and the MS-DOS and PC-DOS optimizers yielded significantly better results than their default installations.

One big surprise: The DOSes recovered more memory with manual adjustment than using their bundled optimizers. Following a tip in the MS-DOS manual, we moved larger drivers and TSRs before moving smaller ones in CONFIG.SYS and AUTOEXEC.BAT, then we placed DEVICEHIGH and LOADHIGH commands as appropriate, and finally we stripped out MemMaker's load location parameters and rebooted. You can do the same thing in PC-DOS. Coaxing Novell DOS 7 up to 594K in DOS graphics mode required quite a bit more experimentation with program load order.

All managers allow you to extend conventional memory beyond the 640K barrier, which can prove very useful if you work on large databases or worksheets using a text-mode program such as Borland's Paradox. This method annexes memory that sits just above 640K, beefing up conventional memory to 704K or even 736K. However, since the memory just above 640K is the video RAM area, you can't extend conventional memory if you're working with graphics programs. Netroom, 386Max, and QEMM let you reclaim video RAM for text-mode apps running in a Windows enhanced-mode DOS session. We give 386Max a gold star for its easy-to-use DOSMAX feature, but it can't extend conventional memory while in DOS. To activate DOSMAX, double-click its icon, which 386Max installs in Program Manager. A custom PIF editor in 386Max lets you change your existing DOS PIF files to use the extended DOSMAX session.

QEMM's VIDRAM utility and Netroom's Stretch take a little more effort to enable. Both extend Windows DOS–session memory, but require you to load DOS programs by using batch files that first load the video-RAM extender program. The remaining memory managers extend conventional memory in DOS but not in a Windows DOS session. Memory Commander even extends memory through the video area on the fly, by **continued on page 197**

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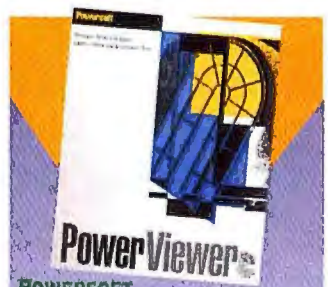

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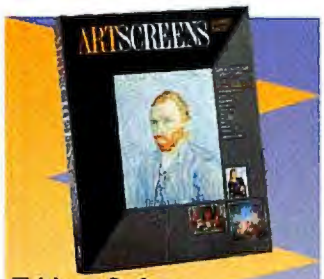

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detecting which applications use graphics and which don't. The DOS-bundled memory managers, by comparison, force you to add cryptic parameters to their command lines manually.

If you tinker a lot with the memory manager, encounter a conflict, or simply want to see what's going on in your system, a utility for viewing the system configuration and memory allocation is a big help. QEMM, 386Max, and Netroom offer the most complete solutions. QEMM's Manifest is the classic, but 386Max's ASQ and Netroom's Discover are comparable tools. MS-DOS's memory utilities are less comprehensive, but they're still effective, especially when used with the MEM command. PC-DOS provides a bare-bones utility that simply sends a list of system features to the screen; it also comes with a version of MEM. Novell DOS's MEM command offers more detail than Microsoft's or IBM's, but lacks a comprehensive configuration viewer. Memory Commander's shell program gives you basic information about memory use but doesn't provide a separate system configuration viewer.

How Do They Do It?

While most of the memory managers loaded all our drivers and TSRs into upper memory, the amount of conventional memory they recovered ranged widely. What gave top performers the edge?

One advantage is the ability to shoehorn programs into tight UMB spaces by using the expanded memory specification (EMS) page frame (assuming there is one) for loading programs. TSRs and drivers usually require extra memory during loading, and the page frame temporarily provides the extra needed space. 386Max, Netroom, PC-DOS, and QEMM offer this feature.

Memory managers also excel by scavenging unused ROM areas for the UMBs. On most systems, for example, the 32K system BIOS area contains a duplicate of the BIOS; the manager uses this duplicate area for another purpose. Only Memory Commander and PC-DOS can't recover unused ROM areas.

Two of the most recent innovations for making UMBs available involve moving the system, video, and adapter BIOSes into the

FEATURES COMPARISON

Memory Managers: How Their Features Stack Up

● Yes
○ No

	BEST BUY 386Max 7.0	Memory Commander 4.0	Netroom 3.03	QEMM 7.03	HIMEM/ EMM386 (MS-DOS 6.2)	HIMEM/ EMM386 (Novell DOS 7)	HIMEM/ EMM386 (PC-DOS 6.1)
Standard features							
List price	$99.95	$99.95	$99	$99.95	Free with DOS	Free with DOS	Free with DOS
Memory management							
Auto-optimization	●	●	●	●	●	○	●
Uses page frame when loading programs high	●	○	●	●	○	○	●
Supports DOS 6 multiconfigurations	●	●	●	●	○	●	○
Loads FILES, BUFFERS high	●	○	●	●	●	●	●
Loads FCBS high	●	○	●	●	○	●	●
Loads LASTDRIVE high	●	○	○	●	○	●	●
Copies BIOS ROMs into RAM	●	●	●	●	●	●	○
Recovers unneeded ROM addresses	●	○	●	●	●	●	○
Copies other ROMs into RAM	●	●	●	●	●	●	○
Moves VGA ROM into unused ROM space	●	●	●	○	○	○	○
Suggests new CONFIG.SYS and AUTOEXEC.BAT load orders	●[1]	○	○	●[2]	○	○	○
Allocates expanded and extended memory from common pool	●	●	●	●	●	●	●
Compatible with Windows 3.1 in standard mode	○	●	●	●	●	●	●
Suspend-resume modes	●	●	●	●	●	●	●
Fail-safe installation	●	●	●	●	●	●	●
Service and support							
Online help	●	●	●	●	●	●	●
Daily support (hours)	7	9	7.5	14.5	12	12	24
Weekend support	○	○	○	○	○	○	●
Toll-free number	○	○	○	○	○	●	●
Fax/BBS	●/●	●/●	●/●	●/●	●/●	●/●	○/●

[1] User must group order-dependent drivers before automatically rewriting AUTOEXEC.BAT and CONFIG.SYS.

[2] User must manually reorder the items in AUTOEXEC.BAT and CONFIG.SYS.

wide-open spaces of extended memory. QEMM's mysterious-sounding Stealth technology copies the contents of the various BIOS ROMs, as well as the DoubleSpace driver, into memory located above 1MB and returns them to DOS memory as needed via the EMS page frame. Netroom's Cloaking feature takes a different approach, with similar results. Instead of copying existing ROMs elsewhere, Netroom simply ignores them, using its own BIOS (codeveloped by Helix and BIOS manufacturer Phoenix Technologies), which it places in extended memory. Novell DOS also takes advantage of extended memory by moving many of the bundled drivers and the TSRs there.

Both Stealth and Cloaking help their respective memory managers free the maximum amount of conventional memory on the first try—but impose a slight hit in system performance. Stealth slows your computer noticeably on disk-intensive tasks, such as indexing a database file. Cloaking marginally reduces system performance. Unfortunately, we were unable to test Memory Commander's speed because of the manager's incompatibility with our test system's keyboard controller. (V Communications says Memory Commander has this problem with about 5 percent of all AMI BIOS–equipped systems.)

Another way to free memory is to move as much of DOS and its related utilities as you can to other areas. Every manager except Memory Commander moves at least some of the DOS BIOS data, including FILES, BUFFERS, FCBS, and LASTDRIVE tables, into either upper memory or the HMA. QEMM takes the prize, however, for carting all but about 5K of DOS out of lower memory, compared to the 10K to 15K of DOS the others leave behind.

No matter how well an optimizer works, it still has to deal with drivers and TSRs in the order in which they appear in CONFIG-.SYS and AUTOEXEC.BAT. However, just as you would pack a suitcase starting with the largest items, memory managers will do a better job fitting all the pieces into upper memory if they get the biggest ones out of the way first. If your optimizer is unable to load all drivers and TSRs into upper memory, you may want to rearrange these programs, starting with the largest ones. (We recommend that you read the appropriate chapter of your DOS manual before attempting to do this.)

Because the memory managers lack the intelligence to know which programs must load before others, all but one of the memory managers are unable to reshuffle the order of the commands in your CONFIG.SYS and AUTOEXEC.BAT files. 386Max is an exception: It lets you group drivers and TSRs that need to remain in a certain order, and rewrites your boot files with a new load order if it needs to, taking into account the grouped programs. QEMM's Optimize lets you test different load orders, but you must reorder the files manually with an editor.

All memory managers let you allocate expanded and extended memory from a common pool, which doesn't give you more conventional memory but does make it easier to mix programs that require both EMS and XMS (extended memory specification). Without the common pool to draw from, you would have to either divide available RAM between the two specifications or reboot to switch between them.

Presto—A Best Buy

If you're a TSR junkie, if your PC is jam-packed with driver-enabled peripherals, or if you would rather not exit Windows every time you want to play Return to Zork, then you'll appreciate the convenience third-party managers provide.

The overall best memory manager is Qualitas's 386Max. In our tests this lone Best Buy achieved memory savings similar to the amounts saved by QEMM and Netroom, without the slight performance trade-offs incurred by these programs' Stealth and Cloaking features. And while 386Max doesn't extend conventional memory past 640K for text-mode programs in DOS, it does so in a Windows DOS box, where that ability is often most needed. While performing excellently in most respects, QEMM and Netroom achieve their near-automatic optimizations at the expense (albeit minor) of overall system performance.

If you're a TSR junkie, if your PC is jam-packed with driver-enabled peripherals, or if you would rather not exit Windows every time you want to play Return to Zork, you'll appreciate third-party managers.

However, if getting as much lower memory as possible for text-mode applications is most important to you, then give Memory Commander serious consideration. While this manager excels at freeing memory far beyond the 640K boundary for text-mode applications, this program is a one-trick pony that can't repeat its performance within Windows. It does a poor job of freeing RAM for graphics-mode applications.

Of course, your Best Buy may well be the No Buy. The MS-DOS and PC-DOS memory managers are more full featured than Novell DOS 7's, but all three products are more than sufficient for standard business-computing operations. Few DOS business applications need more than 512K to run, and all the utilities we examined free a great deal more memory than that. The bottom line: Try out your DOS memory manager before you plunk down $100 for an add-on manager. The DOS managers may not conjure up quite as much memory as their third-party counterparts, but they'll definitely foil the disappearing act in your wallet.

Scott Spanbauer is a contributing editor for PC World.

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

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- 256K 15ns write-back cache, Flash BIOS
- 7 expansion slots: 2 VESA, 7 ISA
- 2X CD-ROM drive, 3.5" floppy drive
- Diamond Viper VLB (2MB VRAM)
- 15" Micron 15FGx, 1280NI, .28mm, MPRII
- Desktop "Tool Free" chassis
- EPA Energy Star compliant
- Microsoft Mouse, 101-key keyboard,
- MS-DOS & Windows for Workgroups
- Microsoft Office 4.2 for Windows on CD*

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DX4 100MHz - ADD $200

4100PCI MAGNUM

- Intel DX4 100MHz processor
- Pentium Technology Ready (ZIF)
- 8MB RAM (expandable to 64MB)
- 420MB 14ms PCI IDE hard drive (PCI)
- 256K 15ns write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- PCI graphics accelerator (2MB)
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- Matrox MGA-II 2MB add: $200

P66PCI POWERSTATION

- Intel 66MHz Pentium processor
- 8MB RAM (expandable to 128MB)
- 420MB 14ms IDE hard drive (PCI)
- 256K 15ns write-back cache, Flash BIOS
- 4 ISA, 2PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy
- PCI graphics accelerator (2MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Desktop "Tool Free" chassis, 3 fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office 4.2 for Windows on CD*

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- 16MB RAM
- 527MB hard drive
- 15" Micron 15FGx

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- 32MB RAM
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- 17" Micron 17FGx

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P66PCI POWERSERVER

- Intel 66MHz Pentium processor
- 16MB RAM (expandable to 192MB)
- 527MB 12ms SCSI-2 hard drive
- PCI 32-bit Fast SCSI-2 controller
- 512K 15ns write-back cache, Flash BIOS
- 1Mb Flash BIOS by Phoenix
- 5 EISA, 2PCI, 1 EISA/PCI slots
- 2X SCSI-2 CD-ROM drive, 3.5" floppy
- PCI graphics accelerator (2MB)
- 14" Micron 14FG, 1024NI, .28mm, MPRII
- Tower: 10 drive bays, 3 cooling fans
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office 4.2 for Windows on CD*

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Microsoft Office
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BIG HARD DRIVES: 300MB and Counting

Is Windows putting a squeeze on your disk space? Try one of these 42 high-capacity hard drives from $260 up.

Remember when your PC's 200MB hard disk seemed like a digital Grand Canyon? A yawning gorge ready to swallow every space-gobbling Windows program you could throw into it? Those days didn't last long. Install Microsoft's Word 6.0 for Windows and Excel 5.0, and they alone can easily devour 50MB. Dump in a few program upgrades, add font and screen saver collections, and shovel in a bunch of data files—and that magnificent chasm begins to look more like a slit trench.

If you're faced with the regular chore of archiving data and removing programs to maintain a bare minimum of working space, maybe it's time to take the storage plunge again. Depending on the vintage and power of your PC, you may need to toss or augment your old hard disk with something heftier and faster—say, a 300MB, 500MB, or even 1626MB IDE hard disk.

By Robert Luhn

GORDON STUDER

IDE HARD DISKS WITH JUMBO CAPACITIES—like these 546MB, 541MB, and 732MB drives from Maxtor, Western Digital, and Quantum—are becoming the rule when it comes to disk-intensive apps.

IDE Spells Economy and Reliability

Today's high-capacity IDE drives are fast, reliable, and surprisingly cheap—about a dollar per megabyte or less. Economy is the reason this is a guide to IDE rather than SCSI drives. Most PCs already come with an IDE adapter, making upgrades cheaper and easier. IDE also offers excellent performance on most stand-alone systems. It takes a heavy-duty server or workstation application to take advantage of advanced features such as request queuing.

Sticking with IDE doesn't limit your selection, either: We've included information on 42 internal drives with capacities ranging from 340MB to an astounding 1626MB (see "Super IDE Hard Drives"). We also provide a rundown on the new Enhanced IDE standard that is helping IDE evolve from its humble econobox beginnings into a storage standard fit for power users (see "Enhanced IDE: Buying for the Future").

They Don't Build Them Like They Used To...

You reap a benefit you may not expect with today's hard drives: Their lower prices don't translate into lower reliability standards. "I haven't seen any junky high-capacity drives on the market," says Doug Anderson, the author of *The Hard Disk Technical Guide*. "Drives are so well made today, MTBF [mean time between failures] ratings are moot. You'll *never* reach a drive's 150,000-hour

Enhanced IDE: Buying for the Future

A number of leading PC, disk drive, and BIOS manufacturers, spearheaded by Western Digital, are getting together to revamp the IDE spec so that new IDE drives will be fast enough and big enough to keep up with today's hot DX2, DX4, and Pentium systems. The proposal boils down to a few key improvements: Enhanced IDE drives won't be limited to 528MB (a constraint imposed by the PC's original BIOS) and will offer disk partitions as big as 8.4GB. They'll also sport SCSI-like data transfer rates (up to 13.3MB/sec). Finally, systems will support four IDE channels and devices other than hard disks—IDE CD ROM players and tape drives, for example.

The changes necessary to deliver the new IDE standard are already in some BIOSes from AMI and Phoenix, for example, and will be included in some new PCs by the time you read this. Storage pundit Doug Anderson suggests that anyone buying an IDE drive above 528MB should consider models offering the following new features:

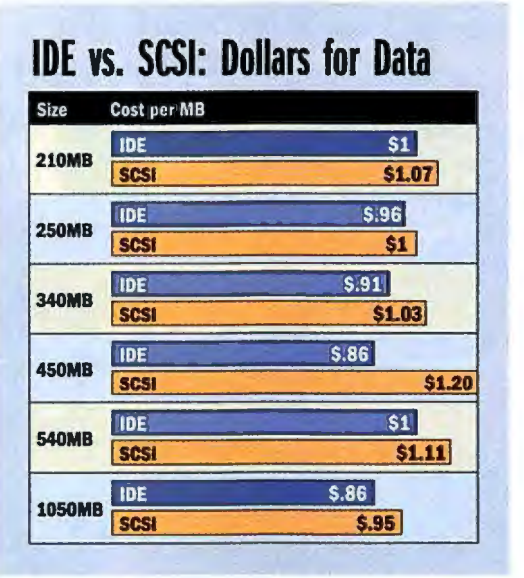
- **Logical Block Addressing (LBA).** **This addressing scheme allows a PC to recognize drives above 528MB. Most PCs made in 1994 will have BIOS chips that support LBA—as will IDE drives above 528MB.**
- **Mode 3 PIO and I/O Channel Ready.** **Mode 3 PIO is a new protocol that gives the disk drive (not the CPU) control over data transfers. The I/O Channel Ready line is used to control how much data your IDE drive puts out. If your drive supports both functions, it senses when your PC's electronic highway is clear and spits out data at rates exceeding 11MB/sec, according to manufacturer claims. Multimedia programs, Windows, and other applications that transfer big blocks of data should benefit especially. Chances are, the local bus system you buy today has built-in Mode 3 PIO and I/O Channel Ready support.**
- **Multiword Direct Memory Access.** **DMA is a tried-and-true technique for speeding data transfers. Typically, the hard disk transfers data directly to the PC's memory without involving the CPU. A PC with an IDE drive that supports Multiword DMA should be able to boost data transfer rates to as high as 13.3MB/sec.**

But, with the exception of LBA, the practical potential of these new features in typical business applications is unclear. Steve Gibson, for one, remains skeptical, noting that "there's almost no difference anymore between these [big IDE] drives." To Gibson and some other hard disk mavens, new features like Mode 3 PIO are competitive smoke screens aimed at swaying PC vendors into choosing one manufacturer's drive over another's but adding little to hard disk performance. Whether these features are just window-dressing or the greatest thing since standard SIMMs, there's no denying Enhanced IDE's main benefit to average users: vastly increased capacity and support for greater numbers and types of drives.

ROBERT CARDIN

MTBF breakdown point."

You'll also find that today's drives are smaller (an inch high or shorter), they sip energy (many offer low-power sleep modes), and they offer truly astounding G shock ratings. That means the average user no longer has to sweat reliability as a point of evaluation. In extensive tests last year using our business application suite, the PC World Test Center found minimal performance differences. That strongly suggests that unless yours is an unusually demanding application, forget most of the tech specs and base your choice on other factors—capacity, price, and support.



IDE DRIVES GENERALLY HAVE a slight price advantage over SCSI hard disks. These costs per megabyte don't include the price of a SCSI adapter.

Old PC, New Drive, Big Hassles?

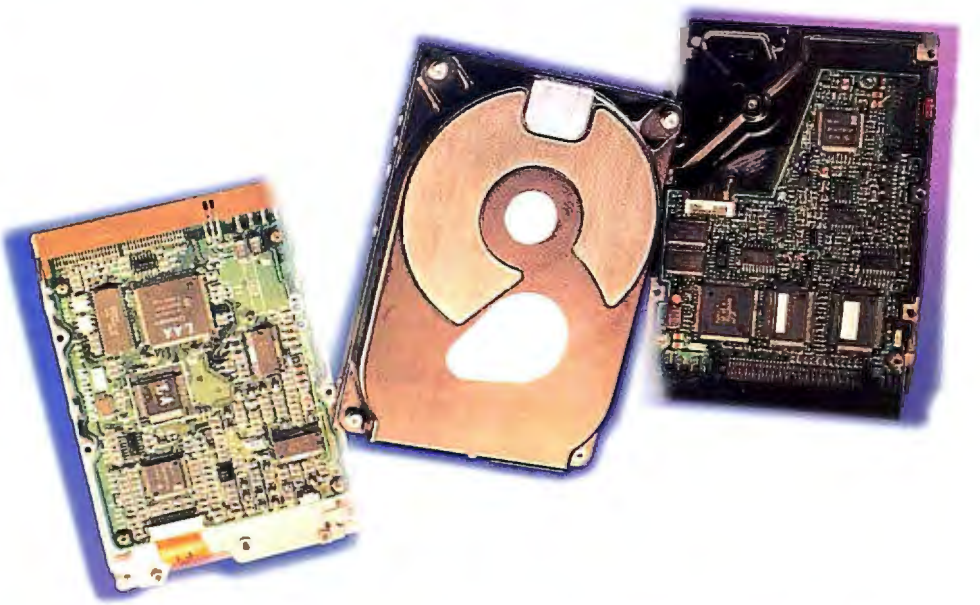
In general, the newer the system, the more sense a hard disk upgrade makes. But whenever you mix new components with old, you face possible incompatibilities, smaller speed improvements than expected, and other unpleasant surprises. If you own just about any PC based on a 486 or more powerful CPU, don't hesitate to pick one of these drives. But if you're using anything older and slower than a 33-MHz 386, you may be putting a Ferrari engine into a Volkswagen chassis. Your new drive won't live up to its potential, since it's saddled with a putt-putt microprocessor, bus, RAM, and video setup.

Note too, that fast IDE drives offering next-generation high-speed features may not function properly in an older PC. For example, Western Digital notes that its 341MB and 425MB drives should work fine in older ISA systems but recommends testing its new 541MB Caviar drive in non–local bus PCs before you buy.

Speaking of local bus, does upgrading a non–VESA local bus (VLB) or non-PCI system mean you have to settle for inferior performance? Well, no and yes—depending on the applications you use. Tests conducted by the PC World Test Center show that a Conner CFA540A drive installed in a PC that uses a 4MB VLB caching controller didn't run much faster overall on our mixed suite of business applications than the same drive using a 16-bit IDE adapter and a 4MB Windows SmartDrive software cache. The VLB cache paid off in only one area, the Paradox for DOS database test, where the local bus caching controller yielded about a 20 percent performance increase over the software cache. The results with SmartDrive were virtually the same using either a standard 16-bit or a noncaching VLB adapter. Some hard disk manufacturers suggest that IDE drives not specifically designed for local bus systems can malfunction when connected to a local bus slot, because they can't move data faster than 5MB/sec. None of our past tests have verified or disproved this assertion, however.

So don't feel you have to lay out big bucks for a local bus system to get speedier hard disk performance in most business applications. But if you're a database jock, a local bus PC and caching controller may be worth the investment. And a new PC will yield another benefit: All the components will be new and designed to work together at maximum speed.

If your existing PC is a good performer and you have decided to upgrade, how do you get all the storage that a 540MB, 976MB, or even 1626MB IDE drive offers? If your PC doesn't have a spanking new BIOS, you'll need a driver from the hard disk vendor, a third-party utility such as Micro House's EZ Drive or OnTrak's Disk Manager, or an Enhanced IDE adapter before you can get over the original PC BIOS's 528MB barrier. This last option might be your best bet—especially if you want to be able to retain an older drive type or install additional devices. Adapters such as the 16-bit ISA Model 4C Accelerator Board from GSI (800/486-7800) essentially give your PC an updated BIOS. Not only can you tap into disk partitions of up to 8.4MB, but you can add an IDE drive



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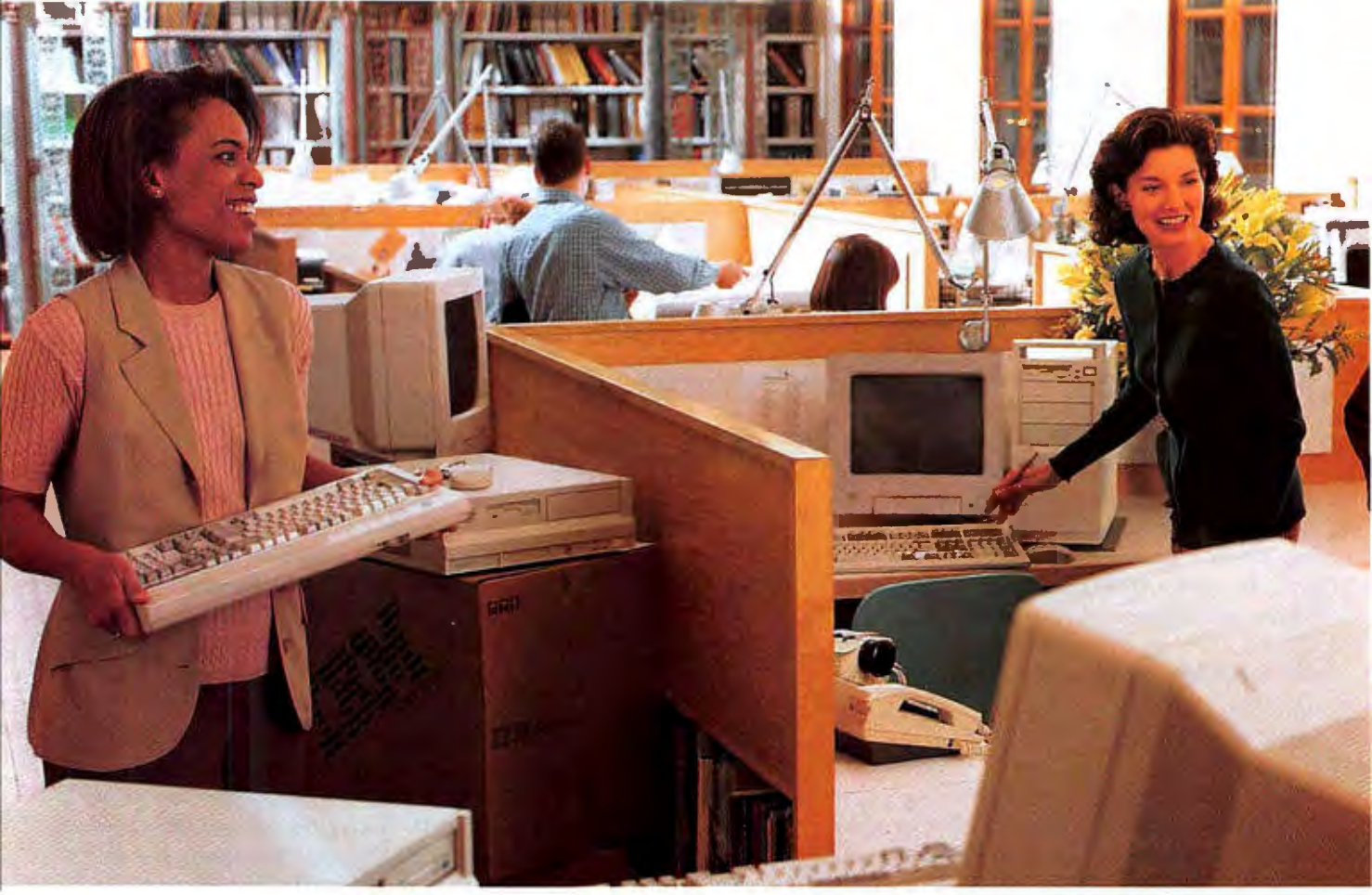
AS WITH SCSI DISKS, CONTROLLER ELECTRONICS for IDE hard disks are integrated on the drive. But current PCs generally come with an IDE interface, so you don't need an adapter to install your new drive.



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- **Operating Environment:** IBM DOS with NetWare from IBM V.3.12 or IBM OS/2 LAN Server 3.0, Entry
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Super IDE Hard Drives: 300MB and Counting

● = Yes
○ = No
n/a = not available

Company	Model	KEY FEATURES: Formatted capacity (MB)	KEY FEATURES: Estimated mail order or street price	KEY FEATURES: Cost per MB	PERFORMANCE: Rotational speed (rpm)	PERFORMANCE: Data transfer rate (MB per second, disk to system)	PERFORMANCE: Burst transfer rate (MB per second, disk to system)	PERFORMANCE: Average seek time (ms)	PERFORMANCE: Cache on drive (K)	VESA (VL)	PCI
AREAL TECHNOLOGY 408/436-6842	A340	395	$495	$1.25	3600	2.4 to 3.9	4	13	32	●	●
	A525	526	$695	$1.32	3600	2.4 to 3.9	4	13	32	●	●
CMS ENHANCEMENTS 714/222-6000	B340A2-N	341	$396	$1.16	3652	2.25	5.75	11	128	●	●
	B425A5	452	$485	$1.07	4500	2.6 to 4.5	8.3	12	256	●	●
	B500A5	528	$572	$1.08	4467	2.6 to 4.5	8	10	256	●	●
	K1.0A1	1020	$1299	$1.27	5400	1.9 to 3	8	10	512	●	●
CONNER PERIPHERALS 800/426-6637	DiskStor 340	343	$275	$.80	4011	2.9 to 4.1	2.8	13	64	●	○
	DiskStor 540	546	$482	$.88	4500	2.8 to 4.3	5.7	10	256	●	○
	Filepro 810	810	$559	$.69	4500	3.5 to 5.8	10	12	256	●	○
	Filepro 1080	1080	$675	$.63	4500	3.5 to 5.8	10	10.5	256	●	○
FUJITSU COMPUTER PRODUCTS 800/626-4686	M2705	350	$395 [2]	$1.13	5400	3.3 to 6	8	12	256	●	●
	2682	350	$295 [2]	$.84	4500	2.8 to 4.7	8	14	256	●	●
	M2706	530	$550 [2]	$1.04	5400	3.3 to 6	8	12	256	●	●
	2684	530	$375 [2]	$.71	4500	2.8 to 4.7	8	14	256	●	●
IBM PC COMPANY 800/426-7299, 800/772-2227	IBM 364MB AT	364	$329 [2]	$.90	4500	3.87 to 5.62	8.3	12	96	●	●
	IBM 527MB AT	527	$459 [2]	$.87	4500	3.87 to 5.62	8.3	12	96	●	●
	IBM 728MB AT	728	$629 [2]	$.86	4500	3.87 to 5.62	8.3	12	96	●	●
MAXTOR 800/262-9867	7345A	345	$276	$.80	3551	3.75	8	14	64	●	●
	7546	546	$397	$.73	4500	3.5 to 5.6	11.1	12	256	●	●
MICROPOLIS 800/395-3748	2210A	976	$860	$.88	5400	5	5	10	512	●	○
	2217A	1626	$1185	$.73	5400	5	5	10	512	●	○
PROCOM TECHNOLOGY 800/800-8600	PR-IDE 340I	340	$441	$1.30	4011	2.9 to 4.1	7	13	64	●	●
	PR-IDE 500I	527	$660	$1.25	5400	3.22	10	10	256	●	●
QUANTUM 800/624-5545	ProDrive LPS 340	343	$299	$.87	3600	1.6 to 2.8	6 to 13.3	12	128	●	●
	Quantum Lightning 365	366	$325 [2]	$.89	4500	2.5 to 5	6 to 13.3	11	128	●	●
	Quantum Maverick 540	540	$480 [2]	$.89	3600	1.8 to 3.6	6 to 13.3	14	128	●	●
	ProDrive LPS 540	541	$479	$.89	4500	2.4 to 4.8	6 to 13.3	12	128	●	●
	Quantum Lightning 540	541	$530 [2]	$.98	4500	2.5 to 5	6 to 13.3	11	128	●	●
	Quantum Lightning 730	732	$598 [2]	$.82	4500	2.5 to 5	6 to 13.3	11	128	●	●
SAMSUNG ELECTRONICS 800/726-7864	SHD-3172A	357	$260	$.73	3600	8	8	13	64	●	○
SEAGATE TECHNOLOGY 408/438-8111	ST3390A	341	$290	$.85	4500	4.3 to 13.3	13.1	12	256	●	●
	ST3391A	341	$290	$.85	3811	4.3 to 13.3	13.1	13	120	●	●
	ST3491A	428	$385	$.90	3811	4.3 to 13.3	13.1	14	120	●	●
	ST3550A	452	$410	$.91	4500	4.3	4.3	12	256	○	○
	ST3600A	528	$600	$1.13	4500	4.3	4.3	11	256	○	○
	ST3655A	528	$525	$.99	4500	4.3 to 13.3	13.1	12	256	●	●
	ST5660A	546	$545	$1	4500	4.3 to 13.3	13.1	12	256	●	●
TOSHIBA DISK PRODUCTS 714/457-0777	MK2326FC	340	$350	$1.03	4200	3.7	4	12	512	○	○
	MK2428FC	524	$550	$1.05	4000	4	6	12	512	○	○
WESTERN DIGITAL 800/832-4778	Caviar 2340	341	$275	$.81	3322	2.2 to 3.75	2.1 to 3.9	13	128	●	●
	Caviar 2420	425	$340	$.80	3314	2.2 to 3.75	2.1 to 3.9	13	128	●	●
	Caviar 2540	541	$489	$.90	4500	2.8 to 4.5	2.9 to 5.6	12	128	●	●

[1] Drives under 528MB need not support this function.

[2] Vendor list price.

to a system with older ESDI and MFM drives. GSI's adapter costs $169; it gives you four IDE channels, allowing you to attach up to eight IDE devices including tape drives and CD ROM players.

Performance, Specs, and Specsmanship

As Mark Twain might have said, there are three kinds of lies: lies, damned lies, and hard disk specs. At best, specs can be computed using different (though legitimate) methods. At worst, they are downright misleading. Nonetheless, the differences between a premium and an economy hard drive boil down to data transfer rates, cache size and type, disk speed, and warranty. Does your application demand razor's-edge performance? Or do you want the maximum warranty protection? Here are the most important factors.

- **Data transfer rate from disk to system memory.** According to Rebecca Black, a quality assurance analyst with Symantec, this may be the most important factor affecting performance in demanding applications. "This number incorporates everything from DMA to the disk's encoding scheme to its bus structure." IDE drives are typi-

ADVANCED FEATURES				RELIABILITY AND SUPPORT SPECIFICATIONS				
Logical Block Addressing support	Mode 3 PIO	I/O Channel Ready	Multiword DMA	Warranty (years)	Contact start-stop cycles	G shock rating (operating/nonoperating)	Low-energy or sleep mode	Reader service number
○	○	○	○	2	50,000	150/300	●	627
○	○	○	○	2	50,000	150/300	●	627
○	○	○	●	3	20,000	10/75	●	628
○	○	○	●	2	20,000	2/75	○	628
○	○	○	●	2	20,000	10/75	○	628
○	○	○	●	5	20,000	5/10	○	628
○	○	○	●	1	n/a	5/75	●	629
●	○	○	●	1	n/a	5/75	●	629
●	●	●	●	2	20,000	5/75	●	629
●	●	●	●	2	20,000	5/75	●	629
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●	●	●	●	1	40,000	10/70	●	632
○	○	○	●	5	10,000	5/60	●	633
○	○	○	●	5	10,000	5/60	●	633
○	○	○	●	2	20,000	5/75	●	634
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●	○	○	○	1	40,000	10/100	●	638
○	●	●	●	3	10,000	10/70	●	639
○	●	●	●	3	20,000	10/70	●	639
●	●	●	●	3	50,000	10/70	●	639

For more information about all products in this table, circle reader service no. 904.

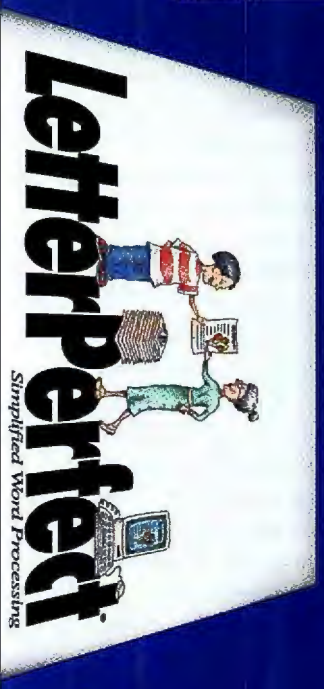
cally limited to a maximum of 5MB/sec, although drives geared toward local bus PCs can be faster. Burst-transfer figures indicate how fast a single block of data can blast into system memory.

- **Rotational speed.** Black puts it succinctly: "Since all high-capacity drives these days use 1 to 1 interleaving, the faster a disk spins, the faster data will be scooped up."
- **Cache (dedicated RAM built into the drive).** The smallest on-disk cache buffer is 64K, and though some vendors claim that the benefits of caching diminish above 128K, sizes range up to 512K. The size of the cache is certainly a factor, but its "intelligence" also plays an important role. In the best of all worlds, the cache reads ahead, anticipating what data you'll probably need next and pulling it into the buffer; it then writes the data back to disk—efficiently—in one gulp when the system is idle. A smart cache is also adaptive and segmented—it calculates the amount of cache that's needed for each read and write; then it dynamically sizes the RAM segments so that the data is stored in one contiguous block. Steve Gibson is the author of SpinRite, the original utility (and still one of the best) for maintaining hard disk health. He says, "Go for a cache that offers many small segments." Gibson claims that these smaller segments can make caching more efficient.
- **Warranty.** Of course longer is better. The average warranty is about two years; but CMS, Fujitsu, Micropolis, and Western Digital offer some three- and five-year warranties. Also look for convenience. Both Conner and Maxtor, for example, provide 48-hour turnaround on warranty work and drive replacement. You may also discover that while a retailer may offer only a one-year warranty, the original manufacturer may back the drive for three years. Then again, buying a hard drive either installed in a system or from a third-party vendor may negate any manufacturer's warranty beyond what the vendor provides. When in doubt, ask. All the manufacturers we surveyed confirmed that they'll repair a drive that fails during its warranty period, but most say to check first with the company that sold you the drive.
- **Durability.** A solid warranty is the best indicator of a well-made product, but also check out the contact start-stop (CSS) and shock ratings. The CSS rating measures how many times you can start up the drive before the read/write head damages the platter—an important factor now that more hard disks offer power-saving sleep modes. The shock rating shows how the drive withstands jostling, bumping, and other abuse.

Leaving Room Enough to Grow

Before you buy a hard disk, figure out how much storage you really need. If you own a new 486 or Pentium and your disk is full, buy as much storage as you can afford—operating systems such as Windows NT and OS/2, and applications ranging from PageMaker 5 to Corel Draw 4, eat up megabytes by the score. If you've got a 386 with a serviceable drive, the general rule of thumb is to buy 150MB of storage for each year you plan to keep the system. That should give you enough storage to upgrade programs and accumulate files without running out of space.

Contributing Editor Robert Luhn also cowrites "The Green PC," a syndicated column on the environmental impact of personal computing.



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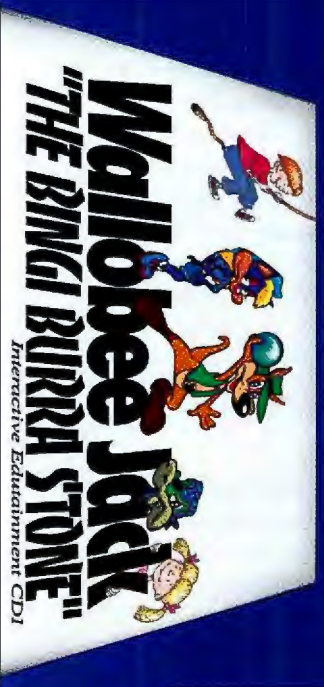

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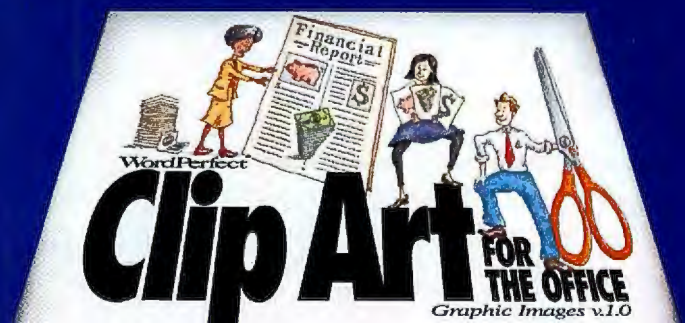

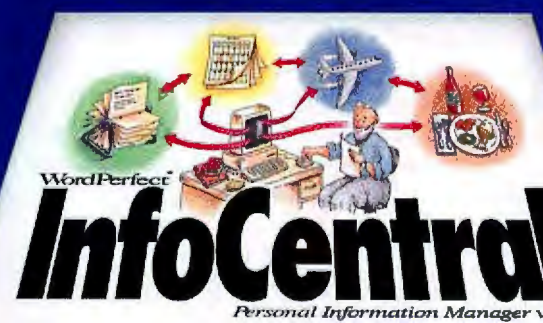

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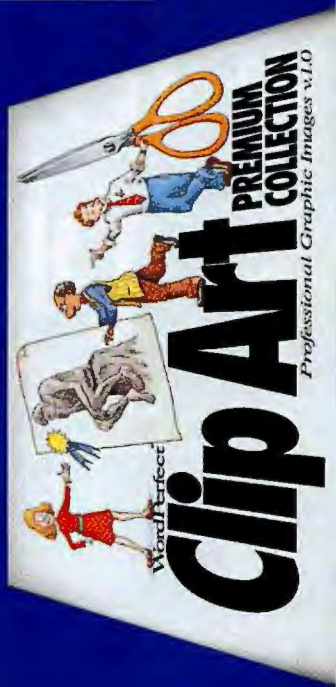

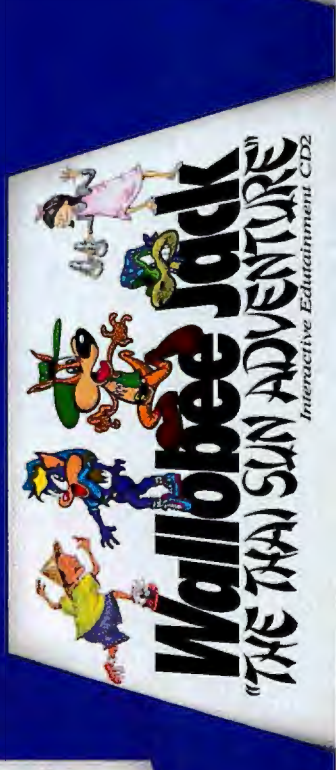

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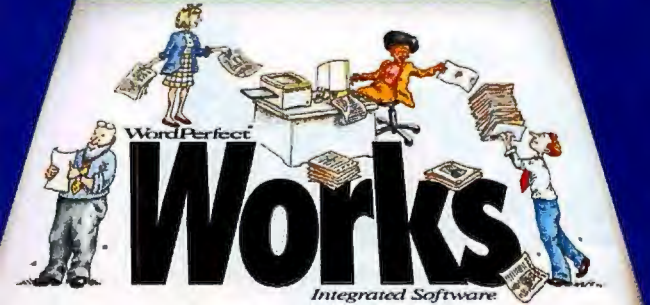

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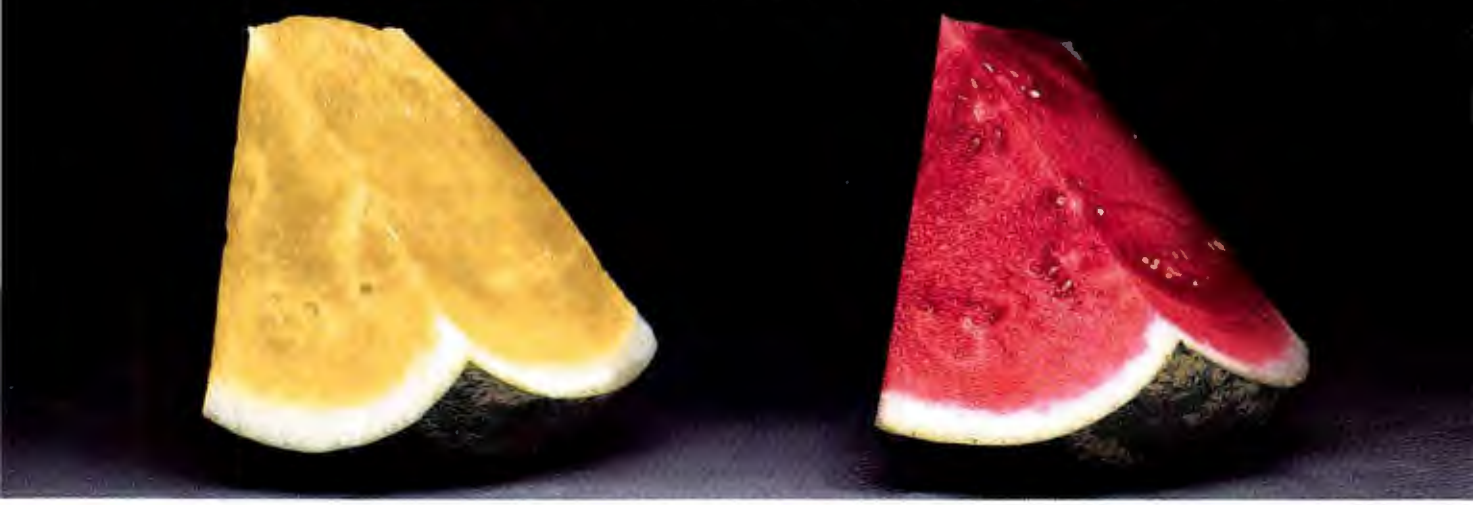
We Scan Corrected.



You expect a scanned image to accurately reflect the color found in your original. Getting there, however, is usually no picnic. After scanning, precious hours are often spent adjusting the image in software to capture the truest blue, a faithful fuchsia, or for example, just the right kind of red in a ripe watermelon. But DCR™ has changed all that.

Now, when you purchase the **new, low-priced ScanMaker® IISP single-pass color scanner**, you also get **DCR, Dynamic Color Rendition**, an advanced, yet easy-to-use color calibration and correction system. DCR actually calibrates the ScanMaker IISP to a photographic industry-accepted calibration target, creating a custom color profile of your specific scanner, ensuring the most accurate color possible as you scan the image. But don't take our word for it. Here's what *PC Magazine* said in their February 8, 1994 issue: "...this mechanism (DCR) seems to have worked well, because the ScanMaker IISP's color output was clearly the best of any scanner in our survey."

So, even if you need to capture the bright yellow flesh of a Honeyheart watermelon, like the wedge on the left, the quickest way to do it is with the new ScanMaker IISP with DCR.

For more information about the ScanMaker IISP, DCR, your nearest authorized Microtek reseller, or a FREE copy of *The Scanned Image* — a scanning primer, call **1-800-654-4160** or fax (310) 297-5050.

The ScanMaker IISP accurately captures millions of brilliant colors at resolutions up to 1200 x 1200 dpi through software interpolation (300 x 600 dpi optically). In addition to the DCR color calibration/correction system, the ScanMaker IISP is bundled with ***Adobe Photoshop 2.5 LE*** *for either Windows or Macintosh. Windows users also get* ***Caere's PageKeeper Portfolio*** *document and image management software.*

PC MAGAZINE EDITORS' CHOICE
February 8, 1994
Microtek ScanMaker IISP

IMAGING MAGAZINE EDITORS' CHOICE

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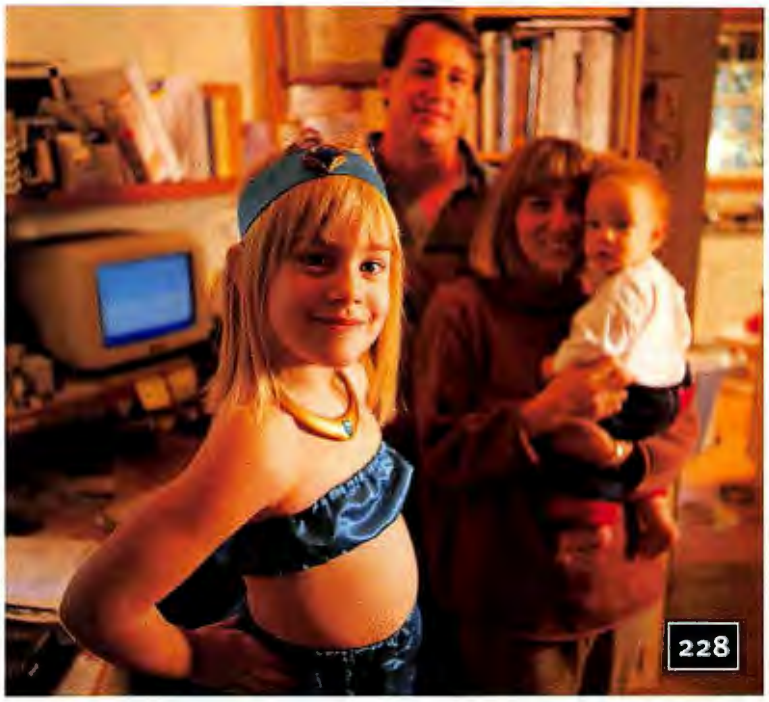
SPECIAL REPORT

Small Office Home Office

FROM HIGH-RISE TO HOME

How to set up a small office that works.

EDITED BY STEVE FOX AND ROBERTA FURGER



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HOT PICKS

These are a few of our favorite things.

BY STEVE BASS

PHOTOS: ERIK BUTLER (TOP); ROBERT CARDIN (BOTTOM); ILLUSTRATIONS: PETER ROEI

Special Deliveries

When it has to get there overnight, which shipper is right for you? By Peter Scisco

SOMETIME IN THE LAST FIVE YEARS or so, we all ran out of patience. How else to explain the boom in faxes, E-mail, and overnight shipping? Once upon a time we were happy to wait days for a letter. Now, if it can't get there tomorrow, you might as well not send it. And while faxing and E-mail are great for some documents, others demand overnight mail.

But which overnight shipper is right for you? You need to consider three factors: 1) Reliability—you want to be sure your package actually gets where it's going on time. 2) Price—pricing varies from service to service and depends on what you're sending and when it has to get there. 3) Convenience—whether and how the service picks up your parcel and how well it tracks your package on its journey.

So how do the various services stack up? You have five major companies to choose from—Airborne Express, DHL, Federal Express (FedEx), United Parcel Service (UPS), and the United States Postal Service (USPS). To assess reliability, we used four of these five carriers to ship packages around the country (see "The Great Package Race"). (DHL declined to participate in our tests; company representatives said they preferred to emphasize DHL's international service.) To compare pricing, we found out how much these four carriers charge for sending a standard business letter and a 10-pound package overnight and via two-day mail. To evaluate convenience, we asked each vendor to tell us about its pick-up policies, tracking services, and any other amenities.

A couple of important points to remember when comparing these services: First, overnight doesn't *always* mean overnight. You'll find gaping holes in most service guarantees. Also, a service may guarantee delivery by 10:30 a.m. the next day to major cities, but not to outlying areas; rural recipients may have to wait until later in the afternoon. Second, most services offer a discount for frequent shippers. What kind of volume merits a discount? Ask the carrier. Finally, all prices are subject to change. Call the courier for the latest tariffs.

Airborne Express

If saving money is your top priority, Airborne Express is your best bet.

Let's say you're shipping a letter overnight and don't mind noon delivery. Airborne's standard overnight service, the Growing Business Program (GBP), costs just $9.50 for door-to-door service. For afternoon delivery, Airborne charges just $8. Airborne also offers the best deal if you're shipping large parcels. The company ships a 10-pound box overnight for just $26 (including pick-up)—20 to 45 percent less than its competitors.

Despite the low prices, we had no problem shipping with Airborne. Every package we sent via Airborne in our cross-country package race arrived at its destination on time, even when a raging blizzard shut

PETER HOEY

down much of the East Coast. Airborne picks up at your door—all you have to do is call. (For faster service, set up an account and then ship a minimum of five packages a week.) Like the more expensive carriers, Airborne says it can locate your package within 30 minutes.

So what's wrong with Airborne Express? For one thing, the company doesn't have as many drop boxes as the other shippers, so you might find it difficult to ship something while you're on the road. In addition, like every service except the U.S. mail, Airborne charges extra for Saturday delivery and doesn't ship to P.O. boxes. Still, Airborne is an excellent option for anyone looking to save bucks.

Federal Express

Federal Express is one of those names, like *Kleenex* or *Xerox*, that are synonymous with the products they identify. How did the company come to symbolize overnight shipping? By emphasizing dependability and convenience over price.

FedEx has marshaled all the high-tech tools it can, including

The Great Package Race

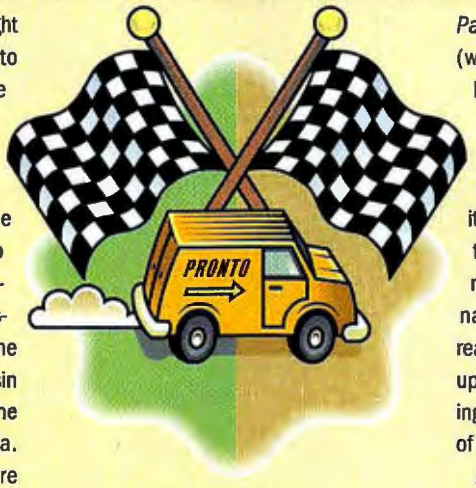
There are plenty of ways to play the overnight shipping game, but the best strategy is to get the goods on the shipper before the shipper gets your goods.

That's why I ran an experiment. I call it The Great Package Race. I got a friend in San Francisco to send four packages, one by each of the big overnight shippers, to a buddy in Boston (he enclosed preaddressed labels and postage when necessary). The friend in Boston used the same services to send the packages to my cousin Judy in Wisconsin. When Judy got them, she forwarded them to me in North Carolina. Then we did the same thing three more times, just for good measure.

When we were done, I asked my helpers what they thought of overnight shipping. Subtract some colorful language, and here's what they said.

Neither Snow nor Rain?

The good news from our test: All 16 of the packages mailed from San Francisco made it to North Carolina. Only 2 of the 16 packages failed to make it to their destination overnight, but that was nature's fault. During the third round of shipping, an ice storm left roads all over the Eastern Seaboard as cold and slick as a carnival preacher. Everybody's trucks were running late, if they were running at all. Despite the ice, Airborne and FedEx got each of the packages to its destination on time—I don't know how. The USPS ran a day late, as did UPS. If you take a close look at the fine print, you'll find that bad weather is enough to void an overnight guarantee with all four shippers.



Courtesy Counts

Even when the mail went through, however, it wasn't necessarily pleasant being on the sending or receiving end. Service is one of those concepts some people just don't get.

Take the U.S Postal Service—please. The outfit that's made an art form of making people stand in line could use a little help in the human relations department. One worker insisted the USPS couldn't deliver Express Mail to me in High Point, North Carolina. Well, I've got news for that pencil-pushing pension hound: I get Express Mail all the time. After Judy convinced this guy to take the packages and give it a try, they arrived without a hitch.

A similar thing happened with UPS. My friend in Boston told me her UPS driver wouldn't accept a package that had been paid for or preaddressed by a third party. Instead, my friend had to haul the whole mess to the local UPS office, through downtown Boston traffic in the middle of the day. *Pain in the butt* was the phrase she used (whether she was describing UPS or me, I'm not sure).

Pickup Trucks

If we learned anything from this exercise, it's that it pays to know your driver. Most of the time, the same people drive the same routes. Learn their faces, learn their names, and be sure your packages are ready to go when the drivers arrive for pickups. That's how you get courtesies like having packages left on your back deck instead of out front when you're not home.

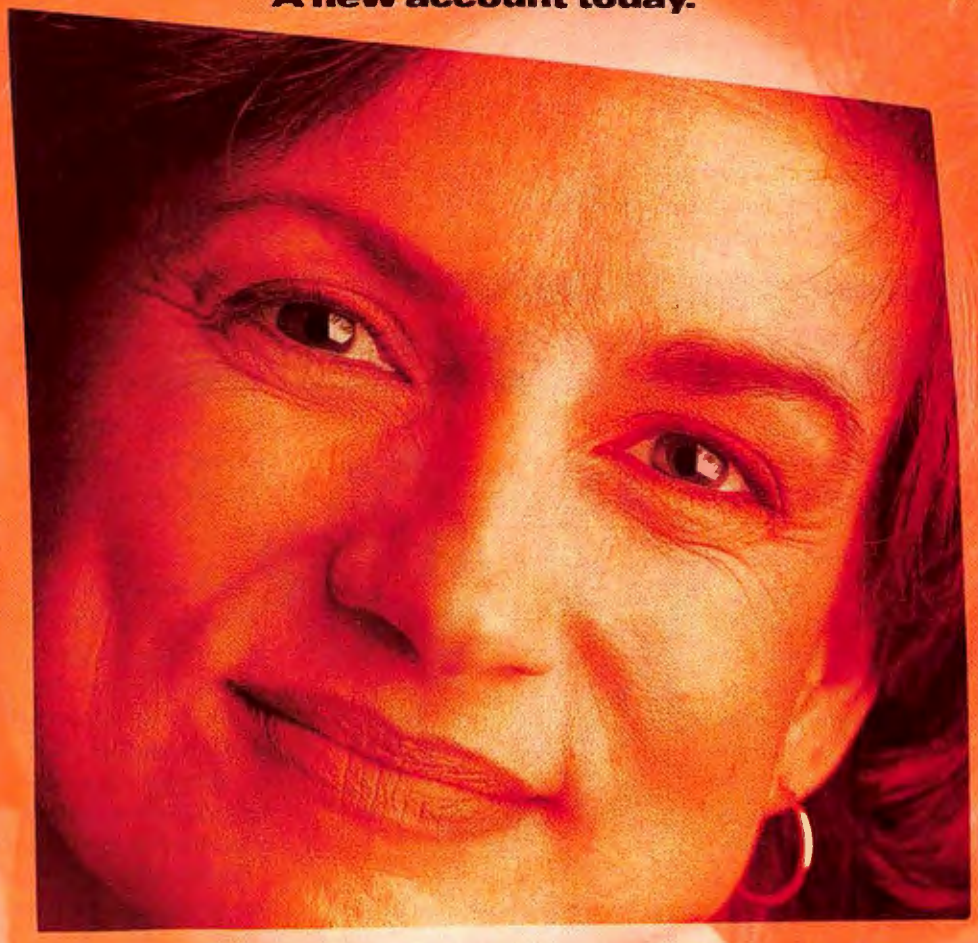
Another way to get good service: Use FedEx. When you call for a pick-up, you can expect to see the FedEx truck within an hour or less. You can also get software from the company that plugs directly into FedEx's in-house tracking system, so you can locate your packages in seconds. The software communicates only at 2400 bps, but that's 2400 bps faster than the software you get from anybody else.

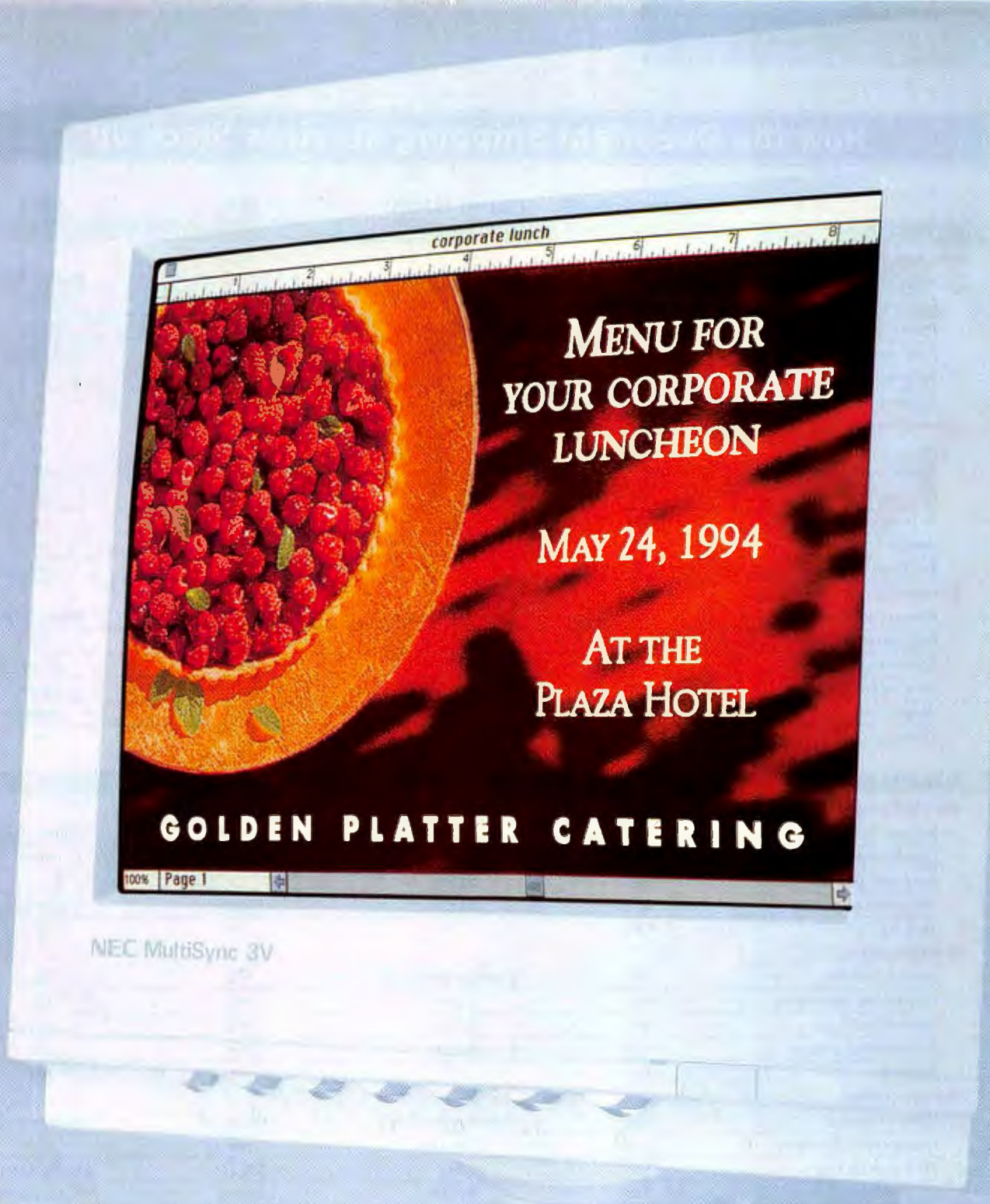
Sure, the other services offer tracking, but nothing as neat as FedEx's. Airborne and UPS say they'll find your package in 30 minutes or less, but in our experience an hour's more like it. With the USPS (surprise, surprise), you'll have to wait a lot longer to find out where you package is—like, maybe all day.

So what did we learn from four weeks of bad weather and geographically challenged clerks? That spending a little time up front thinking about how you want to ship overnight can save you plenty of grief and money down the road.

PETER HOEY

8 hours last night.
A new account today.





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How the Overnight Shipping Services Stack Up

	AIRBORNE EXPRESS	FEDERAL EXPRESS	UPS	USPS
LETTERS				
Overnight priority				
Name of service	GBP	Priority Overnight	Next Day Air Letter	Express Mail
Guaranteed delivery by	noon[1]	10:30 a.m.[2]	10:30 a.m.[2]	12 p.m.[3]
Price with pick-up	$9.50	$15.50	$13.75 [4]	$14.45
Price without pick-up	$9.50	$13	$9	$9.95
Weight limit (oz.)	8	8	none	8
Tracking	Y	Y	Y	Y
Overnight regular				
Name of service	SDS	Standard Overnight	n/a	n/a
Guaranteed delivery by	3 p.m.[5]	3 p.m.[6]	n/a	n/a
Price with pick-up	$8	$11.50	n/a	n/a
Price without pick-up	$8	$9	n/a	n/a
Weight limit (oz.)	8	8	n/a	n/a
Tracking	Y	Y	n/a	n/a
Two-day delivery				
Name of service	n/a	Economy Two-Day	2nd Day Air Letter	Priority Mail
Guaranteed delivery by	n/a	4:30 p.m.	n/a	n/a
Price with pick-up	n/a	$13	$8.75[4]	$7.40
Price without pick-up	n/a	$10.50	$5.75	$2.90
Weight limit (oz.)	n/a	16	10	none
Tracking	n/a	Y	Y	N
PACKAGES (10 lbs.)				
Overnight priority				
Name of service	GBP	Priority Overnight	Next Day Air	Express Mail
Guaranteed delivery by	noon[1]	10:30 a.m.[2]	10:30 a.m.[2]	noon[3]
Price with pick-up	$26	$46.25	$33.25 [4]	$32.10
Price without pick-up	$26	$43.75	$30.25	$27.60
Tracking	Y	Y	Y	Y
Overnight regular				
Name of service	n/a	Standard Overnight	n/a	n/a
Guaranteed delivery by	n/a	3 p.m.[6]	n/a	n/a
Price with pick-up	n/a	$28.25	n/a	n/a
Price without pick-up	n/a	$25.75	n/a	n/a
Tracking	n/a	Y	n/a	n/a
Two-day delivery				
Name of service	SDS	Economy Two-Day	2nd Day Air	Priority Mail
Guaranteed delivery by	5 p.m.[7]	4:30 p.m.	n/a	n/a
Price with pick-up	$18	$22	$18.25[4]	$10.85–$17.30
Price without pick-up	$18	$19.50	$15.25	$6.35–$12.80
Tracking	Y	Y	Y	N
OTHER SERVICES				
Saturday delivery	Y	Y	Y	Y
Delivery to P.O. boxes	N	N	N	Y
Prepaid packaging	Y	Y	Y	Y
Drop boxes (approximately)	7000	29,500	32,000	27,000
Volume discounts	Y	Y	Y	N
Account set up free of charge	Y	Y	N	N

[1] By 5 p.m. to outlying areas. [2] By noon to outlying areas, 5:30 p.m. to remote areas. [3] By 3 p.m. outside of major cities. [4] $5 to $7 per week for daily pick-ups. [5] By second or third business day outside of major cities and their environs. [6] By 4:30 p.m. to outlying areas, second morning to remote areas. [7] May be third business day in remote areas.

n/a = not applicable

Spending time up front thinking about how you want to ship overnight will save you grief—and money.

satellite communications and scanning devices, to give customers a real-time picture of where each package is and when it was delivered. Recently, FedEx extended these tools to desktop PCs, with software that lets you track a package yourself.

FedEx used its head start in the marketplace to expand its service; at last count FedEx had nearly 30,000 drop boxes and 1300 offices worldwide. If you'd rather stay at home and have your parcels picked up, just call FedEx's 800 number—no account required. Despite the high-tech paraphernalia, FedEx has a human side, too: Participants in our package race consistently noted how friendly their FedEx drivers were.

If price matters more to you than reliability and convenience, however, forget FedEx. The company's pricing is consistently higher than the competition's. Its Priority Overnight letter service costs at least $1 more than anybody else's. The Standard Overnight letter service isn't a bad deal, but at $11.50 with pick-up, it can't beat Airborne. FedEx is a particularly bad choice for heavy overnight packages: Priority delivery is nearly $50 for a 10-pound package.

Pricing aside, if your business life depends on reliable deliveries, FedEx is for you.

UPS

If you had to choose just one company for all your shipping, you'd do best to go with UPS.

Take overnight letters. If you're willing to do without pick-up, UPS costs less than Airborne Express; with pick-up, UPS costs more than Airborne but still less than FedEx or the USPS. However, UPS says it will deliver your letter by 10:30 the next morning—unlike Airborne, which gives itself until noon. UPS offers next-morning delivery (without pick-up) for about 30 percent less than FedEx. One added bonus: UPS's Next Day Air Letter service has no weight limit; you're allowed to ship anything that fits into the Next Day Air Letter cardboard envelope.

For second-day letters and packages, UPS is also a better deal than FedEx (although it still can't beat the U.S. mail). Door-to-door service for letters runs $8.75, but you can cut that to $5.75 if you drop the letter in a box yourself.

The trick to saving money with UPS is to set up an account. You normally pay an additional $3 per individual pick-up ($4.75 for Next Day Air Letter), but with an account you can get daily pick-ups for $5 a week.

As for the quality of UPS service, participants in our package race had just two complaints. The company failed to make one delivery on time, but that was during a massive snow storm that delayed the U.S. mail as well. Anecdotally, our package race participants rated UPS lower than FedEx or Airborne for friendliness, but it's hard to generalize too much from our limited sample size.

UPS's biggest disadvantage is that, for any given level of service, there's always someone cheaper. If you're willing to deal with more than one carrier, you can save money. If, on the other hand, you want the convenience of dealing with just one shipper, UPS is the way to go.

USPS

The U.S. mail may be the best option for sending a birthday card to Aunt Tillie in Omaha, but when it comes to overnight mail, it has a hard time competing with the specialists.

That's not to say the USPS *can't* compete. It's a great choice for sending letters by second-day mail. For $2.90 ($7.40 with pick-up), you can count on your letter getting to its destination within two days. In addition, there's no weight limit; you can mail anything that fits in the Priority Mail envelope. Mailing packages is trickier: Since the postage depends on the destination, you'll probably have to make a trip to the post office. In either case, with Priority Mail you get no guarantee, no confirmation of delivery, and no tracking. And except for second-day mail, the USPS can't compete with the other services on price. Express Mail costs more than Airborne or UPS for overnight letters.

What makes the USPS worth considering for business mail is its convenience. It's the only service that delivers on Saturdays for free and to P.O. boxes. Also, you can leave your package out with your regular mail or drop it in the corner mailbox. The only problem with these two methods: You may miss the local post office's daily deadline for overnight mail. If you want to guarantee that your package gets into the overnight pipeline on time, order a special pick-up (which costs $4.50), drop the package in a special Express Mail box, or drop it off at a post office.

If you do go to the post office, there's no telling what kind of service you'll get. Furthermore, compared with other shippers, the USPS is not as well equipped to track packages—it can do it, but don't expect it to be fast. And despite its "Neither snow nor rain..." motto, the USPS took an extra day to deliver one of our packages through that ferocious blizzard.

Still, you can't beat the U.S. mail's convenience—just pray it doesn't snow.

Peter Scisco is a writer based in High Point, North Carolina.

PETER HOEY

The new HP DeskJet printers *let you*

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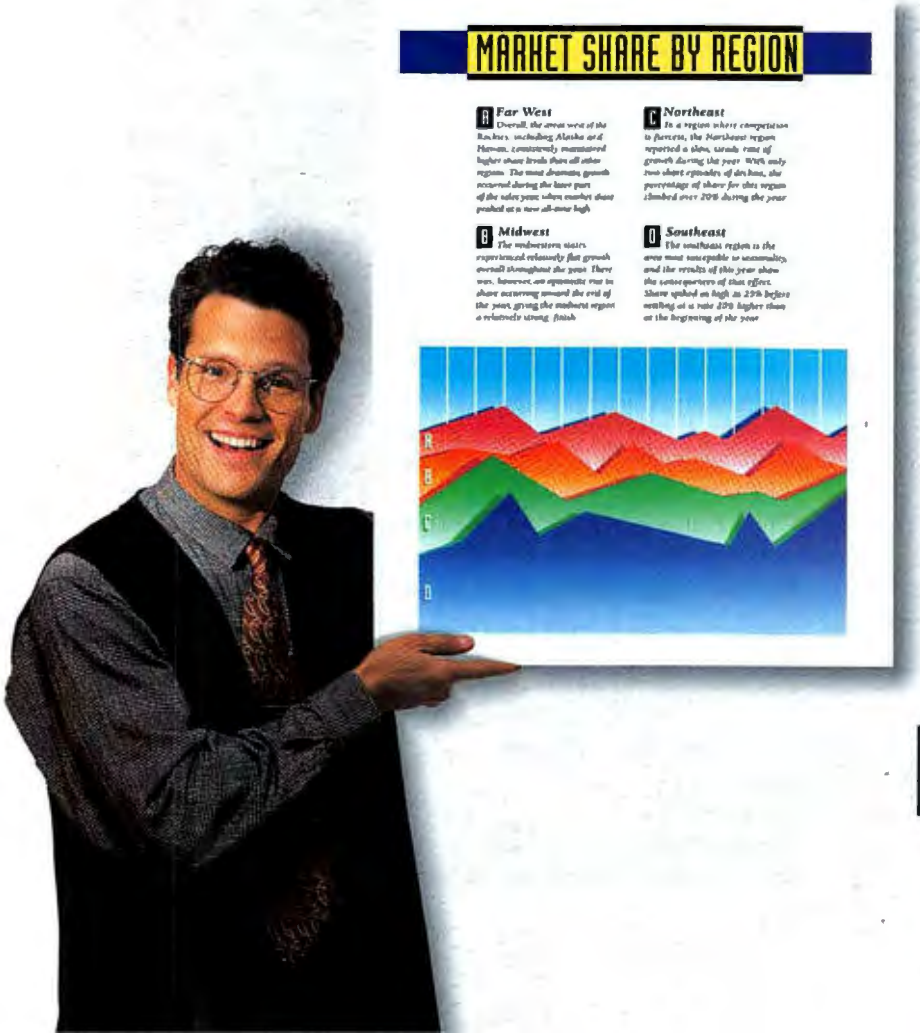
It's hard to be modest when you have one of the new DeskJet printers from Hewlett-Packard. That's because the HP DeskJets now print 600 x 300 dots per inch and use Resolution Enhancement technology for even clearer, sharper black & white printing. For better looking color, the DeskJet 560C has a new technology called ColorSmart. By automatically adjusting the printer settings for you, ColorSmart makes printing impressive colors easier than ever. A ColorSmart upgrade disk is also included with the HP DeskJet 500C.

So if you want your documents to look as good as the output sample shown here, get a new HP DeskJet printer and start printing things you can really be proud of. Look in your local Yellow Pages for the name of the HP authorized dealer nearest you.†



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Hot Picks for the Home Office

These are a few of our favorite things. By Steve Bass

AT&T's tapeless Digital Answering System 1545 offers four voice mailboxes and multiple outgoing messages.

IF YOU WORK IN A SMALL OFFICE, there's no room for compromise: You need high-quality equipment at the lowest available prices. Consider a portable copier for about $250. How about a $120 surge suppressor that guarantees your equipment against up to $25,000 in damage? Or a large hard disk you can store in your shirt pocket? Read on to discover how these sizzling new products can keep your small office cooking while saving you time and money.

Home Security, PC Style

Now that you've invested in all the right equipment, it's time for you to think about protecting it from theft. You can hire round-the-clock security guards, or—for a lot less money—invest in a Kablit security cabling system from Secure-It. For as little as $35, you get a 10-foot cable/fastener combo that secures your computer and keyboard to your desk. The cable threads through each fastener and wraps around a leg of your desk. (If the desk has no leg to loop around, special glue-on fasteners are available.) You can also get a cable designed for securing notebook computers, as well as extra fasteners for your printer, copier, and fax machine. *Kablit $34.95 to $49.95; Secure-It; 800/451-7592, 413/525-7039, 413/525-8807 (fax).* **Reader service no. 744**

Who's Calling, Please?

Your home office has all the best stuff: A fast computer, a razor-sharp monitor, and a modem that's speedy enough to heat up the phone wires. But I'll bet your answering machine is a noisy relic from the past. If it is, reach out for AT&T's tapeless Digital Answering System 1545. The 1545 is loaded with sophisticated—and useful—features, such as four voice mailboxes and multiple outgoing announcements. Small businesses can use each mailbox for different announcements, perhaps giving the address and business hours on one and using another mailbox for, say, announcing new products. Alternatively, each mailbox can be used by a different individual for voice mail. Because the unit is tapeless—voices are digitized on a microchip—messages are instantly played and repeated and can be individually stored or deleted. If you're busy and not answering calls, you can give important customers a code to set off a special tone, alerting you to their call. The 1545 has a regular handset so you can answer your own calls, and it also features, among other things, a speakerphone, 16-number memory, a hold button, and redial. *AT&T Digital Answering System 1545 $229.99; AT&T; 800/222-3111.* **Reader service no. 745**

The Portable Copy Store

Okay, so you need only a few photocopies each week. But the number's growing and the trip to the copy store is getting to be a pain. You don't want to invest much money in a copying machine, and you certainly won't give up precious desk space. The answer? Xerox's X-note, a 4-pound portable copier due out sometime in May. Powered by a rechargeable NiCd battery, the photocopier will accept documents as small as an index card and as large as 8½ by 17 inches.

The X-note is small enough to fit into a briefcase—ideal if you need to take it with you to a client's office. The lightweight copier also comes with a three-year warranty and Xerox's stellar three-year X-tra Protection Program—the company guarantees exchange or replacement of faulty units within 48 hours. *Xerox X-note Portable Copier $249; Xerox Corp.; 800/832-6979.* **Reader service no. 746**

Protect your investment: For less than $50 Kablit secures your PC to your desk.

Storage to Go

Even if you work from a home office, it's not uncommon to take your notebook or handbook to a client's office.

TOP PHOTO: ROBERT CARDIN

I'll bet your answering machine is a noisy relic from the past.

Say good-bye to endless cords with PowerManager. It's more than just a surge protector.

Is there a way to quickly grab the important data from your desktop and take it along? Yes, it's possible with Maxtor's MobileMax, a cool new 105MB PCMCIA Type III hard disk. While not cheap—about $499 on the street—the MobileMax is portable and has lots of storage space. Maxtor's DeskRunner, an internal PCMCIA slot you install on your desktop, lets you use *any* PCMCIA device. For about $148 on the street, this slot lets you use your notebook's fax-modem card, flash-memory card, or even sound card on your desktop PC. *MobileMax $539, DeskRunner $175; Maxtor; 800/262-9867, 408/432-1700, 408/432-4510 (fax).* **Reader service no. 747**

Control Central

Have you looked under your desk recently? If it looks like Olivia de Havilland's nightmare in *The Snake Pit,* it's time you rounded up that mass of coils with American Power Conversion's PowerManager. Just flip the lid and neatly wrap the cords inside the unit, below the cover. The sleek PowerManager not only stores your cords, it also provides surge protection and power control for up to five computer devices. There's even a convenient outlet on the unit's side for plugging in a laptop computer or a desktop lamp. The PowerManager comes with a $25,000 equipment protection policy that guarantees repair or replacement of equipment damaged by a power surge or lightning strike. *PowerManager $120; American Power Conversion; 800/800-4272, 401/789-5735, 401/789-3710 (fax).* **Reader service no. 748**

Visible Means of Support

If you use Windows, you're using a mouse. And after a day of computing, it's likely your arm and shoulder are more than just sore. Instead of reaching for the heating pad, why not take a preventive measure: Attach a Mouse Arm to your chair's armrest. One end of the device supports your arm with a sturdy rest while the other end widens, providing a platform for you to roll your mouse. With the mouse in easy reach, your posture and hand position become more natural, decreasing fatigue and reducing the chances of developing carpal tunnel syndrome. *Mouse Arm $39.95; Ring King Visibles; 800/272-2366, 319/263-8144, 800/272-2382 (fax).* **Reader service no. 749**

All Aboard the InfoCentral Express

Don't let anyone kid you—a good personal information manager is worth its weight in gold, *especially* for a one-person office. Plenty of PIMs are already on the market, and most offer the usual features—calendars, dialers, to-do lists, and address books. But one new PIM is unique—and amazingly powerful.

Stealing the spotlight is WordPerfect's InfoCentral, a PIM that knows how to pull together every last scrap of information and show it in a meaningful way.

What makes InfoCentral tick is object orientation, which means it grabs your data—such as people, events, and places—as separate objects, connects them, and describes each object's relationship to the other object. The translation? As you enter data, the program intelligently—and automatically—sorts it and makes it available for instant retrieval in your choice of formats: outline, calendar, or address book.

InfoCentral also lets you connect objects to other applications. For example, clicking a name in the address book or calendar automatically launches your favorite word processor—with the person's name and address, the opening salutation, and the closing ready to go. InfoCentral ships with four information bases covering a range of useful topics, including the top 500 consumer product companies, computer hardware and software vendors, worldwide business-travel services, and wines of the world. *InfoCentral $139; WordPerfect; 801/225-5000, 801/228-5077 (fax).* **Reader service no. 750**

Lighten the load on your arm and shoulder with the Mouse Arm.

PC World contributing editor Steve Bass is president of the Pasadena IBM Users Group.

For more information about all products in this article, circle reader service no. 903.

TOP PHOTO: ROBERT CARDIN

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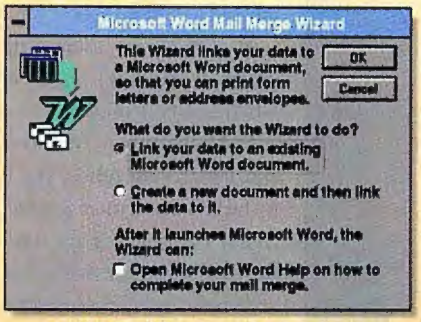
They say you can't be all things to all people. But one database comes really close: new Microsoft Access® database management system 2.0. The first relational database for everyone.



Mail Merge Wizard works directly with Microsoft Word to place your selected data into the document of your choice.

If you need a database with a small "d," you've found it. Microsoft Access is easy to use. So easy, you can create tables, make forms, and print reports right from the start.

Want that capital "D" variety? Then fasten your seat belts.

Microsoft Access packs speed, power, and control. Helping database developers quickly create sophisticated database applications.

The fact is, Microsoft Access has something for everyone. Or more precisely, a lot for everyone.

Like new Rushmore™ query optimization, a technology that makes queries lightning fast. So you get your data quicker.

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Like Query Wizard, a helpful assistant who walks you through the steps of finding your data.

In fact, thanks to IntelliSense™ technology, a Microsoft Office feature, many of your routine tasks will be automatic. And your complex tasks become much easier.

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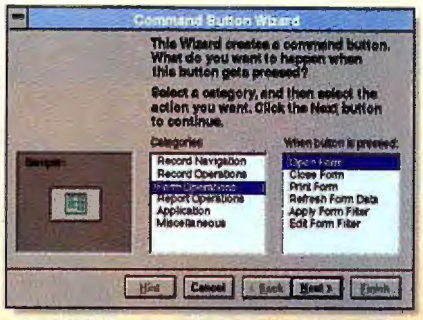

Add fully functional buttons to a form using the Button Wizard. Microsoft Access does all the work of writing the code behind the button.

Microsoft Access even makes it easy to tap into any current database you have, from Paradox® to Microsoft SQL Server.

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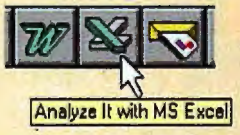


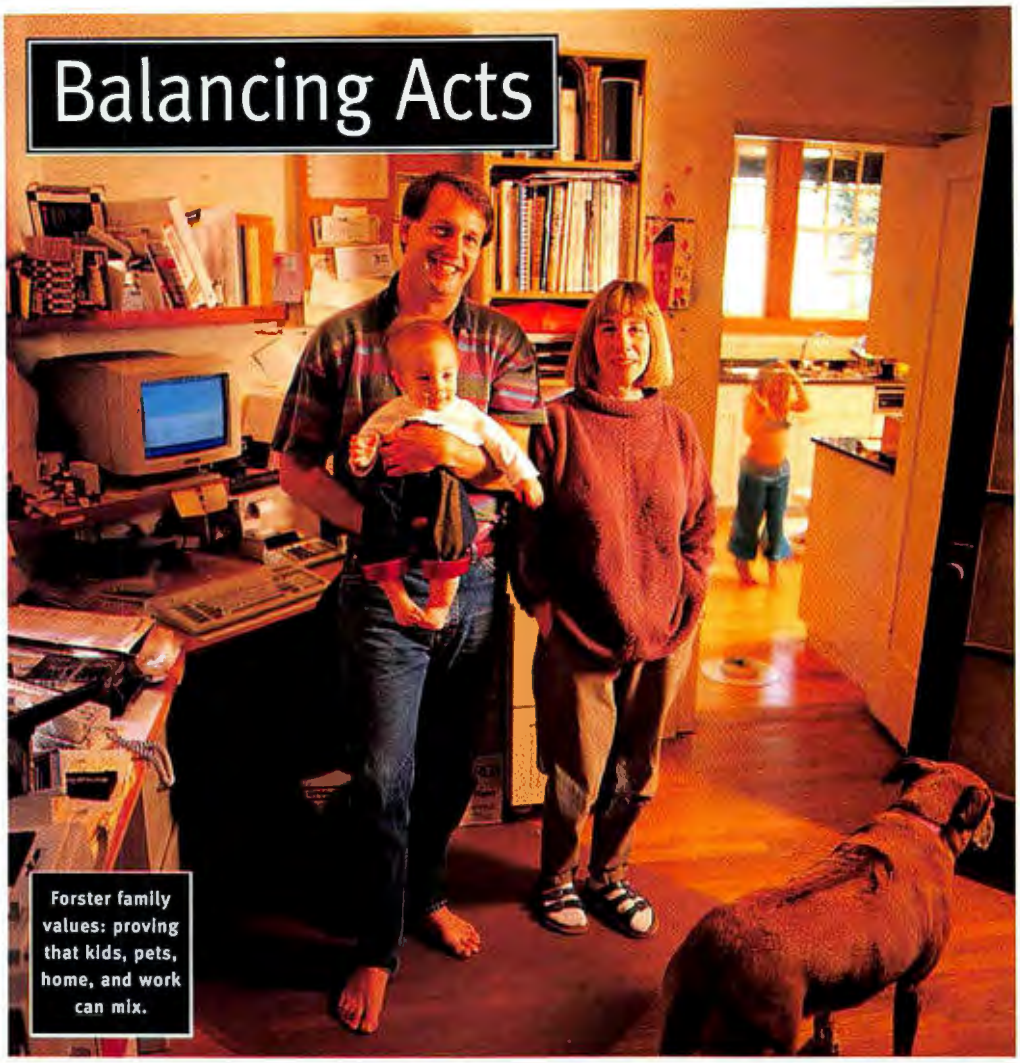
With OfficeLinks, send data directly to Microsoft Excel using the Analyze It toolbar button.

And for as little as $99* for an upgrade or $359* for the Office Professional upgrade, Microsoft Access couldn't be more, well, accessible. For a reseller's name, or to order, call 800-370-8996, Dept. CN3.

Microsoft Office

*cess qualify for $40 rebate upon acquiring Office Professional 4.3 ($399 upgrade SRP). Plus applicable sales tax. Reseller prices may vary. Offer good until August 31, 1994 and only in the 50 United States. © 1994 Microsoft Corp. All rights reserved. Microsoft inside the 50 United States & Canada, call your local Microsoft subsidiary or (206) 936-8661. Microsoft, Microsoft Access, PowerPoint, Visual Basic and the Windows logo are registered trademarks and IntelliSense and Rushmore are trademarks of Microsoft Corp.

Balancing Acts



Forster family values: proving that kids, pets, home, and work can mix.

Time-saving strategies and other advice for managing work at home. By Steve Fox

WHO WOULDN'T RATHER WORK AT home? No boss breathing down your neck, no time clock, no dress code, no commute. It sounds like paradise. But down here on planet Earth, paradise gets lost in a hurry. Small distractions loom large, from the kids' violin lessons and the cat's litter box to *Geraldo*. And of course, that pint of Häagen-Dazs in the back of the freezer keeps calling your name.

Okay, so you're human. Still, it is possible to gain control of your home work. Here are a few strategies that have stood the test of time.

That office back at corporate headquarters has one thing going for it: It's not home. In fact, it practically screams "Work!"—a good thing, in this case. So when you set up a home office, try to create boundaries that separate it from the rest of your house. "If you have a spare room, that's ideal," says Janet Attard, author of *The Home Office and Small Business Answer Book* (Henry Holt & Co., New York, 1993). "Then you can say, 'I'm walking into my office.' You are telling yourself this is your time to work, and you're telling your family that, too. If you can't spare a separate room, you can always set off a corner of your living room with an inexpensive folding screen."

For some home workers, a more permanent barrier is a must. John Forster runs his general contracting business from home in Oakland, California. He and his wife, Holly, a nurse-practitioner, have a teeming house—three kids, two cats, and a rambunctious dog. The Forsters quickly learned they needed a home office "with closable doors." Before they created a defined space, John says, "if I put something down, it wouldn't be there when I turned around."

And remember, wherever you locate your office, you'll be healthier and more productive if the quarters are comfortable and attractive. After all, you'll be spending long hours there. Irwin H. Doben, who runs an accounting and tax preparation practice, took over two upstairs bedrooms in his Long Island, New York, home. Both offices have natural sunlight, U-shaped desktops so that everything is just a chair swivel away, and separate radios so that he and his assistant next door can each listen to their own music. "If you're in a dismal place, it's tough to work," says Doben. "A lot of accountants have dreary offices in basements. I've put art on the wall, not just diplomas. It gives me something nice to look at."

I Have a Little List

As a home worker, if you don't tell yourself what to do, no one else will. The best solution is to make a daily to-do list. The satisfaction you get in crossing off each item is a built-in reward system. You can commit your list to paper, but when it comes to keeping track of appointments and contacts, you can't beat computer-based personal information managers (PIMs). A PIM organizes your to-do list according to priority and due date, tracks task status, and even beeps at you when a meeting time approaches.

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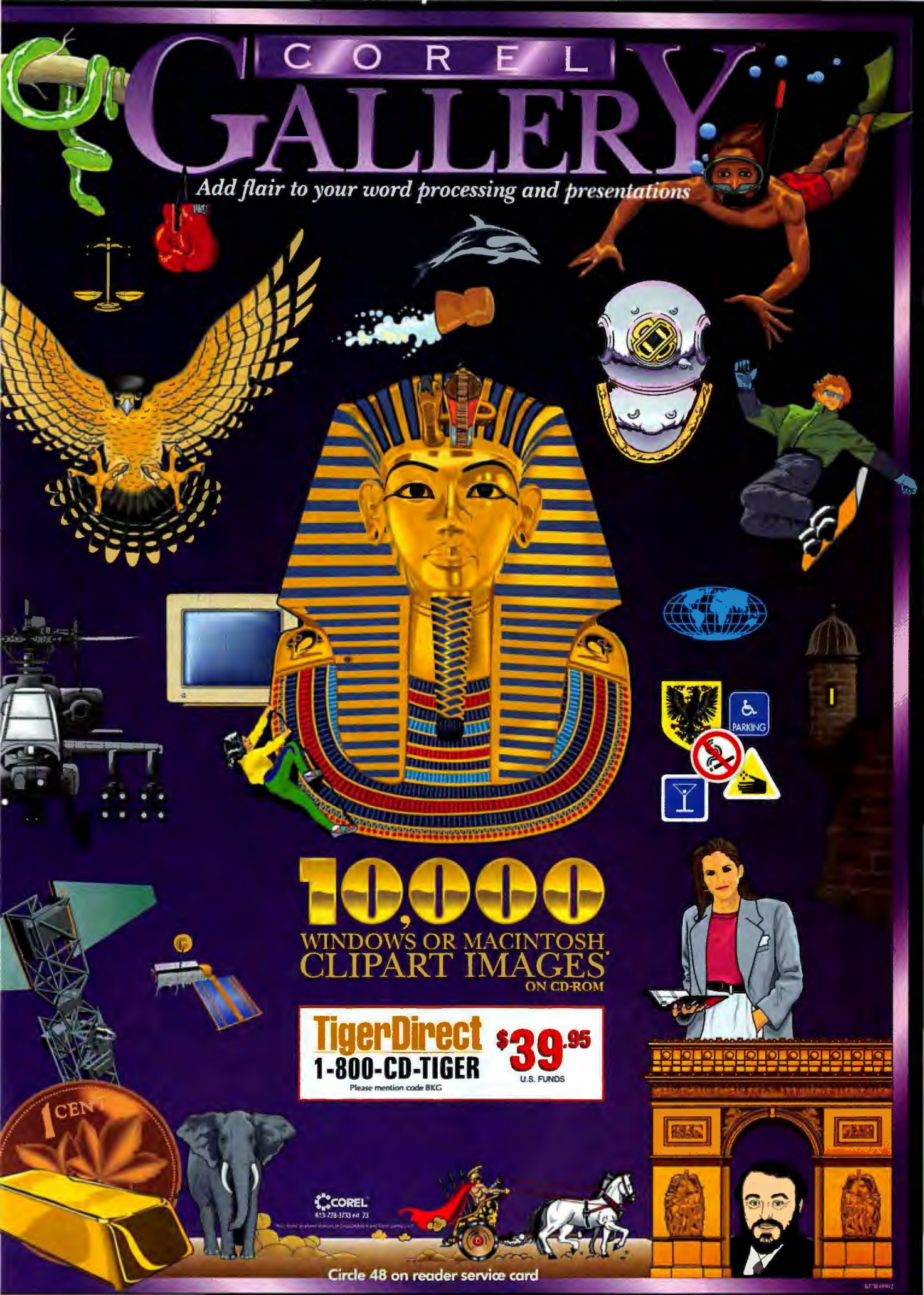
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Bob Adler: Don't stop by—unless you have Giants tickets.

Of the dozens of PIMs available, each takes a different approach to organizing your life—from Day-Timer look-alike Lotus Organizer to WordPerfect's InfoCentral for Windows, which links related information about people, places, and events. Other PIMs include Contact Software's Act, Okna's DeskTop Set, Arabesque's Ecco, and Polaris's PackRat. (This writer is a fan—and user—of Ecco and Organizer and is toying with a switch to InfoCentral.)

Even if you're a model of efficiency, life's demands keep intruding. Should you feel guilty about paying business bills, cleaning the office, or installing a CD ROM drive? No. Upkeep is written into your job description. Simply add those tasks to your to-do list.

Making Time

Parcel your time prudently. Get an answering machine, voice mail, or an answering service. Then screen your calls and return them later that day. Paul and Sarah Edwards, authors of *Working From Home* (Jeremy P. Tarcher/Perigree, 1990), suggest you set a specific hour for returning calls. "Then *you*, not the callers, set priorities."

Meetings and errands are also a time drain. Think twice before calling a meeting or running off to pick up a package. Ask yourself, Can this be handled by phone or mail? You can have overnight-mail and courier services come to your door, order stamps from the U.S. Postal Service (call 800/782-6772), and even have your dry cleaning or groceries delivered to your doorstep. And when tasks pull you out of the office during the workday, try to schedule them to avoid rush-hour traffic.

It's a Family Affair

Sometimes the work itself is easy—the tough part is getting family members to understand that, though you work at home, you have a real job. "I'll let my sons play quietly on the computer, as long as they don't ask me questions," says Kare Grams, who runs a desktop publishing business in Orange County, California. "Sometimes my ten-year-old folds newsletters with me, and my five-year-old helps out, too."

Though this strategy may work for older kids, tots require more attention. "It's unrealistic to think you can take care of an infant full-time while working full-time," says nurse-practitioner Forster, who does quality assurance work and writes protocols from home. "It's hard to meet deadlines, because kids' patterns don't know deadlines. I do most of my work when my baby sleeps."

Forster's experience is typical. "Don't try to play superwoman or superman," advises Attard. If your schedule won't conform to your child's sleeping habits, consider a more

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Insist upon a printer with genuine Adobe™ PostScript™ software inside. It's the industry standard and the only way to guarantee that your printer will work with virtually every software application and hardware environment, today and tomorrow. Adobe PostScript software sets the standard for new color and network printers. In fact, leading printer manufacturers offer over 300 Adobe PostScript printers. Adobe PostScript is your assurance of the highest-quality output—every time—whether you're printing from DOS, Windows™, OS/2®, Macintosh®, or UNIX®. So if

SET YOUR SIGHTS ON GENUINE ADOBE POSTSCRIPT DEVICES

structured day-care arrangement—either in your home or outside it. If your budget permits, have someone come in once a week to clean house. Your time is precious.

"I've had friends taking days off from work who think they can just stop by to shoot the breeze," explains Bob Adler, a San Francisco photographer. "I used to accommodate them, but I've learned to say no—unless, of course, they happen to have tickets for a Giants game that day."

It may sound like pop psychology, but learning to say no is invaluable—whether you say it to friends, family, or even clients. "People know you're at home," says accountant Doben. "If clients call my home number on a Sunday, I tell them to hold the question and call back on my business line on Monday. You can't be at the beck and call of clients 24 hours a day. And clients will learn to respect you for that."

You can't be at the beck and call of clients 24 hours a day. They'll respect you for setting limits.

But all the time-saving tricks in the world won't make you a successful work-at-homer if you overdo it. "You'll get more work done when you're alert than when you're burned out," notes Attard. "If your work keeps you cooped up, force yourself to take a break." Julian Guthrie, a San Francisco freelance writer, is thankful for her dog Oliver. "He needs to be walked at least twice a day, which gets me outside, breathing fresh air."

Actually, breaks are good for the body as well as the mind. Hours spent at a keyboard or on a phone can lead to crippling injuries like carpal tunnel syndrome. So take frequent breaks, and vary your activities; your wrists, neck, and back will thank you.

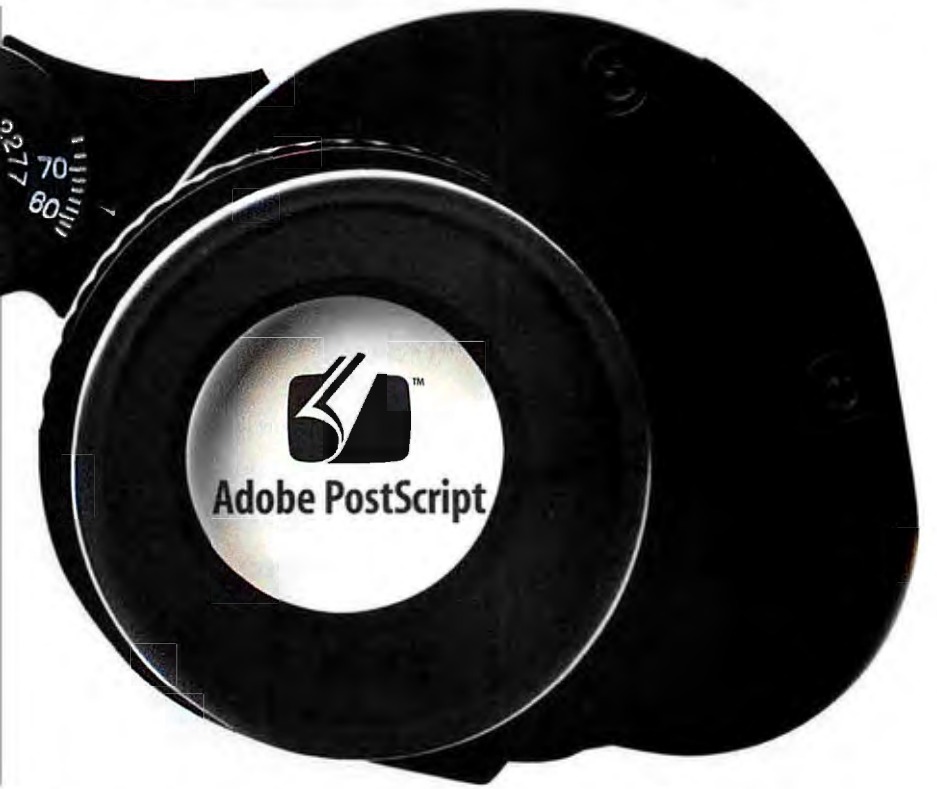
However you choose to chill out—listening to music, weeding your garden, or chatting with a neighbor—don't be too hard on yourself. Take an hour break and go to the gym, or get online and network on the digital superhighway. "CompuServe has been a lifesaver for me professionally—when new programs come out, the desktop publishing forum is invaluable," says Grams. "And it's given me a network of people in New York, Seattle—all over the country."

Professional associations can ease the burden of isolation. They also help you maintain professional contacts. *Gale's Encyclopedia of Associations* is a great place to look for organizations. If you can't find a group, Sarah Edwards suggests you create one. "It could even be a group of people who serve the same types of clients—say, a group for people who do weddings. You'll network and give each other business."

Isolation, distractions, repetitive-strain injuries—these are the obvious hazards. Less obvious, and more insidious, is workaholism. Too many home workers fail to set limits on their hours. They get up, work all day, have dinner, and work some more at night. Weekends, holidays, even vacations become fond memories. Our advice: Don't let this happen to you. You struck out on your own so you could be your own best boss—don't become your worst.

Steve Fox, a senior editor at **PC World**, is guilty of playing far too much Solitaire on his home office computer. ■

DAY IS THE PRINTER YOU'LL USE TOMORROW.



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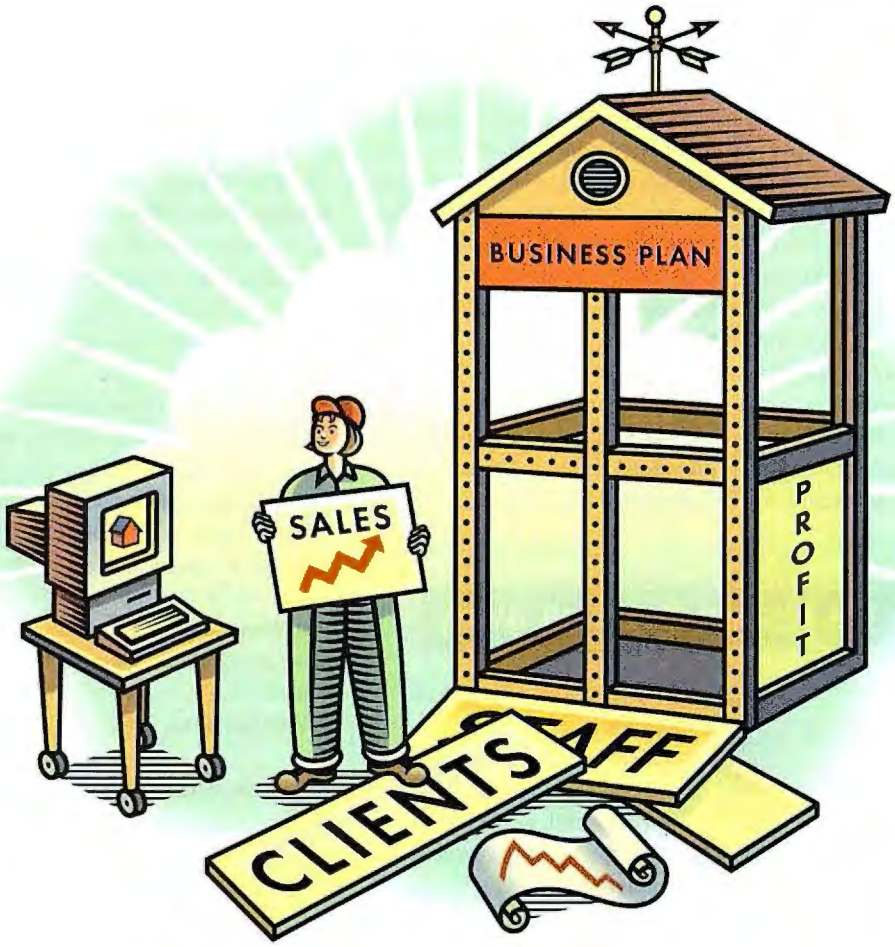


PETER HOEY

It's All in the Plan

Business planning is tedious and time-consuming. There's software to help, but don't expect the packages to do all the work. By Thom Foulks

THE ENTREPRENEURIAL SPIRIT HAS grabbed you. It's time to break those 9-to-5 chains and invest in your own business. Step One: You must have a business plan. And if you need justification for that statement, your business is in trouble before you even give it a name.

If you launch your own enterprise, you'll join one of the fastest-growing segments of the U.S. economy. According to the Small Business Administration (SBA), the number of small businesses grew 54 percent during the eighties.

Those are glowing stats, to be sure. But the news isn't all rosy. Nearly one out of seven businesses that started in the first half of 1992 failed. And with those failures went their owners' dreams of independence—along with a sizable investment.

A healthy percentage of those business failures can be chalked up to bad ideas. But without planning, even brilliant ideas can end in failure.

Advisers in a Box

Just a decade ago, preparing a business plan involved a lot of drudgery. No longer. Now, a rich variety of software tools can help guide you through the process. In this article we look at six products that do everything from helping you summarize your business goals to projecting revenues and profits. They can show you examples of successful business plans and help you find potential problems in your plan before it ever hits the desk of a lender or investor.

First, some cautionary notes: Software or no, don't delude yourself into thinking it's an easy task to prepare a business plan. It's not something you whip together in one weekend and sail by your banker over a cup of coffee on Monday morning. A business plan requires forethought, information, analysis, and projections. Newcomers to business planning also typically believe in some magic list of standard financial statements and forms for the plan. No such luck. Although some personal and financial information categories are common to all plans, each plan for a newborn business requires customization.

That's why many first-time users run into problems with business planning software. They assume that once they go through and answer all the questions, they'll have a finished plan. Not so, say the bankers and SBA officials we spoke with. Sure, all the packages produce a "final" document, but that doesn't mean it's the plan you want to present to a would-be lender.

Rather than relying solely on software, SBA and banking officials recommend using a planning package only as a guide to preparing the all-important final document.

"If business owners put the effort into using one of these planning packages, they at least have their basic data organized," says Harry Martinez, director of the SBA's Colorado Springs Small Business Development Center. But, he adds, "we just look at this as one step in getting a polished plan." Martinez's views

(echoed by nearly every SBA official we spoke with) should be taken to heart, since most lending institutions follow SBA guidelines.

All the products discussed here can guide you through the planning process. The principal differences between products are the additional software they require (only Plan Write is truly stand-alone) and whether they organize primarily financial or narrative information.

Despite claims to the contrary, most of these packages don't produce presentation-quality output, so your final document will need to be formatted using a good word processor. The spreadsheet-based products tend to concentrate more on numbers than on narrative information. Although most of the packages promise to create a "complete" plan, bankers and SBA officials say that's simply not true; you'll likely need to gather additional information and prepare more paperwork even after the software says you're done.

FIRST STEP BUSINESS PLAN

The fastest, least-expensive way to get a taste of business plan development is by ordering First Step Business Plan, a $5 package from the Dallas-based National Business Association (NBA).

The menu-driven First Step Business Plan prompts you through the process of entering the elements of a minimal plan. It includes one sample—a start-up plan for a delicatessen. Unlike the other products, First Step Business Plan can't prepare a balance sheet. But it does include a compact reference file on typical loan requirements—information not easily found elsewhere.

Other available NBA modules (all of which are free to association members) include Profit or Loss Statement, Cash Flow Analysis, and Review. If your start-up plans include an SBA loan, Review will be the most helpful—it asks you questions about your business plan and rates your chances of meeting the necessary qualifications.

For $5 a disk, you can't go wrong. You'll likely also want one of the other companies' packages for their full-featured output, but the First Step series provides a fast overview of the plan preparation process.

First Step Business Plan, $5
National Business Association
800/456-0440
Reader service no. 765

PLAN WRITE FOR WINDOWS

At the other end of the functionality spectrum is Plan Write, a sparkling Windows product that includes a full-powered word processor (complete with spelling checker) and business plan outliner, along with an integrated spreadsheet-charting module. With such helpful features as a business term glossary and advice for various elements of your plan, you should be able to prepare every document you need from within Plan Write.

Plan Write is so new that none of the SBA or banking officials we spoke with were familiar with it; still, of all the products in this group, its final report most closely meets the criteria experts define as critical. At $129.95, it's our top choice.

Plan Write, $129.95
Business Resource Software, Inc.
800/423-1228
Reader service no. 766

BIZPLANBUILDER

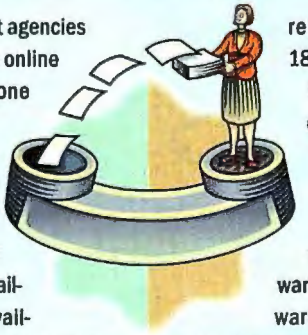
BizPlanBuilder, from Jian Tools for Sales, is the granddaddy of this group, boasting more than 55,000 users since its 1988 release.

The one-disk install routine builds you a set of WordPerfect or Word narrative files and Lotus 1-2-3 (WKS or WK1) spreadsheet files. The manual explains the various templates, describing what kinds of information each should contain. This straightforward process can be helpful because it forces you to think carefully about your venture. Unfortunately, you also spend too much time concentrating on which template you just completed and whether the information it contains duplicates data you've entered in another template. And you must keep the manual close at hand, since BizPlanBuilder's inputting process is not intuitive.

At this point, the neophyte entrepreneur may well stumble. BizPlanBuilder suggests inputting gobs of information on numerous topics. It's definitely overkill, unless you heed the following comment from the manual: "If a particular passage does not make sense to you or does not

PETER HOEY

Free Business Help: It's Just an 800 Call Away



Few, if any, federal government agencies can match the SBA's extensive online system. Operating with 48 phone lines, SBA On-Line is a treasure trove of information for any business—and it's free. For general information, just dial 800/697-4636 to log on at either 2400 bps (14 lines available) or 9600 bps (34 lines available). In the system's first year of service (beginning in October 1992), SBA On-Line received more than 560,000 calls; at last report, it averaged more than 1800 calls a day.

SBA On-Line boasts hundreds of files with information on SBA services and publications. Most files can be read online or downloaded for later review. Also available are shareware and free downloadable software, as well as statistics about U.S. businesses. It's an information service that every entrepreneur should be using—you can bet your competitors are.

seem appropriate for your business, then simply delete it."

Although BizPlanBuilder's marketplace popularity is notable (every banker and analyst we talked with mentioned it), you should use it with care—and considerable forethought.

BizPlanBuilder, $129
Jian Tools for Sales, Inc.
800/346-5426
Reader service no. 767

The Business Plan Toolkit

If you need an all-in-one package that covers everything from financial analysis to market forecasting, take a look at The Business Plan Toolkit from Palo Alto Software.

The package includes a robust set of spreadsheet templates and an ingenious text editor for writing a business plan. The Business Plan Text Writer walks you through 46 topics, with a short explanatory note of what each section covers. As you type in your comments, it automatically creates a database of your plan's various elements, making later revisions a snap.

The Toolkit's outstanding feature is its 218-page manual. It not only explains the software but gives clear, sensible advice on plan preparation, including tips on what to leave out of the plan, depending on the type of business you're starting.

The $149.95 Business Plan Toolkit is a top choice for start-up entrepreneurs who expect strong financial growth and expansion, and who need to perform complex calculations to demonstrate those potentials.

The Business Plan Toolkit, $149.95
Palo Alto Software
800/229-7526
Reader service no. 768

PlanMaker

PlanMaker from PowerSolutions for Business features a menu-driven interface that's both handsome and easy to use. It comes with three sample business plans for guidance.

Although PlanMaker has no true spreadsheet component, it includes financial tables to help you organize such information as projected operating expenses, loan amortization schedules, and an overall balance sheet. However, you'll have to supply the numbers from elsewhere. PlanMaker doesn't calculate your profit-and-loss statement; it only provides blanks for you to fill in.

For the narrative portions of your plan, PlanMaker offers a split-screen text editor—instructions appear in the top half, while you enter relevant data in the bottom half. PlanMaker is billed as a total plan preparation package, with no extra software necessary—which is both its strongest and its weakest point. The output goes directly to your printer, with few formatting options, or to a raw text file. If you don't like the bare-bones output, you'll have to reformat the report in your word processor.

PlanMaker, $129
PowerSolutions for Business
800/955-3337
Reader service no. 769

Business Blueprint

Business Blueprint from Spreadware is an add-in worksheet with linked templates for Excel 4.0 (and later versions). The $149 one-disk package, which includes a highly functional "control panel" to guide you through 12 charts of text and financial information, takes advantage of Excel's ability to deal with numerical and text information. Blueprint is the most potent package in this group for an entrepreneur grappling with complex financing mechanisms.

Blueprint also possesses the text-handling power necessary to produce the plan's narrative, with full Wysiwyg font display capabilities. That means you can produce a business plan with a Fortune 1000 appearance (although a winning look obviously doesn't guarantee a winning plan).

Unfortunately, Business Blueprint suffers from the slimmest manual of the group—only 45 pages, most of which illustrate the template collection's menus in Macintosh format. You get no instructions on the business planning process, no guidance to SBA assistance, and no cautionary comments about information overkill. It would be easy to generate 30 to 40 pages of financial data from Blueprint and wind up with only a few pages that are meaningful for a start-up business plan.

A spreadsheet guru, however, would likely choose this package over any other in the group.

Business Blueprint, $149
Spreadware
619/347-2365
Reader service no. 770

Thom Foulks is a business computing consultant and freelance writer in Colorado Springs.

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

Business Planning 101

Not sure what belongs in a business plan? Here's what the SBA looks for:

I. The Business
- A. Description of business
- B. Marketing
- C. Competition
- D. Operating procedures

II. Financial data
- A. Loan applications
- B. Capital equipment and supply list
- C. Balance sheet
- D. Break-even analysis
- E. Pro forma income projections
- F. Pro forma cash flow

III. Supporting documents
- A. Tax returns
- B. Personal financial statement (all banks have these forms)
- C. For franchise businesses, copy of franchise contract and all supporting documents provided by the franchiser
- D. Copy of proposed lease of purchase agreement for building space
- E. Copy of licenses and other legal documents
- F. Copy of résumés of all principals
- G. Copies of letter of intent from suppliers

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Maximum Scanning Area	8.5 x 14"	8.5 x 11.5"	8.1 x 11.0"
Scanning Throughput*			
300dpi/8.5 x 11"	2:00 Minutes	1:55 Minutes	4:05 Minutes
600dpi/8.5 x 11"	5:22 Minutes	9:27 Minutes	17:35 Minutes
800dpi/4 x 5"	2:20 Minutes	3:38 Minutes	6:36 Minutes
1200dpi/4 x 5"	5:28 Minutes	9:05 Minutes	13:00 Minutes
Single Lamp Design	Yes	Yes	No
Software Bundles	Complete PhotoShop	Photoshop LE	PhotoShop LE
Descreening	Yes	No	No
Unsharp Masking	Yes	No	No
Suggested Retail	$1,395	$1,179	$1,500

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2	Audio Lab	298 Congress St.	Troy	555-2860	M,T,W 10-6; Th-Fr 10-9
3	Radio Shack	110 Watervliet Ave.	Watervliet	555-1125	M,T,W 10-6; Th-Fr 10-9
4	Lechmere	89 Federal Way	Albany	555-7927	M,T,W 10-6; Th-Fr 10-9
5	Dalton's Audio	310 State Street	Albany	555-4500	M,T,W 10-6; Th-Fr 10-9
6	B.J.'s Wholesale	97 Third St	East Greenbush	555-5091	M,T,W 10-6; Th-Fr 10-9
7	Hippo's	1500 Central Ave.	Albany	555-5538	M,T,W 10-6; Th-Fr 10-9
8	K-Mart	80 Washington St	Rensselaer	555-1519	M,T,W 10-6; Th-Fr 10-9
9	Elmers	Village Plaza, Rt. 146	Schenectady	555-9047	M,T,W 10-6; Th-Fr 10-9
10	Ernest's Stereo	76 O'Brien Way	Loudonville	555-4230	M,T,W 10-6; Th-Fr 10-9
11	Caldor's	1423 Heath St.	Albany	555-1987	M,T,W 10-6; Th-Fr 10-9
12	Coco's	Northern Plaza, Rt. 152	Albany	555-2921	M,T,W 10-6; Th-Fr 10-9
13	Belton Stereos	150 State Street	Troy	555-1473	M,T,W 10-6; Th-Fr 10-9
14	Concord Audio	1999 Railroad Ave.	Albany	555-0200	M,T,W 10-6; Th-Fr 10-9
15	Radio Shack	872 Johnson St	Watervliet	555-0711	M,T,W 10-6; Th-Fr 10-9
16	K-Mart	89 Albany Street	Albany	555-2205	M,T,W 10-6; Th-Fr 10-9
17	Hippo's	45 Wadsworth Circle	Menands	555-6099	M,T,W 10-6; Th-Fr 10-9
18	Sam's Club	870 Central Ave.	Albany	555-3155	M,T,W 10-6; Th-Fr 10-9
19	Audio Lab II	1145 Lawler Ave.	Albany	555-8049	M,T,W 10-6; Th-Fr 10-9
20	Wilton Stereo	189 Central Ave	Albany	555-4995	M,T,W 10-6; Th-Fr 10-9
21	Caldor's	45 Branch St	Colonie	555-8606	M,T,W 10-6; Th-Fr 10-9
22	Fettig's Stereo	2764 Consort Rd.	Schenectady	555-8424	M,T,W 10-6; Th-Fr 10-9
23	Somer's	619 Crusty Way	Loudonville	555-1965	M,T,W 10-6; Th-Fr 10-9

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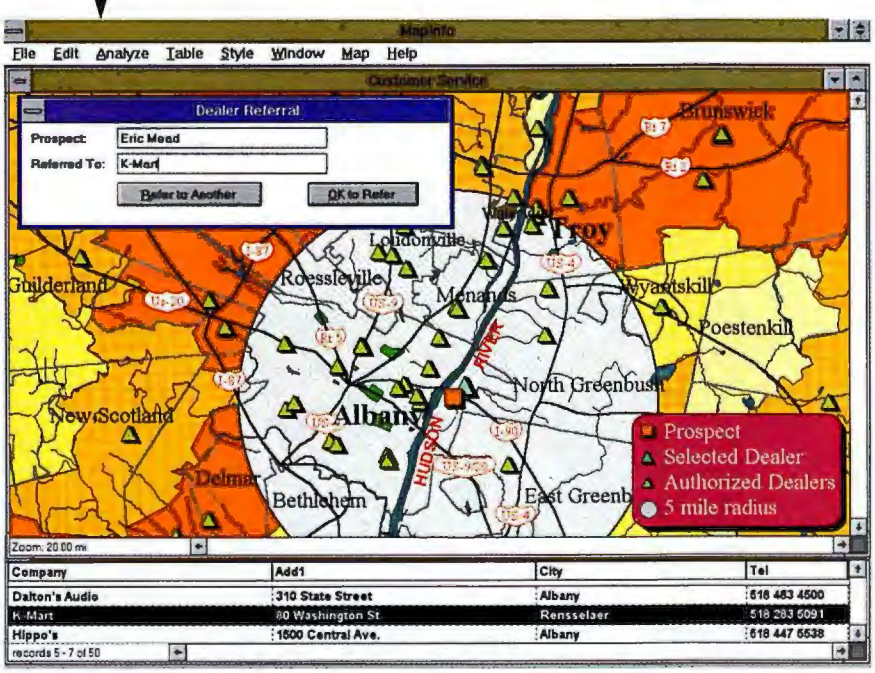

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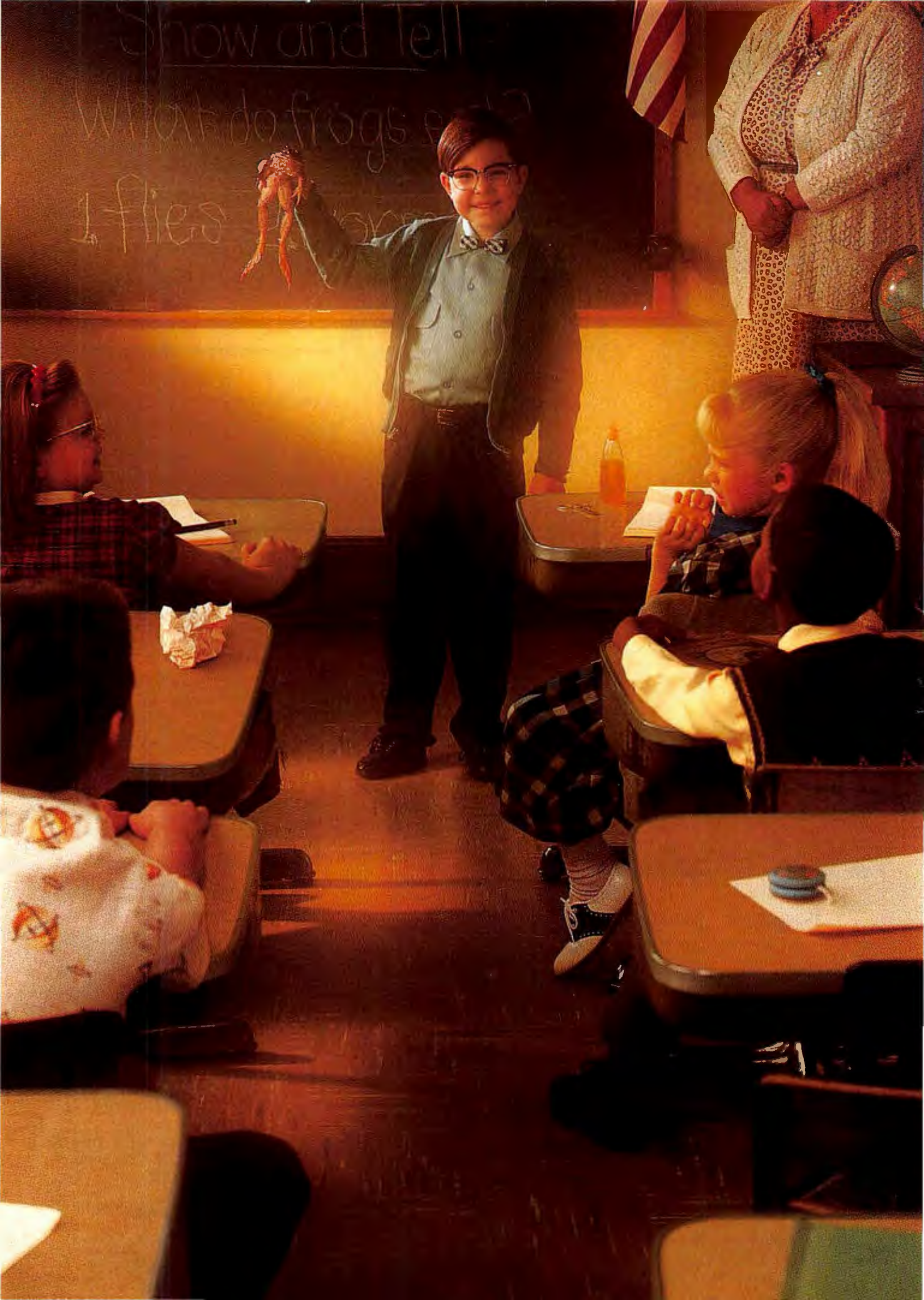
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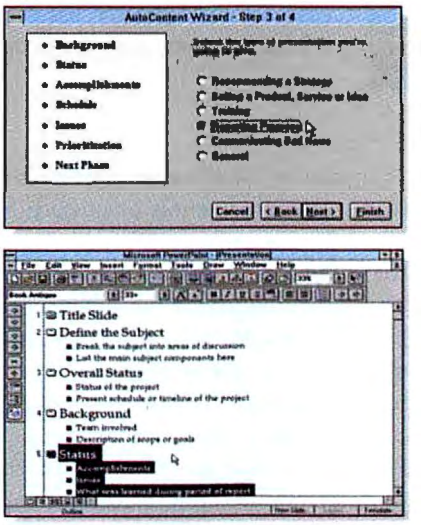

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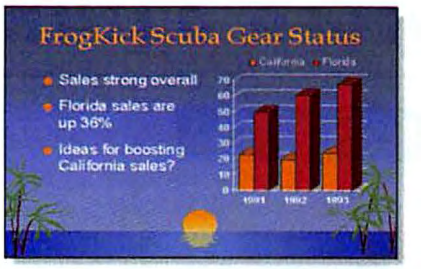

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Here's How

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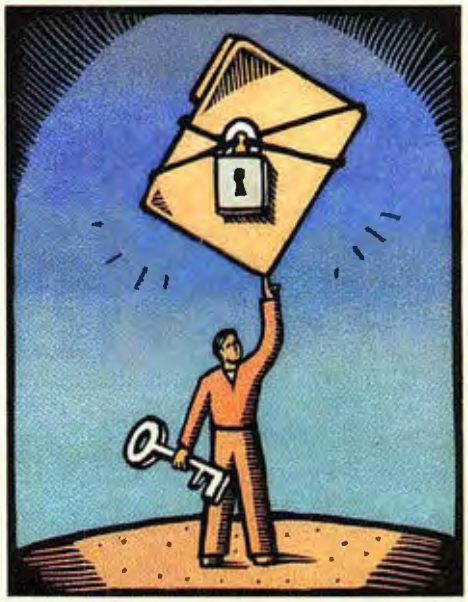
HELP LINE Q&A



Tip of the Month

PROGRAM MANAGER SECURITY: To protect your Windows Program Manager's File menu and Setup functions, place some restrictions on Program Manager's use by editing your PROGMAN.INI file.

In Program Manager, select File • Run, type PROGMAN.INI, and press <Enter>. If the file doesn't have a [restrictions] section, start a new line at the bottom, type [restrictions], and below that type the entries you want to use, one per line. If you do have a [restrictions] section, edit its entries as appropriate. When you're done, exit and restart Windows so the changes will take effect.

The entry NoRun=1 disables the File • Run command so that a user can't run an application from Program Manager unless you've set up an icon for it. NoFileMenu=1 removes Program Manager's File menu entirely. NoClose=1 prevents a user from exiting Windows. NoSaveSettings=1 disables the Options • Save Settings on Exit command, so any changes made to the placement of your Program Manager group windows and group and application icons cannot be saved upon exiting Windows. To nullify any of these entries, remove it or change the value from 1 to 0.

Shane Rau, Assistant Technical Editor

What's So Super About SVGA?

Q I'm confused about the different video modes out there. Everyone knows Windows uses the term *VGA* for 640 by 480 resolution and the term *super VGA* for 800 by 600. But many DOS programs seem to mix the two. For example, Microsoft Flight Simulator 5.0 calls the 640 by 400 256-color mode super VGA, and Virgin Games' The 7th Guest calls the 640 by 480 256-color mode super VGA as well. Who is right?
Raymond Chi, San Francisco

A They're all right. IBM introduced the Video Graphics Array (VGA) display standard with the PS/2 line in 1987; VGA's graphics display modes included resolutions of 640 by 480 in 16 colors and 320 by 200 in 256 colors. IBM's XGA and 8514/A video boards offered higher resolutions and more colors (640 by 480 in 256 colors, for example), but most competing manufacturers chose not to clone these incremental improvements on VGA and began producing lower-cost adapters offering even higher resolutions. Unlike the modes offered by IBM's CGA, EGA, and VGA, the new graphics modes were more or less proprietary. Since there was no standard way for programs like 1-2-3 and Windows to select display modes on all the different boards, manufacturers had to ship custom drivers for a range of programs.

To make life easier for themselves, several of these companies formed the Video Electronics Standards Association (VESA) and created a specification that outlined a standard way to select modes. The current VESA super-VGA standard covers just about every video resolution and color-depth combination currently available, up to 1280 by 1024 with 16,777,216 (24-bit) colors.

Does this mean that your board will work with any old VESA driver? Not necessarily. Not all video boards are compatible with the VESA SVGA spec. Even if a board claims to be VESA compatible, it still may not work with a particular driver, such as the 800 by 600 256-color super-VGA driver that comes with Windows 3.1. In practice, manufacturers continue to provide their own driver software. All you really need to know before you buy is: Does a particular board support your software's display modes, and are the necessary drivers (for Windows, OS/2, Windows NT, or individual DOS applications) included or easily available? Most companies maintain computer bulletin boards from which you can download updated drivers, or they will mail you a disk.

Technology and the Disabled

Q I recently became disabled with post polio syndrome and had to quit my job. I'm on a fixed income, live in a HUD-subsidized high rise, and use a wheelchair all the time. Because I have a computer, I volunteer to do the monthly calendar and newsletter for the tenants—senior citizens and disabled people—of our 162-unit building. I also recently purchased a copy of Voice-Assist by Creative Labs and hoped to help some quadriplegic residents use the computer hands-free.

Unfortunately, I find that my 16-MHz 386 is underpowered for many tasks (notably Voice-Assist), and its 40MB hard disk is too small (several times I've spent hours working on a calendar only to lose it because of a full disk). I would

SHIRLEY HANDY

like to continue my interest in computers and also provide more services to my community. Do you know of an organization that can help with upgrading my system?

Jerry Tollefson, Brainerd, Minnesota

A Besides your state's Department of Rehabilitation, I know of three organizations that may be able to help you or at least direct you to other helping hands in your locality. The first is the Foundation for Technology Access, a network of 47 community-based technology resource centers in 33 states and the Virgin Islands, from which you can find out about technologies and products for the disabled.

Most state governments provide some kind of assistance to the disabled in accordance with the federal Technology-Related Assistance for Persons With Disabilities Act (also known as TechAct). RESNA (the group dropped its original name but kept the acronym) is an Arlington, Virginia–based association that helps states develop TechAct programs for the Department of Education's National Institute on Disability and Rehabilitation Research (NIDRR). If you're unable to find your state's TechAct program, RESNA can help put you in touch.

The United Cerebral Palsy Association has a grant from IBM to help people with cerebral palsy and other disabilities acquire assistive equipment. Contact your local United Cerebral Palsy affiliate, or call the national organization's 800 number for information about available services, providers, and funding. The association also has a program called Access Group that provides expertise and funding for the purchase of equipment and software.

Finally, if *PC World* readers or their company has computers and software to donate, they should contact the National Cristina Foundation, which transfers equipment to reputable nonprofit organizations that assist the disabled. For more information about organizations that accept donations of equipment for use by other disadvantaged groups, see the December 1993 *Consumer Watch*.

- **Foundation for Technology Access** 415/455-4575
- **RESNA** 703/524-6686
- **United Cerebral Palsy Association** 800/872-5827
- **National Cristina Foundation** 800/274-7846

To DoubleSpace or Not to DoubleSpace

Q I've just "Stepped Up" to DOS 6.2 with Microsoft's upgrade kit. Using the multiconfiguration feature, I can choose from several setups, some of which do not need access to my DoubleSpaced drives. One of DOS 6.2's features lets you bypass loading the DoubleSpace driver by pressing <Ctrl>-<F5> or <Ctrl>-<F8 > at startup. Not loading that driver means I have more room in upper memory blocks for other drivers and TSRs. But <Ctrl>-<F5> causes DOS to skip the entire contents of my CONFIG.SYS and AUTOEXEC.BAT files, and <Ctrl>-<F8> requires me to press <Esc> to continue processing those files or to press Y or N for each command in those files. So at present I'm pressing <Ctrl>-<F8>, then <Esc> every time I want to prevent the DoubleSpace driver from loading. Is there a way to automate this process?

Larry Crosson, Topsham, Maine

A You save almost 40K by not loading DoubleSpace, and it would be great to automate the keystrokes to bypass it. Unfortunately, it can't be done. If the file DBLSPACE.INI is in your boot drive's root directory, DOS loads the hidden DoubleSpace driver (DBLSPACE.BIN) before it starts processing CONFIG.SYS.

If you aren't trying to prevent access to your DoubleSpaced drives and you have enough upper memory for the drivers you want, my first suggestion is that you simply load the driver in upper memory (using DEVICEHIGH=C:\DOS\DBLSPACE.SYS /MOVE in CONFIG.SYS) and live with it.

USER GROUP OF THE MONTH

Anderson PC Users Group

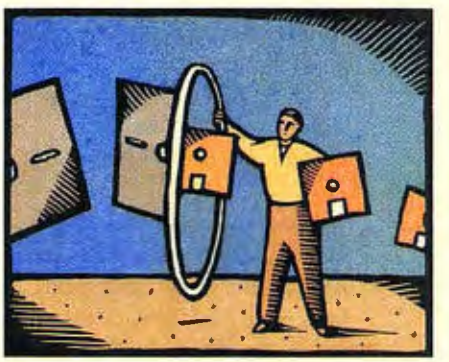
June's user group tips come from the Anderson PC Users Group in Anderson, South Carolina. The group holds informal meetings on the second Tuesday of each month in the United Way Building at 114 West Greenvill Street in Anderson. Its monthly newsletter features a report on the previous month's meeting, product reviews, industry perspectives, and members' PC-related experiences. APCUG's beginners' special interest group is popular with new members. The group's electronic bulletin board has more than 650MB of shareware and public-domain software that's readily available to members and nonmembers alike.

For more information, write to APCUG at 110 Blake Dr., Townville, SC 29689, or call 803/287-9080. APCUG's Electric City BBS number is 803/226-5287 (up to 14.4 kbps). Membership costs $12 per year, and there's a $10 initiation fee for new members.

Reader service no. 611

5¼-INCH DISKS IN A 3½-INCH DRIVE: I recently had to transfer an application on 5¼-inch disks to a portable system that had only a 3½-inch floppy drive. Fortunately, my desktop system had a 5¼-inch floppy drive and DOS 6's Intersvr utility, and my portable system had DOS 6's Interlnk utility. So I connected the systems with a serial cable and set up a client-server link between the two, with my desktop's floppy drive represented as drive E: on my notebook. I inserted the first application disk into my desktop's floppy drive, and then it was easy to install the app on the portable's hard drive.

Gene Welsskopf
Anderson PC Users Group



If you absolutely must prevent DoubleSpace from loading, you have three choices, all of which require more effort than pressing <Ctrl>-<F8> followed by <Esc>. First, you can simply boot from a floppy disk that contains copies of your CONFIG.SYS and AUTOEXEC.BAT files but doesn't contain the DBLSPACE.BIN hidden file. Second, you can rename DBLSPACE.BIN or, even better, DBLSPACE.INI—use ATTRIB -S -H -R DBLSPACE.INI to remove the system, hidden, and read-only attributes first. (You could write a pair of batch files—one to rename the files and another to restore the names—to automate this process.) Finally, you can purchase a third-party disk compression program that relies on CONFIG.SYS to load its compressed-drive driver and set up a DOS 6.2 multiconfiguration menu with choices for loading and not loading that driver.

If you can live with using just 17K of memory below 1MB, get Stac Electronics' Stacker 4.0. It loads the rest of its code in extended memory, delivers better compression, and will convert your DoubleSpace drives to Stacker format during installation.

DoubleSpace Ratios Gone Awry

Q In October 1993's *Help Line*, you suggested using the DOS command DBLSPACE /RA to update the compression ratio that MS-DOS 6.*x*'s DoubleSpace uses to estimate the amount of available space on a compressed disk. I checked the actual compression ratio of my disk, which DoubleSpace reported as 1.6:1. Nevertheless, the program also estimated remaining free space using a ratio of 2:1. When I tried to adjust the estimated ratio to 1.6:1, I got an error message saying that valid compression ratios for the disk were between 2:1 and 4.7:1! Can you tell me what's happening here?
Lee Siler, Belmont, Massachusetts

A I've received several letters complaining of the same problem. Unfortunately (or, rather, fortunately), I've been unable to duplicate the problem on my own system. According to Microsoft, the error is caused by excessive file fragmentation on your hard disk. Use DOS's **DEFRAG /F** command to solve the problem, but wait until the end of the day—defragmenting even a moderately scrambled compressed hard disk can take you a number of hours.

Computers and Education

Q I am desperately looking for suppliers of educational computer products, as well as computer trade shows that serve the education market. Where should I start looking?
Charlotte Boyer, America Online

A Here are a few resources that may be able to help you locate suppliers of educational products:

- **Association for Computing Machinery SIG on Computer Uses in Education** (special interest group); 212/869-7440, 212/302-5826 (fax)
- **Association for Educational Communications and Technology** (special interest group); 202/347-7834
- **EDUCOM;** 202/872-4200
- **Quality Education Data** (market research firm); 303/860-1832

Shutter Shuck

Q I recently received a software upgrade on a 3½-inch floppy, and although it was packaged extremely well, the disk's shutter was askew and wouldn't open properly. To use the disk, I gently pried the shutter off and found an additional part, the spring, which I also removed.

This is the second disk I've received with a damaged shutter. Surely I'm not the only one who's had this problem. Is there a way to reassemble a shutterless floppy, or shouldn't I bother?
Charles Beck, America Online

A If you spend enough time trying to reassemble your shattered shutter, you'll find that it's a job made for a machine, which, no doubt, is how floppies are assembled in the first place. It's just as well, because the shutter isn't a make-or-break feature. Like the Tyvek sleeves that protect 5¼-inch floppies, the shutter exists only to protect the floppy's surface from dust, fingerprints, coffee spills, and so forth. Such contaminants, in addition to making the disk's data irretrievable, can soil the floppy drive's head, in which case the drive may not be able to read any floppy disks. You can safely continue to use the shutterless disk as long as you take steps to protect the exposed media.

The best course of action is simply to copy the contents to a new disk and chuck the broken floppy. Whatever you do, watch out for the metal shutter, which is quite sharp. Be careful when you tear open the plastic package on application disks (I recently injured myself this way in an overzealous rush to install a new program), and keep broken shutters away from children.

Another Side of CD ROM

Q My desktop system rests on its side. Can I install a CD ROM drive with a caddy and operate it sideways? I was told by someone that CD ROM drives operate differently from hard and floppy drives and need to be resting horizontally. Is this true?
Michael Rosen, America Online

A CD ROM drives do operate differently from magnetic disk drives in many respects; however, most newer drives will work fine horizontally or vertically. The only way to be sure is to check your drive's documentation or call the manufacturer. One company I spoke with, Texel, warns that its drives can be used only in one vertical position—with its eject button at the top. Flipping the drive over (with its eject button at the bottom) will prevent the caddy from seating properly.

Naturally, caddyless drives are the exception to this general guideline—a CD ROM would fall out of position in a vertically mounted tray drive, assuming you could even insert the disk in the first place. An exception to the exception is Toshiba's new XM-3401B drive, which adds a spindle clip to its tray, much like those found in CD cases.

By Scott Spanbauer

Scott Spanbauer is a contributing editor for PC World. Help Line *welcomes your questions (see page 12 for contact information).*

WOW!

SideBar Wonks Your Windows to Perfection

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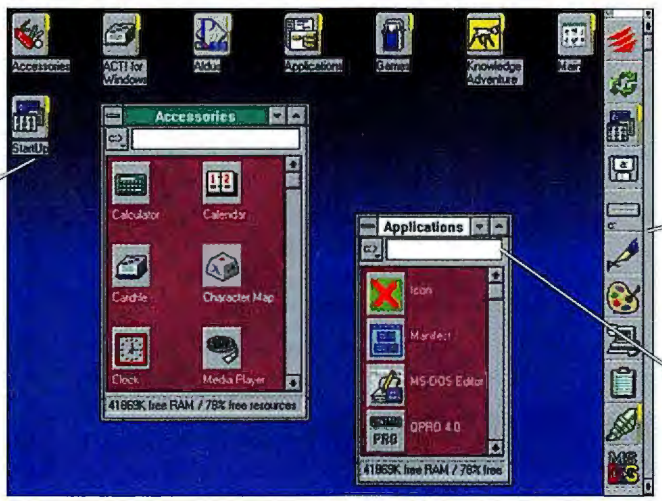

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Circle 189 on reader service card

SPREADSHEETS Q&A

Keeping Graphs Current in 1-2-3

Q I have a 1-2-3 release 2.4 worksheet that tracks monthly production. The worksheet contains six named graphs, each displaying data for a different product. Each month, I add a new row of data at the bottom and have to extend every graph's X and data ranges to include it. Can I write a macro to update all the graphs automatically?
Minh Tran, Charlotte, North Carolina

A You could, but first try the following trick—you may decide the macro's not necessary. Simply assign range names to the X and data ranges, then, after you've added a new month, reset the range names to include the new data. 1-2-3 will automatically update all the named graphs that use those ranges.

The worksheet in **FIGURE 1** contains three named graphs (only the A-RANGE graph is shown). The worksheet plots the values for PROD_A in column B; B-RANGE plots the values in columns B and C; and C-RANGE plots columns B, C, and D. We've used the /Range•Name•Create command to assign the range names that are shown in the table at F2.

Let's say you enter the September data beginning at A10. Without range names, you'd use /Graph•Name•Use to retrieve each graph, then extend its X range and data ranges to include the new values, and then use /Graph•Name•Create to update the graph. Instead, to display the new data for each of the four range names, just execute */Range•Name•Create*, select the range, and extend it to include row 10.

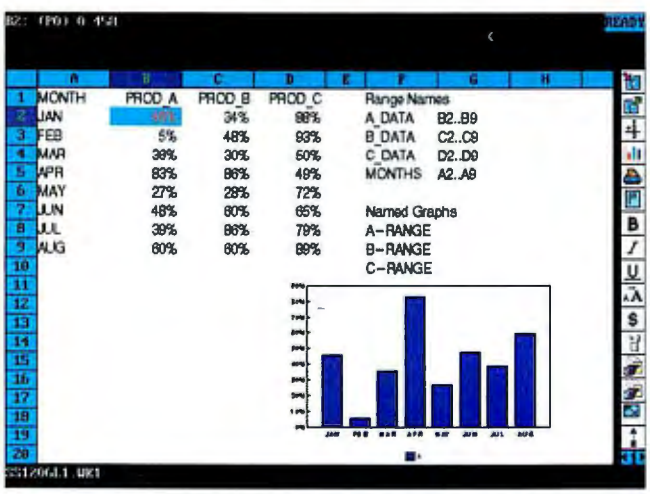

FIGURE 1: ADD NEW DATA POINTS EASILY TO 1-2-3 GRAPHS by using range names for the data ranges.

Skipping Over Nothing, Again, in 1-2-3

Q You suggested a 1-2-3 macro that prints a range but skips all the rows with zeros in the Quantity column [see "Skipping Over Nothing in Quattro or 1-2-3" in *Spreadsheets Q&A*, January 1994]. There is a simpler way. Let's say that the labels and the data are located in B1..D10, with the quantities in column B; in cell A2, enter the formula **@IF(B1=0,"|SKIP","")** and copy it to A3..A10. Now select A1..D10 as the print range and print it. The formula displays the label |SKIP whenever the quantity is zero; because the label begins with the nonprinting label prefix (|), 1-2-3 skips that line in the report. By adjusting the logical expression in the @IF formula, you could select any subset of rows to print—for example, just those rows that have 'ENGR' in, say, the Department column.
Shane Devenshire, Walnut Creek, California

A Thanks, Shane. I tried this trick years ago and found it didn't work with 1-2-3's /Print commands. But times change: Now it works with both the /Print commands and the Wysiwyg :Print commands, except in 1-2-3 release 2.4, where using /Print won't do the trick. It also works in 1-2-3 for Windows, but unfortunately not in either Excel or the DOS or Windows versions of Quattro Pro.

Changing the Default Font in 1-2-3 for Windows

Q You can change the font for an entire worksheet page in 1-2-3 for Windows by selecting the command Style•Worksheet Defaults. But how do you set the default font for all newly created worksheets? I don't want to have to change the font every time I open a new sheet.
Bill Alione, Cincinnati

Spreadsheet Toolbox

This month's Master Class talks about importing data from database-style text files into your spreadsheet using the parse procedure. The methods described work fine if your ASCII data is in tidy rows and columns. If that's not the case, TransPlus, a pricey but intelligent Windows utility from Intex Solutions, might be just the ticket.

TransPlus is a stand-alone application that turns a messy ASCII text file, such as you might download from the company mainframe, into a 1-2-3–format WK1 file, which you can then open in any spreadsheet application. The program is highly automated: Specify the source file, provide a name for the WK1 file, and ba-boom, it's done. The only significant user options are whether to recognize common fractions and whether to ignore repetitive page headers. Yet it's surprisingly robust: TransPlus can interpret negative values in a variety of formats and generally assigns the correct format to numeric data. However, it doesn't recognize date formats, and it gets confused if data values are too closely spaced. Fortunately, Intex offers a 30-day money-back guarantee, so you can try it out first. Intex Solutions, $225; 617/449-6222.

Reader service no. 626

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Master Class: The Fine Art of Importing Text Data

It's lonely, frustrating work, but sometimes everybody's gotta do it. Sometimes you're importing a mainframe database report, sometimes a stock price history you've grabbed off CompuServe. Wherever the data came from, it's an ASCII text document you need to put into your spreadsheet. This month, we'll show you how.

In simple cases, the data in ASCII files is organized as a database, in rows and columns, with every row containing a similar set of data values. If you're lucky, you can get your host system to produce a delimited text file, in which each value is separated by commas, with quotes surrounding the labels (Comma Separated Value format). A single line of delimited data might look like this:

```
"JAN",4015,3.18678,"7/3/32","628C"
```

In this example, the first value is a label, the next two, numbers, the fourth, a date. The last, an account code, is a label that begins with digits. You'll want the data to appear in five separate columns: The delimiters tell your spreadsheet where to split the lines.

If you're using 1-2-3 or Quattro, you need to import the data into a worksheet; in Excel, you open the ASCII file itself, which gets converted to a worksheet in the process. If you're using 1-2-3 for Windows, ignore the advice of the documentation to use File • Open, which doesn't always work properly, and use the Classic menu command /File • Import instead. Here are the commands for moving delimited data into your spreadsheet:

1-2-3 for DOS and Windows: */File • Import • Numbers.*

Quattro Pro for DOS: *Tools • Import • Comma & "" Delimited File.*

Quattro Pro for Windows: Select *Tools • Import*, then check *Comma and " Delimited File* in the Option box.

Excel 4.0: Select *File • Open*, click the *Text* button, select *Comma* and the File Origin, click *OK*, then enter the file name.

Excel 5.0: Open the file and follow the steps in the Text Import Wizard. Select *Delimited* in Step 1, check *Comma* in Step 2, click each sample column, and specify its proper field type in Step 3.

In cases where your data source is not able to provide your data in a delimited format, the data is arranged in lines of equal length, with spaces separating the values:

```
JAN 4015 3.18678   7/3/32 628C
FEB  443 2.14321 11/12/54  543
```

When you open (or import) such a text document, each row is in a single cell, and you must *parse* it to separate the field values into columns. The parse procedure inserts a format line, indicating where to split the lines of data and the type of data in each column.

FIGURE 1 shows a typical parse setup in Quattro Pro 5.0 for DOS, with the format line in cell A1. The imported text data is shown in A2..A8, one record per cell. The parse format line in cell A1 appears in the formula bar. The parsed data, arranged in six columns, is in A11..F17. At the outset of the procedure, before the format line was created, the data was in A1..A7.

To parse it, I left the selector on the first cell (A1) of the imported data and selected */Tools • Parse • Create;* Quattro inserted a rough format line above the data. I then selected *Edit* and altered the format line—*L* shows that the values in that position become labels, *V* indicates values, and so on. Note that each closing angle bracket (>) indicates a character or value and each asterisk (*) a space—you must fill the format line completely.

The next step was to select *Input* and specify A1..A8 (notice that the input range includes the format line). Then I selected *Output*, specified cell A11, and selected *Go*. Finally, I formatted the date values in D11..D17 to Long International format.

FIGURE 1: SLICE ASCII DATA into separate columns with the parse procedure in any spreadsheet.

To parse data in other spreadsheets, use these commands:

1-2-3 for DOS: */File • Import • Text* to import the ASCII data, then */Data • Parse.*

1-2-3 for Windows: */File • Import • Text*, select the range, then *Range • Parse.*

Quattro Pro for Windows: Import the file, then *Data • Parse.*

Excel 4.0: Select the cells in the column containing the ASCII text, select *Data • Parse • Guess.*

Excel 5.0: Open the ASCII file, select *Fixed Width* in Step 1 of the Text Wizard, and follow the remaining steps.

A Use the Windows Notepad (or another text editor) to open the file 1-2-3R4.INI in your Windows directory. Look for the [DEFAULT_FONT] section, and find the line 'DefaultFont=Arial' or simply 'DefaultFont='.

Edit the line to change the font name. Similarly, you can change the default point size by changing (or adding) a number in the line under [DEFAULT_SIZE] that says DefaultSize=*number*. Save the file, and the next time you launch 1-2-3, the changes will take effect. (Thanks to Joe Marrone, a reader from Lynhurst, New Jersey, for providing this tip.)

Graph Plots With Multiple Series

Q I'm using Quattro Pro for Windows to plot lab data. I need to set up a graph that compares several different variables on a single XY graph but can't figure out how [see **FIGURE 2**].

No matter how I try to plot these values, I get three lines with a point in

	A	B	C	D	E	F
1	VBL1		VBL2		VBL3	
2	mV	ppm	mV	ppm	mV	ppm
3	32	26.45	28	15.52	115	21.38
4	108	21.15	197	20.14	282	37.52
5	189	20.51	416	38.66	505	30.71
6	479	15.73	444	27.02	664	32.39
7	679	29.34	515	27.52	784	40.20
8	858	26.76	642	32.58	848	45.58
9	861	30.45	673	25.61	882	38.71

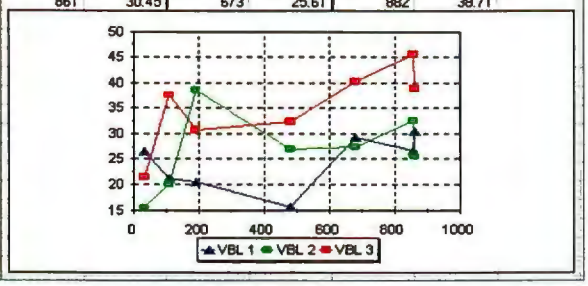

FIGURE 2: THE PROBLEM—DATA SERIES that plot incorrectly with common x-axis values.

	A	B	C	D
1			ppm	
2	mV	VBL1	VBL2	VBL3
3	32	26.45		
4	108	21.15		
5	189	20.51		
6	479	15.73		
7	679	29.34		
8	858	26.76		
9	861	30.45		
10	28		15.52	
11	197		20.14	
12	416		38.66	
13	444		27.02	
14	515		27.52	
15	642		32.58	
16	673		25.61	
17	115			21.38
18	282			37.52
19	505			30.71
20	664			32.39
21	784			40.20
22	848			45.58
23	882			38.71

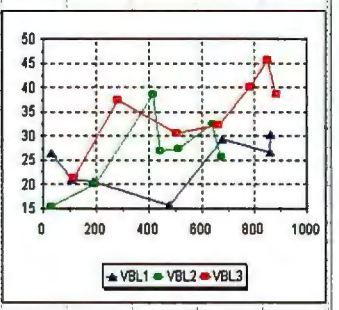

FIGURE 3: THE SOLUTION—SET UP the graph data series as shown to create a graph with three independent series.

each lined up at the *x*-axis values 32, 108, 189, and so on. How can I make each line plot independently?

Tom Williams, Pontiac, Michigan

A The answer isn't obvious, but it works in every spreadsheet program. Lay out the data as in **FIGURE 3**, with the values in column A arranged in ascending order within each variable group (exactly as shown).

Create an XY chart and set the graph data series as follows: The *x*-axis is A3..A23, the first series is B3..B23, the second is C3..C23, and the third is D3..D23. Note that the data series include the blank cells in columns B, C, and D. You'll end up with a graph like the one shown in the figure, with three independent series.

By Richard Scoville

Contributing Editor Richard Scoville is a training consultant in Chapel Hill, North Carolina. Spreadsheets *welcomes your questions (see page 12 for contact information).* ■

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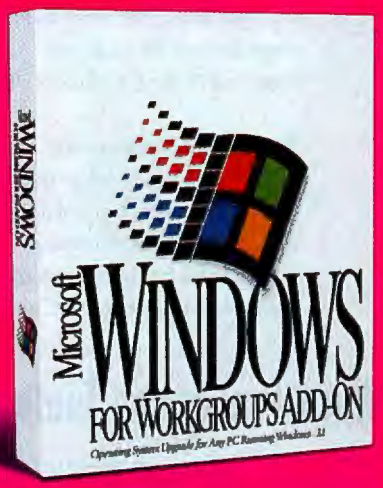

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WORD PROCESSING Q & A

Table Drag-and-Drop Problem in WinWord 6.0

Q I think I've found a bug in Word 6.0 for Windows. I created a three-cell by three-cell table, then used the *Table•Merge Cells* command to merge the top row into a single cell. Later, I needed to move the table, so I highlighted the cells with the mouse, and dragged the table to a new location on the page. After the move, two extra cells were attached to the right of the top row. What's the story here? Is there a way around this situation?

Emmanuel Okoye, Upland, California

A WinWord seems to have restored the two cells you deleted in the merge. I'd call that a bug, but not a serious one, since there's an easy solution.

Rather than selecting all the cells in the table with the mouse, position the cursor anywhere in the table and use *Table•Select Table* or press **<Alt>-<Num Pad 5>** to select the entire table. Then you can drag the table wherever you wish without seeing those extraneous cells.

A Clean Editing Screen for WinWord

Q Ami Pro lets you edit your document on a clean screen, with no menus, tool bars, or anything else to get in your way. That's great, but I use Word 2.0 for Windows, not Ami Pro. Is there a simple way to clear the screen in WinWord?

Dan Fulbright, Tulsa

A There sure is. You could use WinWord's View menu to turn off the tool bar, ribbon, and ruler. But to clear the screen completely, select *Tools•Options•View*. Add a check to the *Full Screen* check box, then click *OK*. Presto! You see nothing but your document. To get back to the normal display, press **<Esc>**.

If you upgrade to version 6.0 of WinWord, you'll find the same feature right in the *View* menu: Select *View•Full Screen*. To return to the normal display in 6.0, click the *Full* icon that floats on your clean screen.

So what happens if you want to issue a menu command while you're in full-screen mode without switching back to normal view? Just hold down **<Alt>** while you press the underlined letter for the menu you want—**E** for Edit, **V** for View, and so on. The menu will pop right up. If you can't remember the letter, press **<Alt>-F** to display the *File* menu, then use the left and right cursor keys to scroll across the menus until you reach the one you want.

Strange Keyboard Action in WordPerfect 5.1 for DOS

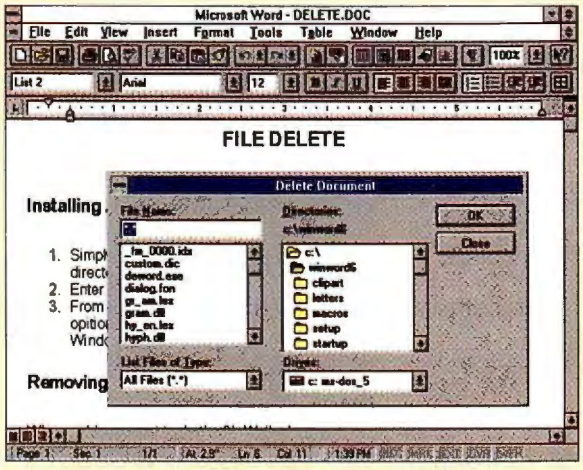
Q WordPerfect 5.1 has been acting very strange lately. I was away from my job for about six weeks, and while I was gone, my company hired a temporary worker to do my work. When I came back, though, I discovered that many of WordPerfect's keystroke commands didn't work any more. Nobody in my office has any idea what's happened. Do you?

Susan Angstrom, Buffalo

A What a shocking development! I suspect the temporary worker who took your place reconfigured your keyboard for you. He or she installed a customized keyboard file for WordPerfect 5.1 for DOS and never took it off.

Fortunately, fixing your problem is easy. To revert to WordPerfect's default keyboard setup, change to your Word-

Word Processing Toolbox



✓FREEWARE Even with all the great new features in Word for Windows 6.0, the program still doesn't have a delete command in the file menu. What you need is a copy of Gerald Henson's FileDelete. It's a WLL file, a special type of add-on enabled by WinWord 6.0. To install FileDelete, just copy the WLL file into the WinWord STARTUP directory. Once you do that, you'll find a delete command on the file menu. When you select it, you'll get the FileDelete dialog box; choose any file for deletion. Best of all the add-on is free. You can download it as WDDEL.ZIP on PC World Online (see page 12 for information).

USER GROUP TIP

Keeping Program Configurations

If you want to protect your WordPerfect 5.1 for DOS setup, back up the file WP{WP}.SET, which is located in the application's program directory. This file stores changes that you made in the WordPerfect Setup menu (reached by pressing <Shift>-<F1>); if you ever lose or damage it, you can restore it from the backup to reinstate your settings. You can also copy this file to another computer if you want to customize that system's settings quickly.

John Luzar
Anderson PC Users Group

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FIGURE 1: GET A LIST OF FONT SAMPLES in WordPerfect 6.0 for Windows with the included ALLFONTS.WCM macro.

Perfect directory, then start the program with the command **WP /X**. The /X switch will temporarily restore all WordPerfect defaults. To change back to WordPerfect's original keyboard layout for good, press **<Shift>-<F1>56<Enter>**. If you had your own custom keyboard layout, you can select it by pressing **<Shift>-<F1>5** and choosing your layout from the list. If you had a custom keyboard layout but can't find it on the keyboard layout list, the file containing the layout may have been moved or deleted. First, check your hard drive for all files with the extension WPK. If that doesn't turn up your layout file, you'll have to restore the file from a backup.

A Font List for WordPerfect 6.0 for Windows

Q Help! I have too many fonts, and the list gets longer every week. I thought of creating a document in WordPerfect 6.0 for Windows that would show samples of all my fonts, but it was just too much trouble. Could you create a macro to do this job and put it on PC World Online?
Anna Wilkins, Brooklyn

A I could write that macro, but there's no need to: WordPerfect 6.0 for Windows ships with the macro you're looking for. It's called ALLFONTS.WCM, and it creates a document that shows samples of every font on your system. You should be able to find ALLFONTS.WCM in the default WordPerfect macro directory (if the macro isn't there, do a custom installation now to copy WordPerfect's built-in macros onto your system). With the macro installed, select *Tools•Macro•Play*, and then press **<F4>** to display the list of macro files. Choose the *ALLFONTS.WCM* file and click *OK* and then *Play*. It will take a few minutes for WordPerfect to create the font sample document. When it's done, you can either print the document or keep a copy on your system to consult whenever you want to choose a font.

A Faxing Dilemma in WordPerfect 6.0 for DOS

Q I do most of my faxing with Delrina's WinFax Pro and a Class I fax-modem. As long as I'm using Windows, everything works just fine, but WordPerfect 6.0 for DOS is my word processor. I know it's supposed to handle fax-modems, but I can't seem to make it work. In fact, the Fax Services option is grayed out in the Print•Fax dialog box. The manual hasn't been much help. Can you tell me how to get this fax feature to work?
Jack Drooger, Hagerstown, Maryland

A You're right, the main manual's entry on Fax Services is pretty limited. "Appendix S" in your manual is more informative. It'll tell you how to install the FaxDirect software that shipped with your copy of WordPerfect. Read this appendix carefully and follow its instructions to the letter. You should also find README.FAX in your main WordPerfect program directory. It offers additional tips and hints. Load the file right into WordPerfect and print it out as a reference.

Mixing Bullets and Numbers in Ami Pro

Q I'm a heavy user of numbered lists in Ami Pro 3.01. I like the way Ami Pro handles these lists, except for one thing: Sometimes I need to embed a bulleted list inside a numbered list. When I do that, Ami Pro starts the numbers at 1 again after the bullets. I can't find a way to continue the numbering in sequence. Any ideas?
Dave Williams, Utica, New York

A Your problem comes from the way Ami Pro handles numbered list styles. It numbers items in the list sequentially until it comes to a different style, such as your bulleted lines. When you revert to a numbered list style, Ami Pro thinks you're beginning a new list and starts the numbering over again.

The solution to this problem is fairly simple, but not obvious. Rather than change to the bullet style right in your text, put your bulleted text in a separate frame. That way, you fool Ami Pro into thinking that the list is continuous. Here's how to proceed.

Start by creating your numbered list as you normally do, choosing a numbered list style. Then, with the cursor located where you want to insert a bulleted section, select *Frame•Create Frame•OK* to insert a default frame.

Now, right-click the selected frame to pop up the *Modify Frame Layout* dialog box. In the Placement section, select *Flow with text*. Click the *Size & position* option, then select *Clear Margins* to line up the text in the frame with your numbered list. You won't want any borders, so select *Lines & shadows*, then uncheck all options in the Lines section and specify *None* under Shadow. Finish by clicking *OK*. To position and size the frame the way you want it, just select the frame (if it's not already selected), then move and size it as you wish.

To enter the bulleted list in the frame, double-click inside the frame, then select a bullet style and type your list. Your bulleted list will appear in your text, but it won't disrupt your numbering sequence.

By George Campbell

George Campbell is a contributing editor for PC World. *He can be reached on PC World Online as PCW George.* Word Processing *welcomes your questions (see page 12 for contact information).*

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WINDOWS Q&A

Cheap Reminders

Q I'm supposed to do hand exercises twice a day for the next two weeks. Can you recommend a Windows program that will remind me?
Abraham Wraith, San Francisco

A No need to go shopping—the Calendar utility that comes with Windows does this trick for free. Depending on how you set it up, a Calendar alarm can flash its icon, beep, or even display a message. To make it work automatically, you must load Calendar and the accompanying file you create whenever you run Windows.

Here's how to turn Calendar into your digital nag: Double-click the *Calendar* icon; the program displays the daily calendar view by default. Place the cursor at the first hour of the workday and press **<F5>** to set an alarm. Press **<Cursor Down>** twice to move down 2 hours, press **<F5>** to set the second alarm, and so on. If you want to see a message when an alarm goes off, simply type in the text next to the appropriate time. You can repeat a message elsewhere by copying and pasting. To set alarms for each day in the following two weeks, press **<Ctrl>-<Page Down>** to display the next day, and repeat the steps outlined previously.

If alarms on the hour aren't precise enough for you, select *Options•Special Time*, type in the time (for example, **6:17**), specify a.m. or p.m., and click *OK*. If you want all alarms to go off a bit early, choose *Alarm•Controls* and specify an early ring between 1 and 10 minutes. While you're in the Alarm Controls dialog box, you can also tell Calendar whether an alarm should beep. When you're finished, click *OK*. Finally, save the calendar to a file and exit the program.

To automatically load both this file and Calendar whenever you load Windows, run File Manager, locate the file, click and drag it over to the StartUp group icon, and let go. A Calendar icon will be tucked into the StartUp window. If you want to keep Calendar out of the way when it loads, open the StartUp window, select the icon, and press **<Alt>-<Enter>**; in the Program Items Properties dialog box, click the *Run Minimized* check box, then click *OK*.

The next time you start Windows, the Calendar icon will appear minimized on the desktop. When an alarm goes off, the icon will flash—and make a sound if you chose that option. To turn off the alarm, click the icon once; to view your personalized message, double-click the icon. If you specified a sound alarm but it doesn't go off, Windows may not be set up to play back sounds. Open the Control Panel, double-click the *Sound* icon, and make sure *Enable System Sounds* is checked.

Relocating Bit Maps

Q I want to move all the bit-map (BMP) files out of my crowded WINDOWS directory and into a directory of their own. But if I move the bit maps, can I still use them as wallpaper?
Judy DeVos, Cincinnati

A You bet. You can move the bit maps to any existing directory or create a new directory in File Manager with *File•Create Directory* and move the files there.

To select your wallpaper image, launch Control Panel, then open the Desktop option and locate the Wallpaper section. Although the Wallpaper drop-down list shows '(None)', you can specify a wallpaper image by typing its path and file name using DOS conventions. For example, if you want to display the zigzag bit map that you moved to your D: drive's PIX directory, type **D:\PIX\ZIGZAG.BMP**, press **<Enter>**, close the Control Panel, and you're finished.

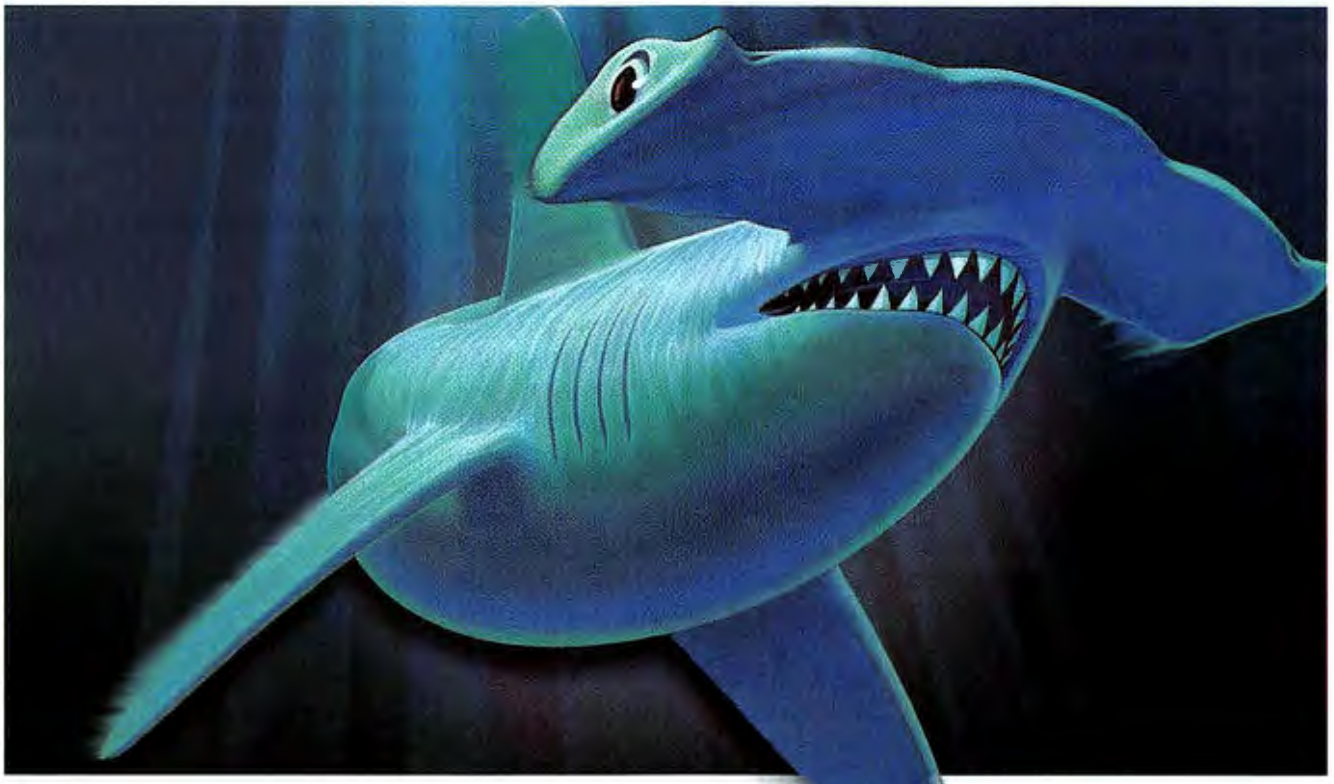
Nudging Wallpaper

Q Control Panel only lets you center or tile wallpaper images. I'd like to keep Program Manager on one side of the screen and my wallpaper picture on the other side. Can I do this?
MaryAnn Saunders, Buffalo

A Sure enough—and it only takes a quick change to the WIN.INI file. You just specify how far down and over,

Windows Toolbox

It's great that Windows lets you run DOS programs, but copying and pasting data between windows is a drag. Instead of digging through the DOS window's control menu for the Edit • Mark • Copy • Paste commands, try Fast-Paste instead. For a measly $10, this shareware offering reprograms your mouse's buttons in DOS windows so that selecting with the left button copies, while clicking with the right button pastes. (You can assign these options to middle buttons as well.) You can even configure Fast-Paste to remove the carriage return from the end of pasted text. If you normally use the mouse to run your DOS application, a quick click can deactivate Fast-Paste. Download PASTE113.ZIP from PC World Online and other online services (see page 12 for information), or contact Robert F. Nee, 201/798-1344. Reader service no. 710



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PC MAGAZINE EDITORS' CHOICE
November 23, 1993
QMS 860 Print System

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PASTE YOUR WALLPAPER WHEREVER YOU WANT—just add the proper horizontal and vertical coordinates to your WIN.INI file.

in pixels, the image should appear.

First, make a backup copy of WIN.INI to be safe. Next, in Program Manager, open WIN.INI by choosing *File•Run*, typing **WIN.INI**, and pressing **<Enter>**. Locate the [Desktop] section and add the following two lines:

WallPaperOriginX=10
WallPaperOriginY=10

The numbers specify horizontal and vertical screen coordinates respectively. For example, on a VGA setup, entering 0 for *x* and 0 for *y* would place the image in the center of the screen. Using the coordinates 1,1 would place the image flush left at the top of the screen. The results, and the coordinates, will vary depending on your video mode and resolution. You'll have to play with these numbers until you find the combination that works best.

While you're in the [Desktop] section, you might as well specify your wallpaper file. Find the line that begins 'Wallpaper=' and type in the path and name of your file, such as **Wallpaper=c:\PIX\akbar.bmp**. Save WIN.INI and exit and restart Windows. If the picture isn't in the right place, experiment with different *x* and *y* values.

Reconstructing Notepad Defaults

Q How can I change Notepad's default margins permanently from .75 inch to .25 inch?
Joseph Li, Boston

A You do this by using Windows Write to change the margin values in Notepad's executable file. The only limitation? When you modify an executable file, the new values must be *exactly* the same character length as the ones you replace. In this case, that means the left and right margin values must be three characters long (counting the decimal point) while your top and bottom margins can be only one digit each (1, 2, and so on).

Here's how. First, make a backup copy of NOTEPAD.EXE to be safe. Then start Write, open NOTEPAD.EXE, and click *No Conversion*. Since you want to change just the left and right margins, choose ▶

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Find•Replace. In the Find What text box, type **.75**; for Replace With, type **.25**. Click *Replace All*, then *Close*.

Note: If you also want to change the default top and bottom margins, which are set at 1, don't use the Replace command. There are oodles of 1s in the file, so you must be careful to change only those that set the top and bottom margins. To do that, search for unique characters that are located nearby in the file, such as the left and right margin values. Select *Find•Find*, type **.75** (or whatever you have set the margins to) in the Find What text box, and click *Find Next*. Locate the swatch of code that looks like this:

Page &p • .75 • .75 • 1 • 1

Change each 1 in this passage to 2 or 3, or any other single digit.

When you have finished making the changes, save and exit Write. The next time you start Notepad and choose File•Page Setup, you'll see your new default margins in place.

Hiding Out

Q Sometimes at lunch I play Solitaire on my PC. But if my boss walks by, I don't want her to get the wrong impression. If I minimize the program, the Solitaire icon still sits on the desktop, giving me away. How can I hide a Windows icon on the desktop? P.S. Don't print my real name!
Joe Worker Bee, Austin, Texas

A Well, we're always happy to do our part to boost American productivity. The simplest ruse is to run Program Manager maximized (filling the screen), then run Solitaire. When you minimize Solitaire, the icon will automatically be hidden behind Program Manager. You can also press **<Alt>-<Tab>** to bring some other maximized application front and center.

But, if you're one of those people who like to see their desktop and wallpaper and so on, you can hide that Solitaire icon behind another icon.

First, minimize Program Manager so you can see the entire desktop. Then launch any business application. This is your camouflage program. Minimize this program and position its icon in the lower-left corner of the screen. If an icon is already there, move it out of the way. Then press **<Ctrl>-<Esc>** to display the Task List, and click *Arrange Icons* to make things tidy. Finally, launch Solitaire, minimize it, and place its icon on top of the business icon you put in the lower-left corner. Double-click the *Solitaire* icon to restore its window. Then next time you minimize the window, the Solitaire icon will disappear behind your camouflage icon.

To restore Solitaire, use the **<Alt>-<Tab>** shortcut. When the boss wanders by, minimize Solitaire again and it will vanish. As long as you don't move, maximize, or restore the camouflage icon, your Solitaire icon will remain hidden. Now just act nonchalant.

By Scott Dunn

Scott Dunn is a contributing editor for PC World *and coauthor of* 101 Windows Tips *(Peachpit Press, Berkeley, California, 1992).* Windows Q&A *welcomes your questions.* *See page 12 for contact information.*

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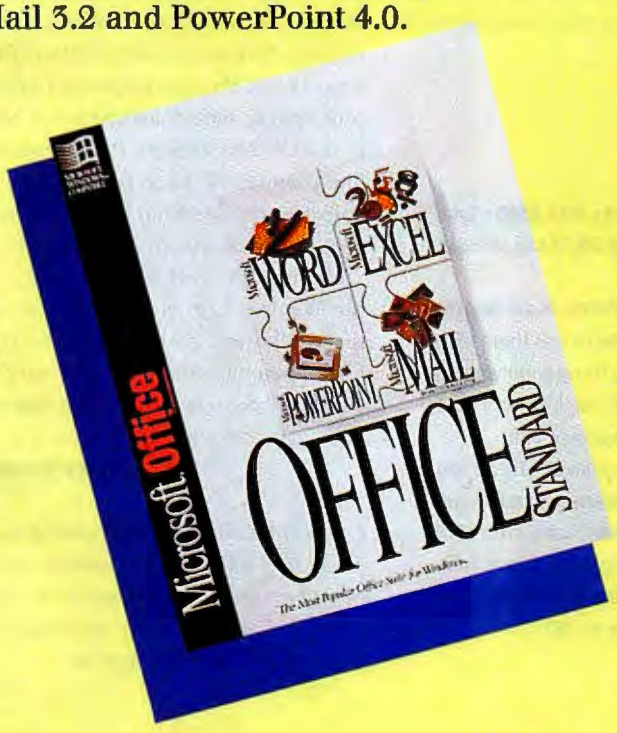

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OS/2 Q&A

OS/2 for Windows Compatibility

Q Can I install OS/2 for Windows from my 3½-inch B: drive? Also, before I upgrade, are there any compatibility problems with DOS or Windows that I should know about?
Stephen P. Shierling, CompuServe

A Sorry, but you have to boot OS/2 from a floppy before you can install it, and there's no way to boot from drive B:. Luckily, there's a 5¼-inch version of OS/2 for Windows available.

Since OS/2 for Windows actually runs the Windows that's already on your computer, virtually everything is compatible with it. Here are the only incompatibilities I know of:

Disk compression: OS/2 doesn't support DOS 6's DoubleSpace; decompress any DoubleSpace volumes before installing OS/2. However, there's an OS/2 version of Stacker. • *Stacker for OS/2 and DOS 1.1 $139.95; Stac Electronics; 800/522-7822. Reader service no. 761*

VxDs: OS/2 doesn't work with any Windows program that uses Virtual Device Drivers (VxDs). That includes Windows for Workgroups, Visual C++, and some parts of Norton Utilities 8.0. Fortunately, there are very few other Windows programs that use VxDs.

Memory managers: OS/2 doesn't need memory managers, so the fact that they don't work with it is no problem.

Fonts: Your Windows TrueType fonts will work in Windows applications that are running under OS/2, but not in native OS/2 applications (see "From Windows to OS/2".)

Word 6.0 for Windows: WinWord can't find its help files when running under OS/2. Other than that, it works fine.

OLE: Neither version 1 nor 2 works between separate Windows sessions in OS/2, but both work fine for programs running in the same Windows session.

Quick Access From the Desktop

Q I have several utilities that I want to access easily, but I don't want to clutter the desktop with more icons. Can I add them to the Window List?
Janet King, Atlanta

A If you add your programs to the Window List, OS/2 will launch them whenever you boot. But every running application takes resources away from the system, so it's not a good idea to put too many programs there.

A better solution is to add your utilities to the Desktop's pop-up menu (the menu that appears when you right-click the desktop). That way you can get to them quickly and easily without running the utilities all the time.

To add items to the desktop's menu, open the Desktop Settings notebook by right-clicking the desktop, clicking the Open arrow, and selecting *Settings*. Then click the *Menu* tab in the Settings notebook. Under Available Menus, make sure the Primary pop-up menu option is selected.

Then right-drag the appropriate icons from their folders to the Actions on Menu list box. Close the Desktop Settings notebook by double-clicking the icon in the upper left corner. Now when you right-click the desktop, the Desktop menu comes up and your application is listed at the bottom.

But when you start your application, you may get an error message about an incorrect command line parameter. That's because OS/2 sends the desktop's directory name (usually C:\DESKTOP) to the application as a parameter. Some programs may object to this, although it shouldn't cause any real problems. To get rid of the error message for good, create a copy of your application object by **<Ctrl>**–right-dragging it. Then open its Settings notebook by right-clicking the object, clicking the Open arrow, and selecting *Settings*. On the Program page, enter a percent sign (**%**) in the Parameters text box to tell OS/2 to truncate the command line parameters. Then drag your new object to the Desktop Settings notebook as described above.

If you really want to add a utility to the Window List, create a shadow of the application in the Startup folder. First open the Startup folder inside your OS/2 System folder, then **<Shift>**-**<Ctrl>**–right-drag the utility's icon to it.

By Lou Miranda

Lou Miranda is a PC World *contributing editor and an OS/2 programmer and consultant based in Minneapolis–St. Paul. OS/2 welcomes your questions (see page 12 for contact information).*

From Windows to OS/2

Fun With Fonts

Windows 3.1 uses TrueType to give you scalable fonts, while OS/2 comes with Adobe Type Manager. The complicated part is that Windows programs running under OS/2 can still use TrueType fonts, but native OS/2 applications can't.

If you're going to use OS/2 applications, you need PostScript Type 1 fonts—the kind ATM can read. Type 1 fonts are widely available, but how easily you'll be able to use them with your Windows applications depends on the version of OS/2 you're using. The regular version of OS/2, which has Windows code built in, includes a version of ATM for Windows that allows you to use the same PostScript fonts in your Windows and OS/2 applications.

OS/2 for Windows, on the other hand, comes with only the OS/2 version of ATM. If you want the Windows version, you have to buy yourself a copy of ATM for Windows. Actually, you may already own one: Many Windows programs, including most from Lotus, come with ATM bundled in (although your version may not be the most recent). Another option is to use TrueType fonts for your Windows apps and PostScript fonts for your OS/2 apps. • Adobe Type Manager version 2.6 $149; Adobe Systems; 800/833-6687. Reader service no. 763

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DATA MANAGEMENT Q & A

Carry On dBASE

Q Following your suggestion in "Getting dBASE Ready for Work" (January 1994), I placed the SET CARRY ON command in my start-up program. Now when I try to enter data, dBASE brings up the last record in my data file. This doesn't do me any good at all. Also, in one of your programs you put a SELECT command after a USE command. According to a dBASE book I consulted, SELECT should come before USE.
Eric M. Davitt, Toronto

A That's not an old record you're seeing: If the SET CARRY option is ON when you APPEND, dBASE makes the new record a copy of the previous one. This is a wonderful timesaver if you're entering records that contain a lot of repeating values. But if that isn't your situation, take the SET CARRY ON command out of your start-up program.

About SELECT: dBASE lets you open more than one data file at a time, and it keeps track of these files by putting each in its own *work area*. You use the SELECT command to move from one work area to another. By default, dBASE is in work area 1 when you start the program. Thus, you can employ the USE command to open a file without first selecting a work area.

To open another data file without closing the active file, use **SELECT** followed by a number, as in **SELECT 2**. Then enter a **USE** command to open the second file. To go back to the first file you opened, enter **SELECT 1**.

Special Characters in dBASE

Q I'm trying to print the British pound sign (£, ASCII 156) as part of a character field in a dBASE report. I discovered that I could display it on screen from the dot prompt by entering the string '? CHR(156)', but this doesn't work in a field.

Borland technical assistance suggested holding down <Alt> and typing in 156, but this doesn't work either. Can you help me?
Richard H. Byne, San Antonio

A Borland's tech support staff was essentially correct, although from your letter it sounds as if they may have failed to include some important information. But whether you can print the character once you have entered it depends on your printer.

To enter the British pound sign, hold down **<Alt>** as you enter **156** *on the numeric keypad* (using the typewriter number keys won't cut it). If you use a notebook computer that lacks a separate numeric keypad, a special function key probably turns some regular keys into a number pad.

Once you see the pound sign in your file, the next challenge is to put it in your printed reports. The problem is, when using high ASCII codes—those above 127—not all printers print the same characters. Depending on which character set your printer uses, you may get a different character or a blank in place of the one you want. If this happens, check your printer manual; there may be a way to specify either the IBM character set (the one DOS uses on screen) or an ASCII code in its native set for the pound sign.

Sorting Out Sorts in Paradox

Q I use Paradox 3.0 at home and at the office. When I try to load a table that I brought from work on my home PC, or vice versa, I get the unsettling error message 'b:Htdist table and index based on different sort orders', and I can't access my table. How can I get around this problem? I certainly hope I can use the same data on both PCs.
Kerry Munson, Plano, Texas

A You're getting that message because your two copies of Paradox were installed using different sort orders. Paradox's sort order, which is set when you install the program, determines the order of data when you sort it and affects the way a table's index is created. You can fix the problem easily by reinstalling one of the copies and changing the sort order as you do so. The country you specify during installation determines the sort order.

Before you reinstall one copy of Paradox, find out what sort order the other uses: In your Paradox directory, enter **TYPE PARADOX.SOR** at the DOS prompt. A message will appear that looks something like 'Paradox "ascii" sort definition version 3.0'. The part in double quotation marks is the sort order; "ascii", for example, is the sort order for the United States.

Be aware that once you change the sort order, you'll have to reindex any keyed tables. For each table, delete its PX file using DOS. Then use *Modify•Restructure*, mark the key fields with asterisks, and press **<F2>**.

Adding a Pick List to an Access Form

Q I created a data entry form in Access for a table of customer service records. I'd like this form to display a pick list of valid customer numbers. Can you tell me how to do this? Also, is there a way to show customer names and numbers on the list?
Cindy Turner, Atlanta

A When you're designing an Access form, you can use the List Box tool to create a pick list of values stored in another table. Then, by changing the properties sheet for the box, you can have Access include more than one field from the table of lookup values. For this example, I'm assuming that your customer number, last name, and first name fields are the first three fields of your customer table. If they aren't, restructure your table so that they are. I'm also assuming that you have already defined a relationship where the link between your table of customer service records and your customer table is the customer number field.

With your form up in Design mode, open the field list window by clicking

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the *Field List* icon on the button bar (if the window is already open, skip this step). Next, click the *List Box* icon in the Toolbox. Click your customer ID field name within the field list window, then drag the mouse to the place on the form where you want the list box to appear. Release the mouse button, and resize the new box to make it wide enough to show the customer number and name fields.

Next you must add the name fields to the pick list. Double-click the border of the new list box to open its properties sheet. Click the Row Source text box and select the name of your customer table from the resulting pick list. Then press **<Tab>** to go to the Column Count text box, and enter **3**. This tells Access to show the first three fields of the customer table on the pick list.

You may also want to change the list box's caption. Click the label to the left of the list box. The property sheet will now show the label's properties. Change the Caption entry to something more descriptive, like **Customer**.

Once you've made these changes, select *View•Form* to see the form in action. You'll be able to scroll through the list to select the desired customer for each new record.

If you'd prefer not to give up precious real estate for the open list permanently, use the Combo Box tool—which gives you a drop-down list—instead of the List Box tool. If you choose this option, be sure to change the properties sheet setting for 'Limit To List' to *Yes*. This way, you can be sure that no one will enter new customer numbers from this form.

Getting Totals With Approach

Q I use Approach to track the temporary employees in my department, noting how many hours each temp works each week. I set up a form for entering information about each person into two data files. The main table is called TEMPS; another table called HOURS is joined to TEMPS using an ID number.

The form works okay, but I can't get a report with a separate total of all the hours worked to date by each person. I created a new report with a summary, but my summary total field always turns up blank. How can I get the totals?

Ann Werner, San Francisco

A If you get blank totals on screen when you switch to Browse, make sure *File•Preview* is checked. If it's not, Approach won't show your summaries on screen.

If the totals won't print, your calculated field may not be designed properly. Select *View•Design* and double-click your calculated field. In the resulting dialog box, click *Field Definition*, then *Options*. In the 'Summarize on' pick list at the bottom of the new dialog box, select *Report #: Trailing summaries for...*, where # is the number of your report.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World *and the author of* The Paradox 4.0 Handbook *(Bantam Computer Books, New York, 1992).* Data Management *welcomes your questions. See page 12 for contact information.*

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Remote to Remote	Yes	No	No	No
LAN to Remote	Yes	No	No	Yes
LAN to LAN	Yes	No	No	Yes
Remote Connectivity Sync, ISDN, X.25 (In addition to ASYNC)	Yes	No	No	Yes
LAN Application Interfaces NetBIOS, NetBEUI, 802.2 (In addition to IP and IPX)	Yes	Yes	Yes	No
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PUBLISHING & PRESENTATIONS Q & A

No-Sweat Graphics for Publisher

Q I want to import an image I created in Windows Paintbrush into a Microsoft Publisher 2.0 document. Once it's in my document, I may have to edit it, but I don't want to mess with the original image and then reimport it. So far, I've been unable to copy and paste the image from Paintbrush into a Publisher picture frame. Can you please describe in simple terms how to import and edit the image?
Sam Neiditch, San Diego

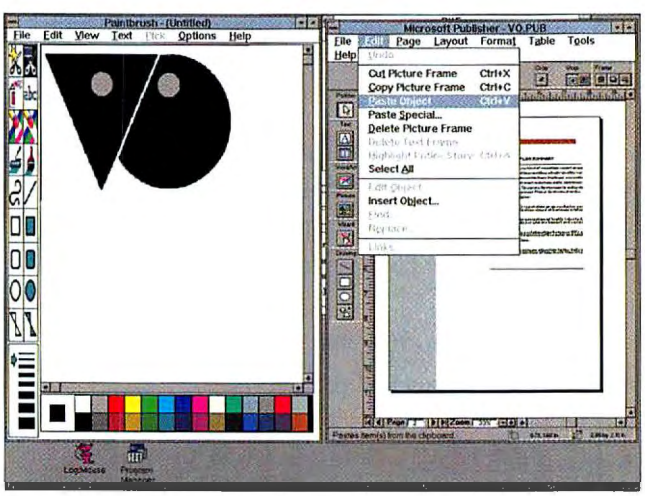
A Using the Windows Clipboard to copy a Paintbrush image into a Publisher document is a good idea if you intend to edit the image after you paste it. That's because you can paste the image as an *embedded object*, which makes it easier to use Paintbrush's tools to change the image later on. You can also paste the image as a *linked object*. The key difference is that changes made to an embedded object change that object only, whereas changes made to a linked object also change the original file. Since you don't want to change the original Paintbrush file, we'll just focus on pasting embedded objects this time. Here's how to do it:

Start both Paintbrush and Publisher. In Paintbrush, load the image you want to paste. Select the *Pick* tool (the scissors and rectangle) and use it to draw an outline around the image you want to paste. Select *Edit•Copy*. Now switch over to Publisher, go to the publication and page where you want to paste the image, and select *Edit•Paste Object*. Publisher will create a picture frame and paste the image from the Clipboard into the frame as an embedded Paintbrush Picture Object.

That's it. You can now move, resize, and crop the Paintbrush image just as you would any other graphic in a Publisher picture frame.

To edit the embedded picture, choose the *Selection* tool (the arrow), then double-click the image. Paintbrush will start up with the image loaded and ready to edit. After you've made your changes, select Paintbrush's *File•Update* and then *File•Exit & Return* to close Paintbrush and return to your Publisher document.

A final tip: You can also use Windows' drag-and-drop capabilities to import graphics files into a Publisher document. Just open File Manager alongside Publisher, use the directory window to locate and highlight a graphics file you want to add, then drag it from File Manager onto a page in your Publisher document. You can also select a group of files manually (hold down **<Ctrl>** as you click each file). Or you can use File Manager's *File•Search* command to locate multiple files in different directories and then drag and drop them from the Search Results window. However, you should be aware that this drag-and-drop technique won't embed the images in your publication the way the technique outlined above does. Use the drag-and-drop method only if you will not need to edit images once they're in your document.



EMBED GRAPHICS IN MICROSOFT PUBLISHER DOCUMENTS by copying them in the original app, then pasting them as objects.

Lost in the Freelance Zone

Q Help! I sent a Freelance Graphics 2.0 presentation (PRE) file on a disk to a friend who has the same version of Freelance, but when he opened the file, a scanned image was missing. Yet on my system, the image shows up just fine. What's wrong?
Jim Brulet, Berkeley, California

A Nothing you can't easily fix. You forgot to tell Freelance to include the image itself in the PRE file, so Freelance saved a reference to the image file's location on your computer. When your friend opened the presentation on another system, Freelance couldn't find the referenced image file and reported it missing.

There are two solutions to your problem. First, you could just send your friend the missing file on a disk and have him copy it to his hard disk. The only problem: If the file was originally in, say, your C:\FLW\WORK subdirectory, your friend will have to put the file in a subdirectory with the same name or Freelance won't know where to find it.

The second solution is a tad more elegant since it doesn't require any extra work on your friend's part. Tell Freelance to *embed* the image in the PRE file rather than merely saving a reference to its file location. Here are the steps:

1. Start Freelance and open your presentation. Go to the page that contains the scanned image, select it with the *Selection* tool, and delete it by selecting *Edit•Cut*.

2. Select *File•Import*, then select the file containing the image you want to import. Next, check the Include Image With File box, and click *OK* to finish importing the file.

3. Move, resize, or manipulate the imported image as necessary to restore its original position on the page. When finished, select *File•Save*.

Now you can copy the PRE file onto a disk and send it off. Although including embedded images in a presentation

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makes a PRE file much larger, it'll be a lot easier to copy and move your show from one location to another.

OCR Scanning Banishes Retyping

Q I've used Picture Publisher 4.0 with a desktop scanner to scan invoices and sales orders for filing. Now I want to use my scanner to import text from printed reports into a company newsletter. Can I do this?
D. Pham, MCI Mail

A If you don't need to edit the text in the documents you're scanning, you can continue using Picture Publisher for electronic archiving. But if you want to edit or reformat the text in a document after you've scanned it in, you need optical character recognition software.

The great thing about OCR software is that it eliminates the drudgery of retyping typewritten, faxed, photocopied, and dot matrix– and laser-printed documents. OCR automatically converts scanned text into editable, searchable, electronic text. Most OCR software can also save converted text in the file formats of many popular word processing, desktop publishing, spreadsheet, and database applications.

This is not to say OCR software is a perfect technology. You can expect to correct at least a few mistakes on every page. But even with these corrections, it should take you far less time and effort to import text through a scanner and OCR program than it would to retype a stack of printed pages from scratch.

Depending on your budget and needs, there are several OCR products to choose from, ranging from low-end packages costing about $100 to high-end packages that will run you $700 or more. For the kind of general OCR work you want to do, two of the best Windows packages are Caere's OmniPage and Calera's WordScan.

Both of these programs are available in multiple versions of varying degrees of sophistication. OmniPage Direct and WordScan are good for importing straight text from legible originals. OmniPage adds the ability to import graphics and better support for documents containing mixed fonts. OmniPage Pro and WordScan Plus add the ability to read poor-quality originals plus bells and whistles such as spelling checkers. OmniPage Pro and WordScan were chosen by *PC World* readers as the top OCR software products in last year's World Class Awards.

One bit of buying advice: Whichever package you decide is right for you, be sure it supports the scanner you'll be using.

- **Omnipage Direct** $119, OmniPage Pro 5.0 $695, OmniPage 5.0 $495; Caere Corp.; 800/535-7226, 408/395-7000, 408/395-1994 (fax)
  Reader service no. 616
- **WordScan 2.0** $249, WordScan Plus 3.0 $595; Calera Recognition Systems, Inc.; 800/422-5372, 408/720-1330 (fax)
  Reader service no. 617

By Richard Jantz

Contributing Editor Richard Jantz is an electronic publishing and presentations consultant in Berkeley, California. Publishing & Presentations *welcomes your questions and makeover candidates. See page 12 for contact information.*

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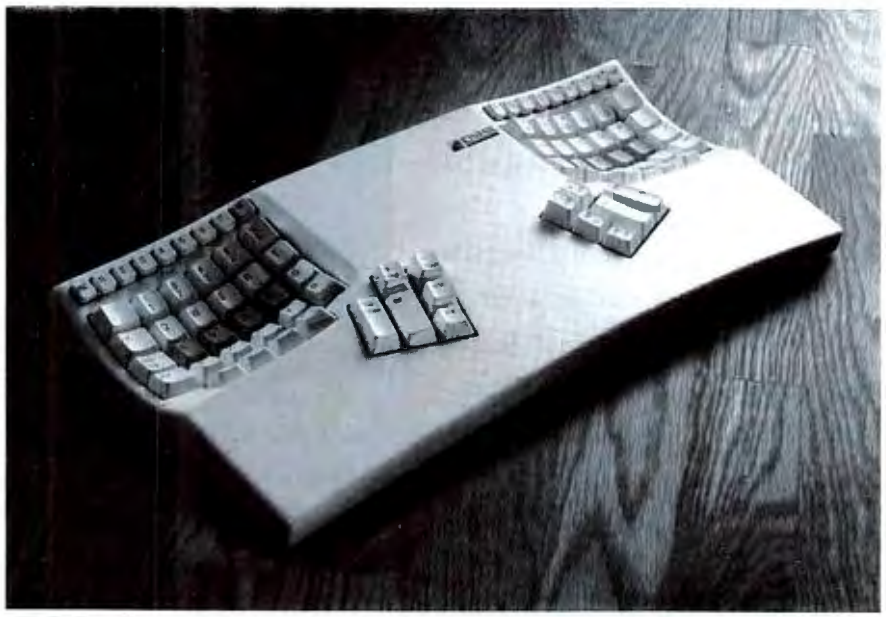

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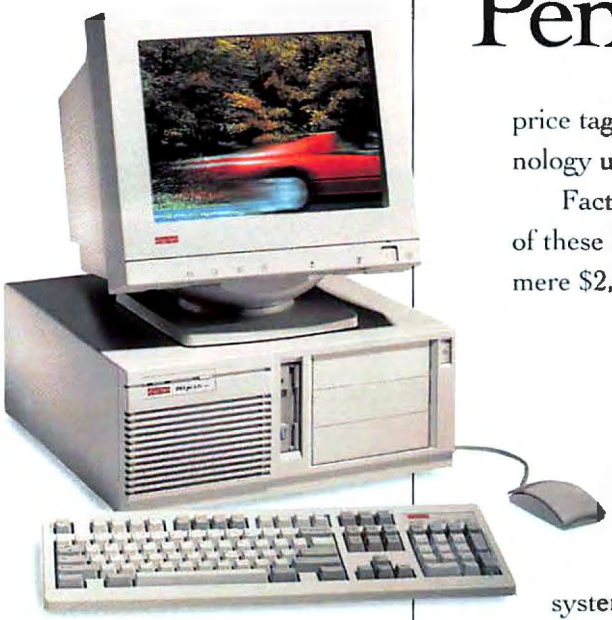

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COMMUNICATIONS Q&A

Clearing Up the Gibberish Bit Stream

Q What's the difference between bps, baud rate, and cps?
William Cai, Bethesda, Maryland

A The term *bps* stands for bits per second. It's a measure of the number of data bits that a modem transmits over a phone line. Modem speeds are measured in bits per second, as in 2400 bps or 14.4 kbps.

Baud rate is often used to refer to bps, but technical purists—and old-timers like myself—blanch at this because the two measure different commodities. Baud rate is a measure of the number of *signaling elements* (electrical pulses) that are transmitted over a communications line, while bps is a measure of the *information elements*. However, in common usage this distinction has become blurred, and baud rate is now synonymous with bps.

Whichever measurement a vendor uses, look out for the phrase *effective throughput*. Effective throughput is nothing more than a theoretical, pie-in-the-sky estimate of how fast a modem might be able to transmit data should the phone line be perfectly clear, the receiving computer ultrafast, and the file type and protocol optimal.

While bps and baud rates measure the speed of modems, *cps* (characters per second) measures the speed of file transfer protocols such as ZMODEM and XMODEM. When you download a file from a bulletin board service or an online service, a box will usually pop up on screen and tick off a list of statistics about the transfer. This is where you'll see the cps rate.

Savvy telecommunicators keep an eye on the cps rate during file transfers. If the cps rate isn't as high as experience suggests it should be, they tweak things a bit by boosting their computer's port speed, deactivating the modem's compression (if the file they're transferring is already compressed), or changing to a different protocol before they try another file transfer.

Supersonic File Transfers

Q I'm on a scientific drilling ship off the coast of Greenland and have to transfer 100K files every day by satellite to a computer at Texas A&M University. Since satellite time costs $10 per minute, I need to make my file transfers as fast as possible.

I'm currently using the Blast transfer protocol, which performs bidirectional transfers. We are using U.S. Robotics' Dual-Standard HST 14.4-kbps modems at each end. Both the sending and the receiving computers have high-speed serial ports with 16550 UARTs and 8K buffers. The files are compressed with PKZip, and the modems' data compression is turned off. Can you suggest anything else? Any protocol we use should be bidirectional so that we can save time by sending and receiving files simultaneously.

P.S. By the time this appears in print, the ship will probably be in Barbados.
Lew Weingarth, Internet

A Sorry about the delay in response. I've been trying to convince *PC World* that this is one comm problem I need to troubleshoot in person—preferably in Barbados. I've got my beach bag ready, stuffed with alligator clips and my handy waterproof modem command chart, but so far it's been a no-go.

It sounds like you've done just about everything you can to make your transfers as fast as possible. However, I do have a couple of suggestions that might help you speed things up even more.

First, try using the HS/Link file protocol. It's bidirectional, faster than even ZMODEM (especially on noisy lines), and offers great error correction and crash recovery. It's also tolerant of delays, which means it will work with satellite transmission. In fact, the Canadian Coast Guard uses it to communicate with its ships at sea through a cellular link. Unfortunately, HS/Link is not built into any communications programs. You can download it direct from The Tool Shop BBS at 213/851-2127 or as HSLINK.ZIP from PC World Online and then add it to your communications software. Fortunately, this isn't hard to do; you can download specific instructions for your software from The Tool Shop BBS. Shareware registration for HS/Link is $20, for the Procomm for Windows version $25. For more information, call The Tool Shop at 213/851-9969 or contact author Sam Smith on CompuServe at 71150,2731.

Look out for the phrase effective throughput. It's nothing more than a theoretical estimate of how fast a modem might be.

Second, be sure to disable your modems' HST mode if you haven't already done so. In HST mode, the modem sends files in one direction at 14.4 kbps, while receiving data through a second channel at 4500 bps. You'll find the command to disable HST mode in your manual.

Finally, check out one of Hayes's new 28.8-kbps modems. They use the Rockwell-Hayes–designed V.fast-class chip that's serving as an interim between V.42 and the not-yet-announced V.32 high-speed standard. They clock top speeds under all latitudes and sunspot conditions and will be compatible with future V.32 modems. They should be available for around $450 on the street. Hayes also sells them for $288 in a special BBS SysOps' deal.

- **Optima 28.8 V.FC+Fax** $579; Hayes Microcomputer Products; 404/441-1617
  Reader service no. 780

By Judy Heim

Judy Heim is a contributing editor for PC World *and the editor of* Online Investor, *a newsletter about using online services to manage investments.* Communications *welcomes your questions (see page 12 for contact information).*

HARDWARE Q&A

Directory Double Take

Q I have a problem with my floppy disk drive. When I change disks and type DIR, I get a directory of the previous disk. Do I need a new floppy drive?
Jonathan Bishop, Greenwood, Indiana

A Not at all. Like a surprising number of systems, yours can't detect that a disk has been replaced. When you swap disks and run a DIR, the system assumes you're asking for a directory listing from the same disk. So instead of reading from the floppy again, it saves time by reeling off the previous listing, which is already in memory. This problem affects any application (Windows' File Manager, too) that reads directories, and it can damage data if the first disk's directory is written to the second disk. Fortunately, the solution is simple: Change drives (to **C:**, for example) after you insert the second floppy, then change back to your floppy drive.

Old PCs and Fast Modems

Q Do I need a 486 PC to use a 14.4-kilobits-per-second fax-modem, or will my 286 suffice?
Steve Lapommeray, Quebec, Canada

A You don't necessarily need a 486, but whether you can use a 14.4-kbps modem with your old 286 depends on whether you buy an internal or an external model. Why? Because the serial ports on older PCs (like yours) can't keep up with high-speed modems. However, this is a problem only with external models, since internal modems come with their own serial ports. The bottom line: An internal 14.4-kbps model should work in your PC.

If you don't have a free slot for an internal modem, there's still hope. The heart of any serial port is its Universal Asynchronous Receiver-Transmitter (UART) chip, and in many PCs this chip fits in a socket and is replaceable. Older systems usually come with an 8250 or a 16450A UART; you want a 16550A. To find out what kind you have, check your manual, call your vendor, or fish around the motherboard near the back of your PC to find a chip with 8250 or 16450 on it, and see whether it's in a socket. You can buy a replacement UART chip from most mail-order houses for about $15.

Bust That Dust

Q My computer lives in a very dusty environment. I'm worried the fan is sucking dust inside, where it will accumulate and do damage. Should I get inside and vacuum with the DustBuster?
Jeff Jones, Middletown, Ohio

A Do it! Dust inside your PC keeps things running hot, and heat is the enemy of all electronic components (especially if you turn your system on and off more than once a day, since temperature *change* does the most damage). Dust clogs your PC's air passages, making the cooling fan less efficient.

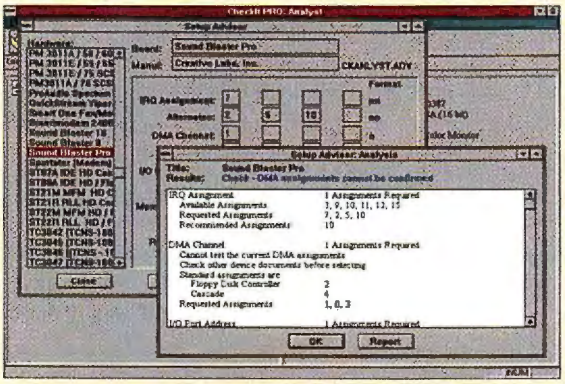
As anyone who's ever had a tape deck for a while can tell you, dust also causes problems with read/write heads. Enough buildup can actually cause floppy drive errors and damage floppy disk surfaces. So by all means, use a portable vacuum. It's much better than a piece of cheesecloth or a can of compressed air, both of which move dust around more than they remove it.

If you're really wallowing in filth, you might want to check out industrial PCs designed for environments like yours. They have sealed cabinets, and filters over the air intakes, not to mention membranes over the keyboards to keep dust from getting in the way of key contacts. Texas Microsystems (713/541-8200) is one company that specializes in this type of PC, offering a full line of battle-hardened systems.

The Best Way to Swap Hard Disks

Q I'm thinking about replacing my old 212MB hard disk with one that holds 400MB or more. Should I back

Hardware Toolbox



Most diagnostic utilities test your PC exhaustively, give you a load of information on system settings, and try to impress you with an unintelligible memory map. TouchStone Software's CheckIt Pro: Analyst will do all these things, if you like—under DOS, Windows, or OS/2—but it also offers more commonsense advice on how to prevent problems than any other program I've seen.

What makes CheckIt Pro: Analyst worth its $85 street price is a routine that recommends configurations for expansion boards before you install them. The trick lies in a database of settings for 103 different boards and system requirements for more than 1800 software packages

Keep in mind that software diagnostics is an inexact science. The manual admits that you may get different results running under DOS than under Windows. (Under Windows, after CheckIt Pro collected its info, my mouse cursor disappeared until I rebooted, and the program still maintains I have a temporary swap file when in fact I have a permanent one.) This is par for the course for diagnostic utilities, because software can't reliably detect all the settings on ISA bus systems. The only foolproof way to avoid conflict is to keep the documentation for every expansion board and make sure you write down every setting. TouchStone Software; 800/531-0450, 714/969-7746. Reader service no. 751

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up my data on tape and restore it on the new hard disk? Or should I install the new drive as drive D:, copy the data onto it, unhook the old drive, and reconfigure the new drive as drive C:?
Roland Soe, Indianapolis

A You should always back up your data before you change hard disks—what if your new drive had problems, and you damaged the old one as you removed it? I suggest you use the tape backup method. Copying data from drive to drive would be faster, but configuring the two drives to work in the same system could easily become time-consuming. And that's *your* time we're talking about, not the PC's.

At $200 or less for a basic model, a tape backup is a worthwhile investment for anyone with an 80MB or larger hard disk. It's the only way to avoid wasting hours swapping floppies as you perform regular full backups. You should have no problem restoring the data to the new hard disk as long as you've installed the thing properly. For help with IDE drive installation, see the June 1993 *Hardware* column ("Third-Party Hard Disks"); for tips on SCSI drive installation, see the September and December 1993 columns ("So That's Why They Call It SCSI," and "More SCSI Horrors").

Restoring Hard Disks

Q I read with interest "Seven Steps to Drive C: Recovery" in your January column. At one point, you suggest using SpinRite to do a low-level format. Most people these days buy IDE drives, which I've heard don't support low-level formatting. What gives?
Steven Kelly, Cambridge, Massachusetts

A You're right. You can't low-level format an IDE drive—or a SCSI or ESDI drive for that matter, which pretty much accounts for all the hard disks sold today. Low-level formatting, which recalibrates a hard disk's basic sector and track information, can be performed only on older, AT- or XT-type drives; IDE, SCSI, and ESDI drives monitor and self-correct, so you don't need (nor is it possible) to use a utility to ensure that sectors and tracks are properly aligned with the read/write heads. However, the problem I mentioned—a hard disk that won't boot until it warms up—is more likely to occur with an older drive that *can* be low-level formatted. I should have made this clear.

All this doesn't mean SpinRite is useless on new drives. The latest version, 3.1, does far more than low-level format. Run it overnight, and it will scan your hard disk's surface bit by bit to detect and correct the smallest errors, including those beyond the reach of Norton Utilities, PC Tools, and the self-correcting hardware itself. Steve Gibson, SpinRite's author, also claims his program can recover data from hard disks other utilities write off as fatally trashed. I recommend it both as preventive medicine and as a last-ditch measure when other utilities fail. Gibson Research; $89 until June 30, $129 thereafter; 800/736-0637. **Reader service no. 771**

By Eric Knorr

Eric Knorr is a contributing editor for PC World. Hardware *welcomes your questions* *(see page 12 for contact information).*

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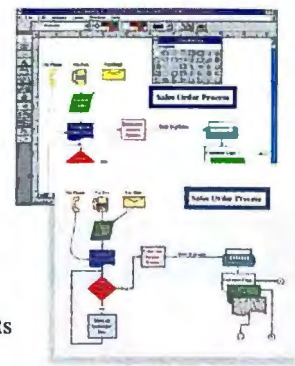

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STAR-DOT-STAR TIPS

DoubleSpace at Double Speed

I've discovered a way to compress multiple blank 1.44MB floppies without having to endure DoubleSpace's long compression process for each disk.

First I compress a blank 1.44MB floppy using DoubleSpace. Next I use DISKCOPY to replicate this disk to others (a process that requires only one disk swap with DOS 6.2). It doesn't matter if these disks were previously formatted before I started the DISKCOPY process. I then copy the files I need to the blank, compressed disks.

How much time do I save? On my 486DX2-66 system, compressing a blank, formatted 1.44MB disk with DoubleSpace takes 3 minutes, while using DISKCOPY takes 1 minute, 42 seconds (including the disk swap).

Ronald R. Sexton,
North Las Vegas, Nevada

Editor's note: Using DISKCOPY to clone an empty, freshly DoubleSpaced floppy disk is faster because DISKCOPY isn't trying to compress nonexistent data. However, because DoubleSpace can cause massive data loss on disks with errors, it's a good idea to use DISKCOPY's /V (verify) command line option to check the accuracy of the copy. (This verification will slow the operation slightly.)

Avoid DISKCOPY Disappointment

The latest, greatest version of Microsoft's DISKCOPY program allows you to copy a floppy in one pass. In most cases, you only need to insert the source and destination disks once each. But sometimes, without warning, DISKCOPY may revert to its old ways and ask you to swap disks several times. If this happens, don't panic—it just means that the directory the TEMP environment variable points to or your DOS boot drive (if there's no TEMP directory specified in your AUTOEXEC.BAT file) can't hold a complete image of the source floppy. This reversion usually happens when there isn't enough space left on the hard disk.

To restore DISKCOPY's convenient, one-swap operation, make sure the drive specified in TEMP has at least 1.5MB free. You can free space by deleting or moving files or by using the SET command to point the TEMP variable at another drive or directory. For example, if C: is unavoidably full, you can create a directory called D:\TEMP and then issue the command **SET TEMP=D:\TEMP**. To make the change permanent, replace the existing SET TEMP command in AUTOEXEC.BAT with the new one.

Georgios Kilitzirakis, Astoria, New York

Editor's note: It's always a good idea to leave lots of room on the disk where your TEMP directory resides, because DOSSHELL, compilers, and many other programs use it rather freely to store temporary files. In particular, if you're running Windows with a temporary swap file (which can grow to consume most of the drive), keep it on a different drive from TEMP. You can move a swap file by opening the Windows Control Panel, double-clicking *386 Enhanced*, and clicking *Virtual Memory*. The Virtual Memory dialog box lets you select a drive for the Windows temporary swap file; I recommend that you use the drive with the most free space.

```
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E100 EB 24 00 00 00 00 50 53 51 52 57 56 1E 06 9C 2E
E110 FF 1E 02 01 B4 00 30 0C BA 00 00 CD 17 07 1F 5E
E120 5F 5A 59 5B 58 CF 30 05 B4 35 CD 21 2E 89 1E 02
E130 01 2E 8C 06 04 01 BA 06 01 B0 05 B4 25 CD 21 BA
E140 27 01 CD 27
rcx
44
w
q
```

FIGURE 1: AUTOMATE PAGE EJECTS after print screens with FORMFEED.COM, a TSR that you create from this script.

Immediate Eject

Many laser printer users are frustrated by the way a PC's <Print Screen> key works. Because the key dumps the contents of the screen to the printer but doesn't eject the page afterward, you must eject the page manually (or press <Print Screen> several times).

In June 1993's *Help Line*, Robert Lauriston suggested a shareware program, LJVGA, to solve the problem. However, this program (designed to print graphics screens) is overkill and costs money to use. Here at the Dairy Management Lab at Michigan State University, we have a better way: a small TSR called FORMFEED.COM. This TSR watches for print screen commands and automatically ejects the current page from the printer afterward.

The DEBUG script in **FIGURE 1** can be used to create FORMFEED.COM. Transcribe it into a plain ASCII text file (the EDIT program that comes with DOS 5.0 and later versions works fine for this job), and save it with the name **FORMFEED.SCR**. Enter the command **DEBUG < FORMFEED.SCR** at the DOS prompt. The program FORMFEED.COM will appear in the current directory. Load it from AUTOEXEC.BAT so it's ready whenever you want to print the screen.

Paul Kimmel,
Okemos, Michigan

Editor's note: This TSR is especially handy for network users, since pressing the formfeed button on a network printer can disrupt someone else's job. I've modified it slightly so that it requires less typing and takes a bit less space. Note that if you do use this TSR with a network, it should be loaded after the network printer driver to make sure it takes effect. If you don't want to type in the DEBUG script, you can download FORMFEED.COM from PC World Online.

Take a Break With Visual Basic

My doctor recommended that when I become fatigued and sore after long hours at the computer, I stretch, do

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USER GROUP TIP

Using Imaginary Printers

I do a lot of work setting up WordPerfect documents and templates for other people. Even if I don't have the same printer a client has, I can still format the document perfectly by loading that printer's WordPerfect driver in my copy of WordPerfect. When I press <Shift>-<F7>V to view the document, I can see just what it will look like when printed on the client's printer.

Carole Ford
Anderson PC Users Group

hand exercises, and refocus my eyes on distant objects once an hour. Since I tend to get absorbed in my work, I needed some sort of alarm to remind me to take a break. So I developed a Visual Basic program, which I call HOURLY.EXE, to produce a 10-beep alarm on the computer's speaker once every hour. I placed this program in my StartUp group, and it now reminds me to take breaks whenever I'm working in Windows.

Here's how to build the program with Visual Basic. First, start a new project, go to the Project window, and remove all extraneous modules and custom controls except Form1. (You can remove such items by highlighting each in turn and selecting *File•Remove File.*) Next, go to the Properties window, set the Caption property to **Hourly**, and give the form an icon by setting the Icon property (double-clicking the Icon property brings up a file-browse dialog box). I use an icon included with Visual Basic that shows an image of a pendulum wall clock; you can find it under VB\ICONS\MISC\-CLOCK04.ICO.

This application will display as an icon at all times, so the next step is to set the MinButton and MaxButton properties to *False* and the WindowState property to *1* (minimized). To prevent the blank form from displaying when you double-click the icon, you must add an event handler to the form: Double-click the form to open the code window, select the *Paint* event from the Proc list, and type **WindowState = 1** on the blank line between the Sub and End Sub statements.

Next you need to make the program keep time. Click the *Timer* icon (which looks like an alarm clock) in the Visual Basic Toolbox, and draw a timer anywhere inside the form. Go to the Properties window and set the Interval property to **1000** (that's 1000 milliseconds, or 1 second). Then return to the code window, select *Timer* from the Object list and *Timer()* from the Proc list, and enter **If Mid$(Time$,4,4) = "00:0" Then Beep** between the Sub and End Sub lines. This single line does all the real work in the program: Once every second, it checks four characters in the middle of the Time$ function's output (which is formatted HH:MM:SS) to see if the time is within the first 10 seconds after the hour. If it is, the speaker beeps.

Finally, you create the finished application by selecting *File•Make EXE file.* Give the application the title **Hourly** and use the clock icon from Form1. Save the application as **HOURLY.EXE** in any convenient directory, and add the program to the Program Manager's StartUp group. From then on, whenever you launch Windows, the speaker will automatically chime on the hour.

Phil Europe, San Francisco

Editor's note: This application is a good example of how to write a Visual Basic *daemon*—a program that runs in the background, displays only an icon, and performs a function at regular intervals.

Scott Dunn offers another answer to a similar problem in this month's *Windows* column ("Cheap Reminders"). If you like Mr. Europe's suggestion, you can find his program in the PC World forums on CompuServe and America Online.

Recording Right

The macro recording feature in Borland's Quattro Pro for Windows can be handy, but it doesn't always do what I expect. I recently attempted to record a macro that would edit a formula within a cell, adding an @Round function to round the result to two decimal places. To add the function manually, the typical keystrokes are simple: You type <F2> to edit cell contents and <Home> to place the cursor before the existing contents. You then type in the

function itself: @Round, an opening parenthesis, <End> to move past the data being rounded, <Comma>, 2, a closing parenthesis, and <Enter>. But if you record this procedure as a macro, you'll notice that it looks something like {PutCell "@Round(*exp*,2)"}, where *exp* is the expression or value in the current cell when you started recording the macro—which, of course, isn't what you want.

Fortunately, there's a way to make Quattro Pro record a macro that functions properly. Select *Tools•Macro•Options* and change the Recording setting from Logical (the default) to *Keystroke*. This command instructs the program to record the keystrokes you type without attempting to interpret your actions. The result: When you record the same keystrokes, you get a macro that looks like {Edit}{Home}@Round({End},2)~.

This macro performs perfectly, adding @Round and its parameter correctly to the contents of the cell.

Michael Trombetta, Manhasset, New York

Editor's note: Both logical and keystroke recording modes are useful. In general, if you're creating a macro that edits the text of a formula within a cell, you'll want to be in keystroke mode, as Mr. Trombetta indicates. However, if you're copying whole cells from one place to another or performing numerical calculations, logical mode will usually produce the result you want.

Clarification

If you tried using the technique described in "Once a Day, Week, Year" (*Star-Dot-Star*, February) and found that it did exactly nothing, chances are excellent you're using DOS 5.0 or an even earlier version of DOS. The FIND command used in CHECKDAT.BAT did not start returning ERRORLEVEL codes until DOS 6.0. We apologize for failing to mention this important fact. The batch file can still be used with DOS 5.0 and earlier, however, if you incorporate the trick mentioned in the tip "FINDers Keepers" (*Star-Dot-Star*, November 1993).

By Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star *welcomes your tips, macros, batch files, and short programs. See page 12 for contact information.*

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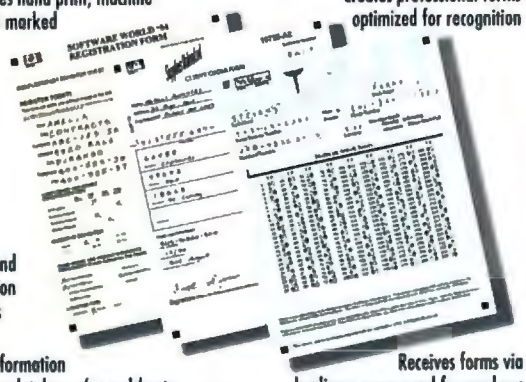

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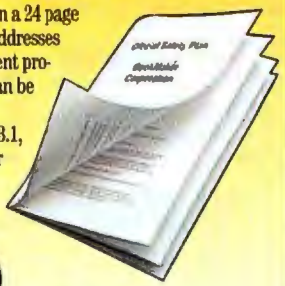

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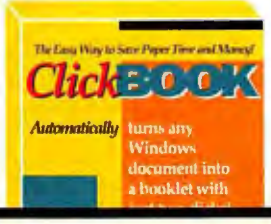

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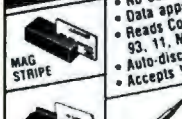

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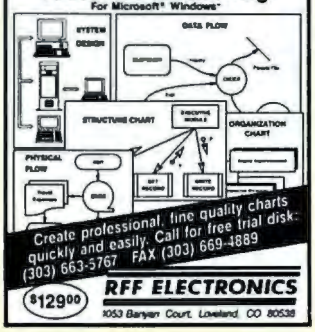

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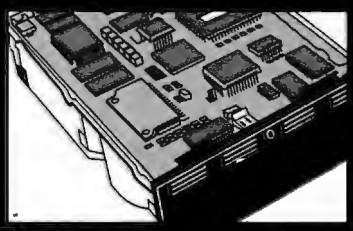

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A1542CBASIC 16Bit SCSI	$225	$215
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PCMCIA Optima 144 + Fax	$289
ACCURA 24	$69/$75
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ActionNote 500C 180MB W/Modem	$2069
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T1950CT 200 MB/320MB	$2899/$3149
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T4700CS 200MB/320MB	$3149/$3379
T4700CT 200MB/320MB	$4579/$4929
T4800CT 500MB	$5599
T6600C, C/CD	$6199/$6699

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WinDX2/40 Color 200MB	$2439
WinDX2/50 Dual Scan Color 200MB	$2789
WinDX2/50 Act. Matrix Color 200MB	$3379
WinDX4/75 Active Matrix Color 340MB/455MB	$4449/$4949
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MAKE THE COMPARISON FOR YOURSELF

Model	Minuteman A500	APC BX600	Tripp Lite Omni 590
PRICE	$289	$399	$379
Price per Watt	.89	1.00	1.03
VA Rating	500	600	500
Waveform Output	Simulated Sinewave	Simulated Sinewave	Simulated Sinewave
Line-Interactive	YES	NO	YES
LED Status Indicators	YES 4-LED's	NO	YES 4-LED's
Site Wiring Fault Indicator	YES	YES	NO
Test Button	YES	YES	NO
Self Diagnostic Test	YES	NO	NO

Model	Minuteman A250	APC BX250	Tripp Lite BC250
PRICE	$144	$139	$139
Price per Watt	.76	.79	.82
VA Rating	300	250	250
Waveform Output	Simulated Sinewave	Square	Simulated Sinewave
Audible Alarm	YES	NO	YES
LED Status Indicators	YES 3-LED's	YES 3-LED's	NO
Site Wiring Fault Indicator	YES	NO	YES
Test Button	YES	NO	NO
Self Diagnostic Test	YES	NO	NO

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32Kx8	19.00	9.00	8.00	7.00
64Kx1	–	11.00	9.00	8.00
64Kx4	–	11.00	9.00	8.00
16Kx4	–	8.00	7.00	6.00
128Kx8	–	–	39.00	29.00

Individual D-RAM Chips

MEMORY FOR IBM & APPLE	45NS	60NS	70NS	80NS	100NS
1Mgx1	–	7.35	7.25	6.75	5.95
1Mgx4	–	35.00	29.00	27.00	–
1Mgx4 (Zip Pk)	27.00	25.00	23.00	–	–
256 x 4 (Video Zip)	–	15.95	11.95	10.95	
256x4	8.95	7.95	6.95	–	–
256 x1	–	4.00	3.50	3.00	2.75
256 x16VRAM–	–	39.00	39.00	–	
64x4	–	–	–	3.25	–
64x1	–	–	–	–	2.00

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8087	45.00
8087-2	49.00
8087-1	85.00
80287-XL	55.00
80387-16 DX	39.00
80387-20 DX	49.00
80387-DX (Does All)	74.00
80487-SX (Does All)	299.00
Intel SX (Does All)	74.00
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Intel 165X	39.00
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Ambra Pentium-60	4/8/16 Meg	179.00/339.00/699.00
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	32Meg	500987-005	1399.00
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Premium 386/33TE, 486/25TE, 33TE			
Prem. Serv. Prem II 386SX/20, 25			
Prem II 386/25, 386/33 486/33, 486SX/20	8Meg	600780-001 (64 pin)	398.00
Premium 386/33T Prem. 386SX/16		600780-004	189.00
Prem. II 386SX/20, 25		600780-002	59.00
Premium 386/25, 33 386/33T 386SX/16,		600780-003	59.00
Prem. II 386SX/20 25		601159-003	379.00
Premiere 433S, 433, 450D, 466D	4Meg	601159-002	789.00
Premia	16Meg	601159-004	1499.00
Premia	32Meg	601159-005	3111.00
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AST Cupid 8d	0–64Meg	600818-001	

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MODEL	AMT. UPGRADED	AST PART #	PRICE
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6450604 (2Meg)	70-061, E61, 121, 50Z, 55SX, 65SX, P-70, 55LS, 65LS, X-Station 120 & 130, 35SX, 35LS, 40SX	89.00
6450608 (2Meg)	70-A21, A-61, B-21, B-61, 35SX, 35LS, 40SX, Val Pt. 325T	90.00
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1057035 (512K)	P/S1-286	49.00
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79F1000 (4Meg)	LX40, N33SX, PS Note, Tkpd 350, 350c, 710T, PS Note 425	199.00
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60G0379 (16Meg)	Thinkpad 350, 350c, PS Note 425	669.00
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	8Meg Module	116561-001	429.00
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DeskPro 386/33L, 486/33L	(Exp Bd)	116569-001	279.00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	199.00
DeskPro 386S-16MHz	1Meg Exp Bd	113633-001	149.00
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	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	113131-001	79.00
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DeskPro 286N, 386N, 386SX/20, 386/25M, 486/25M, 486S/16M	1Meg Module	118886-001	59.00
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Port. I Series 486C	8Meg Module	128877-001	389.00
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Prosignia PC Server, 486/33, 486 DSX/66	8Meg	141685-001	339.00
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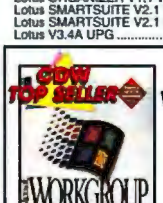

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250MB	IDE	WD225ØA	12ms	3.5" 1"H	219	239
270MB	IDE	WD127ØA	12ms	3.5" 1"H	229	249
340MB	IDE	WD234ØA	12ms	3.5" 1"H	269	289
420MB	IDE	WD242ØA	12ms	3.5" 1"H	289	309
540MB	IDE	WD254ØA	12ms	3.5" 1"H	389	409

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340MB	IDE	CFA34ØA	13ms	3.5" 1"H	349	499
340MB	SCSI	CFA34ØS	13ms	3.5" 1"H	309	329
426MB	IDE	CFS42ØA	14ms	3.5" 1"H	359	379
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1080MB	SCSI	FJ2694S	10ms	3.5" HH	799	949

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245MB	SCSI	MX7245S	15ms	3.5" 1"H	249	399
340MB	IDE	MX7345A	12ms	3.5" 1"H	289	309
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1750MB	SCSI	MC2217S	10ms	3.5" HH	1,079	1,229
2100MB	SCSI	MC1926	11ms	5.25" FH	1,399	1,549
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270MB	IDE	QULPS27ØA	12ms	3.5" 1"H	239	259
340MB	SCSI	QULPS34ØS	12ms	3.5" 1"H	279	299
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540MB	IDE	QULPS54ØA	12ms	3.5" 1"H	479	499
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452MB	SCSI	ST3550N	12ms	3.5" 1"H	529	679
540MB	SCSI	ST3655N	12ms	3.5" 1"H	589	739
545MB	IDE	ST3655A	12ms	3.5" 1"H	389	409
1052MB	SCSI	ST3120ØN	11ms	3.5" 1"HH	769	919
1700MB	SCSI	ST1190ØN	9ms	3.5" 1"HH	1,099	1249
1700MB	SCSI	ST1195ØN	8ms	3.5" 1"HH	1,499	1,649
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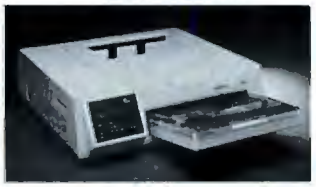

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If this system (Patriot DX2-66) is any indication ,local vendors are every bit as savvy as the nationals when it comes to putting together a performance PC. Simply put , the Computer Square (a division of Myoda Computer Centers, Inc.) Patriot is the fastest machine in the review. It's 12 percent faster than the average system here, just marginally faster in our BAPCo tests than in our Windows suite. That adds up to a balanced , high-performance showing.
(page 158 , Nov. 1993 **PC World**)

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Doctor on a Disk

As Will Durant noted, the health of nations is more important than the wealth of nations. Unfortunately, the fields of health and medicine are becoming so complex that doctors *and* patients need all the help they can get to keep up. Happily, hardware and software vendors are coming to market with a number of new, powerful, health-related PC packages.

Bringing It All Back Home

The Mayo Clinic Family Health Book Interactive Edition from Interactive Ventures purports to provide "comprehensive information on issues relating to good health," and this CD ROM delivers just that. It's a valuable package aimed at demystifying modern medicine, including the health care system.

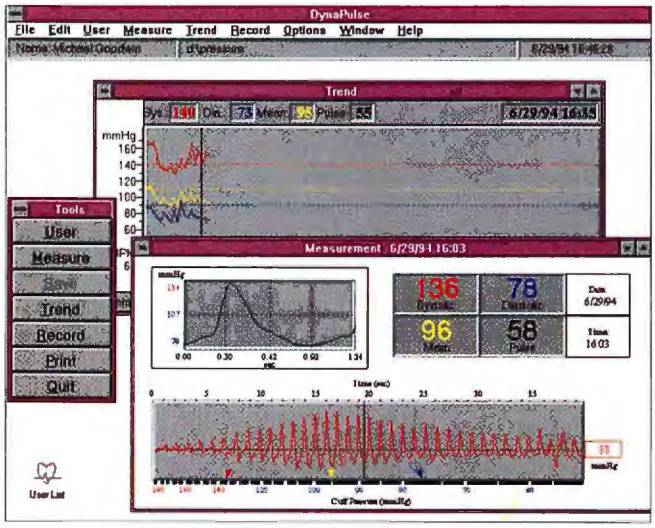
Easy-to-follow articles illuminate a broad range of topics, from coronary angioplasty to pain emergencies, from prevention of jet lag to how to pay your medical bills. What looks like text is really hypertext, with embedded references you can click on for more information, and animated illustrations with voice-over commentary. You'll also find guidelines for maintaining a healthy life-style; after all, the best way to survive a hospital visit is to avoid it.

While symptoms are discussed under entries for specific health problems, the Mayo Health Book is not a diagnostic tool. So if it's 3 a.m. and your child has a pain, don't bother booting the PC. But if you want to know exactly what's going to happen when you go in for that arterial catheter exam, check here.

Have a Heart

Mayo Clinic: The Total Heart is a CD ROM devoted to the fist-size pump that makes such a big difference in all our lives. As you might expect, The Total Heart is quite similar to the Health Book, from the same company, except that it goes into greater depth on subjects like heart disease, EKGs, and reducing risk, and it offers helpful hints for cardiac emergencies. An impressive list of drugs for various circulatory ailments is included.

Multimedia graphics and sound make the complex cardiac topics easy to follow: The Total Heart CD ROM includes 34 animated films and over 60 stills on a variety of important subjects.



DynaPulse takes the guesswork out of tracking your blood pressure–and the Trends window automatically charts your progress.

Specific Gravity of Cerebrospinal Fluid

From its title, you'd expect Medical Dictionary and Family Health Guide to be two products in one. In truth, it's *three:* a dictionary, a family health handbook, and a third volume devoted to children's health. Unfortunately, I found it a bit too technical—and not as useful as the Mayo Clinic package.

The illustrated dictionary is the best component: It delivers a solid A to Z listing (from A-B hemolytic diseases to zymosis) that you can browse via an alphabetical list and search with a Boolean AND/OR/NOT utility. Part Two, the Family Guide, starts you out with 27 topic headings: diets, teeth, and so on. Once you select a topic, you get a short text block that may include a hypertext link to a related subject. However, a lot of the material is fairly abstruse. Look up *head injuries*, for instance, and you'll find sentences like: "The presence of a fracture does not affect management unless the fracture is depressed, or causing leakage...." If my son bashed his head, I'd prefer something in simpler language. Moreover, it's hard to imagine a family emergency where you'd need a table that lists normal and abnormal color, chloride, and the specific gravity for cerebrospinal fluid!

Fishy Videos

Dr. Schueler's Home Medical Advisor Pro gives the impression that it was thrown together very fast. This Windows-based program boasts an excellent Medical Records section where you can record everything from your blood type and surgical history to exactly what type of vegetarian you are. It will also print out a legally valid Durable Power of Attorney and Living Will. But the Advisor component, which includes videos and still images along with a lot of text, has major problems. If you don't use a 256-color video driver, you can't see any of the images or videos; but if you *do* install a 256-color driver (even in vanilla VGA), the text is virtually unreadable in fuzzy blue letters! Moreover, the glossary doesn't even include *sphygmomanometer.* And half the video library is devoted to underwater films of fish! The ostensible reason is that you might get bitten by these denizens of the deep, but obviously the real reason is

By Michael Goodwin

that digitized copies of the videos were available to fill up space on the CD ROM. Dr. Goodwin's Home Medical Advisor says: Don't get bitten!

Under Pressure

Like many folks, I have hypertension. To help my docs keep it under control, I measure my blood pressure several times a day; then (being a computer jock) I use Excel to crunch the numbers and Harvard Graphics to display the trends. Now a hardware-software package called DynaPulse, from Pulse Metric, offers many of the same options, so you never have to write a line of code.

You cable the small unit to a spare COM port. Then, after installing the Windows-based software (a DOS version is also available), you slip on the pressure cuff and pump it up. DynaPulse measures your pressure automatically and dumps the numbers into an on-screen display, along with a nifty graph of your pressure wave form. At the same time, readings are saved in a graphic Trends window, so you can look back and see how you're doing.

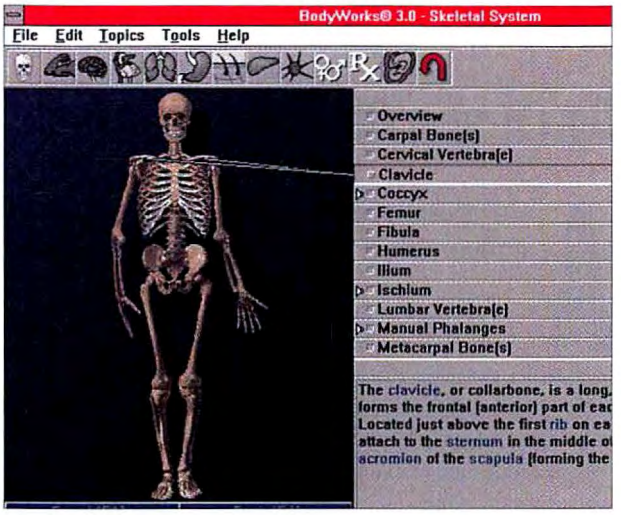
So far, so good—but I have two problems with DynaPulse. One is that its Trends window looks back at every reading you've taken since you started using the product; there's no easy way to limit the range to last month, or to delete old readings. The second and more bothersome problem is that DynaPulse's digital oscillometric readings were consistently 15 to 25 points higher than those that I obtained with my traditional mercury-column sphygmomanometer. Pulse Metric's CEO insists that clinical tests have certified DynaPulse's accuracy, but this is a complex issue. My medical sources tell me that the traditional mercury-column method is more likely to match up with familiar guidelines for normal and high blood pressure.

Leg Bone Connected to Ankle Bone

Bodyworks 3.0 styles itself an "adventure in anatomy." This highly entertaining package takes you on a fascinating, interactive guided tour of the human body. A vast database includes every bone, muscle, and gland you own; a library of high-resolution, full-color graphics provides views, cutaways, and animations; and your computer will pronounce all the technical terms for you.

Whether you run under DOS or under Windows, the control menus for Bodyworks are superb. Hypertext links every illustration and paragraph: You click on a highlighted word and the appropriate body part appears. Click on a body part and full text pops up. The text itself is excellent: Good, clear writing covers the ground with style and grace.

Drawbacks? It takes a long time to copy 8MB of files from floppy disks—delivery via CD ROM would be a big improvement. Also, a series of 2-second video clips (the blink of an eye) are a waste of disk space.



STUDYING ANATOMY WITH BODYWORKS is a lot more fun (and considerably cheaper) than medical school. Words in blue (and most parts of the illustrated skeleton) provide hypertext links.

Take Two Aspirins, Call Your PC in the Morning

It's a good idea to keep track of the drugs you and your family are using, but between generic names, trade names, and time pressure on doctors and pharmacists, this is not a trivial task. Two new products can help.

Great Bear Technology's Windows-based Complete Guide to Prescription and Non-Prescription Drugs makes it easy to get the lowdown on any medication, from an exotic prescription item to a ubiquitous drugstore nostrum. Search by brand name or generic name in a letter-tab listing that resembles a phone book, or use a powerful search utility to look up *cholesterol* or *runny nose*. Once you've located the drug you need, seven icons lead you to listings on dosage, usage, overdose warnings, side effects, precautions, interactions, and so on. The only thing this package doesn't show you is what the pills look like.

PharmAssist, also a Windows-based product, *does* show you what the pills look like. It includes full-color illustrations (and complete listings) for prescription and nonprescription drugs, plus instructions on use, side effects, and interactions. The package boasts first-aid tips too, along with international health information for travelers. It also has a long section on illegal drugs (with an extensive list of street names, many of which are years out of date), plus tips on how to figure out if your kids are fooling around with the stuff. Only one problem: It's painfully slow on my 25-MHz 486SX.

- **Bodyworks 3.0** $69.95; Software Marketing Corp.; 800/364-5451
  Reader service no. 618
- **Complete Guide to Prescription and Non-Prescription Drugs** $69; Great Bear Technology, Inc.; 510/631-1600
  Reader service no. 619
- **Dr. Schueler's Home Medical Advisor Pro** $69.95; Pixel Perfect; 800/788-2099
  Reader service no. 620
- **DynaPulse** Pulse Metric, Inc.; 800/927-8573; $179.95
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Michael Goodwin is a contributing editor for PC World. *He can be reached on PC World Online (see page 12 for contact information).*

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Finding a Needle on a Hard Disk

I have an unfortunate tendency to save everything, but when I want something, I can't remember where I put it. If you want proof, check out my garage—or even worse, my hard disk. I'll spend an hour looking for a file, only to get bogged down reading another one I couldn't find the last time I looked.

That's why I've been looking for the perfect Windows file finding program. I'm still looking, but my two favorites so far are Phoenix Technologies' Eclipse Find and Central Point Software's SmartFind, one of the many great utilities in PC Tools for Windows.

One of the best things about SmartFind is that it's integrated into an already excellent file manager. The advantage? A list of found files looks just like a directory and can be used as one. Think about it: Once you've found the files you want, you can easily sort, view, copy, delete, or launch them in their associated application, all within a familiar interface.

SmartFind does what I'd expect a bright program to do. I can give it some file properties—such as name, type, date, a particular text string—and the program lists the files it finds. If I think I'll perform the same search again, I save the location and file types for later retrieval. SmartFind also looks for duplicate file names, easing housekeeping chores. And with more than 100 file viewers, the program lets me look at each file in its native format. The downside? Without indexing, it's slow.

Considering that SmartFind is only one part of an extensive collection (see "PC Tools for Fixing Windows" in April's *Top of the News* for more information), PC Tools is one terrific value. I've even seen it on sale for as little as $84. • *PC Tools for Windows $179.95; Central Point Software; 800/873-7409, 503/690-8090. Reader service no. 612*

By Steve Bass

And the Winner Is...

But for finding and viewing files, the hands-down winner is Eclipse Find. Not only does it perform lightning-fast indexed searches and come with a great selection of file viewers, I've seen it on sale for a dirt-cheap $40!

Eclipse Find's most amazing feature is its capability to retrieve files with specific character strings in about 3 seconds. The program works at the speed of light because it uses an index to prevent it from having to search each file.

It's easy to create indexes, which take less space than you might think. For example, I found that an index of every file on a 100MB hard disk took about 4MB (your mileage may vary). You can further reduce the size of the index by excluding file extensions like EXE and words like *a*, *and*, and *the* and by indexing only certain file types and directories. Not only will your index files be smaller, but they'll take less time to update.

Creating an index for the first time—especially a big one—does seem to take forever, so it's best to do this overnight. Once an index is established, I set the program to update every 24 hours, running in the background.

A Magic Viewer

Eclipse Find is a rich program with more up its sleeve than just indexes. Its file viewing capabilities are licensed from Systems Compatibility, maker of Outside In, which has the most comprehensive file viewing features I've ever seen. Eclipse Find includes 52 of Outside In's 120 word processing, fax, ZIP, graphic, spreadsheet, and database viewers, with an additional 45 available for just $20. As with Outside In, the interface is a little klutzy, but I'm still able to move, copy, and delete files and—most important—launch in a file's application right from the viewer.

Eclipse Find has a neat way of handling time, too. It can find all the files dating from a specific time period and display their names formatted as a weekly or monthly calendar. This may not sound like much, but it gives you an easy way to find a file you created in, say, the first part of 1989.

But that's not all. If Eclipse finds more files than you want to deal with, you can narrow the search by adding more criteria. And the program's Hard Drive Sweep feature gives me the courage to clean up my hard disk because it finds not only duplicate files, but also empty and temporary ones and old program versions, helping me decide which are ready for a trip to the bit bucket. • *Eclipse Find $89; Phoenix Technologies; 800/452-0120, 617/551-3725 (fax). Reader service no. 613* • *Outside In $89; Systems Compatibility; 800/333-1395, 312/329-0700, 312/670-0820 (fax). Reader service no. 614*

If you buy only one utility this month, Eclipse Find should be it. Now if it could only index my garage.

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 12 for contact information).

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