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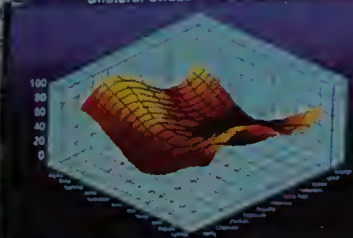
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BRIGHTEST,
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4.013	1.979
4.507	2.036
5.780	2.370
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NEC



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Three years ago, we embarked on a mission. To design and build the finest computer monitors in the world. Which is a rather ambitious quest. After all, many industry experts already considered the NEC MultiSync monitor, first introduced just over a decade ago, pretty darn close to perfect.

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To make things perfectly clear, these monitors feature our unique OptiClear™ surface that virtually eliminates glare, an Invar shadow mask that assures maximum brightness without loss of focus, and a super fine .28 mm dot pitch. In addition, the XE Series features flicker-free, rock-solid refresh rates of up to 120Hz.

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Every NEC monitor is backed by a three-year limited warranty. More importantly, it's backed by NEC's reputation for building the finest monitors in the world.

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XE21

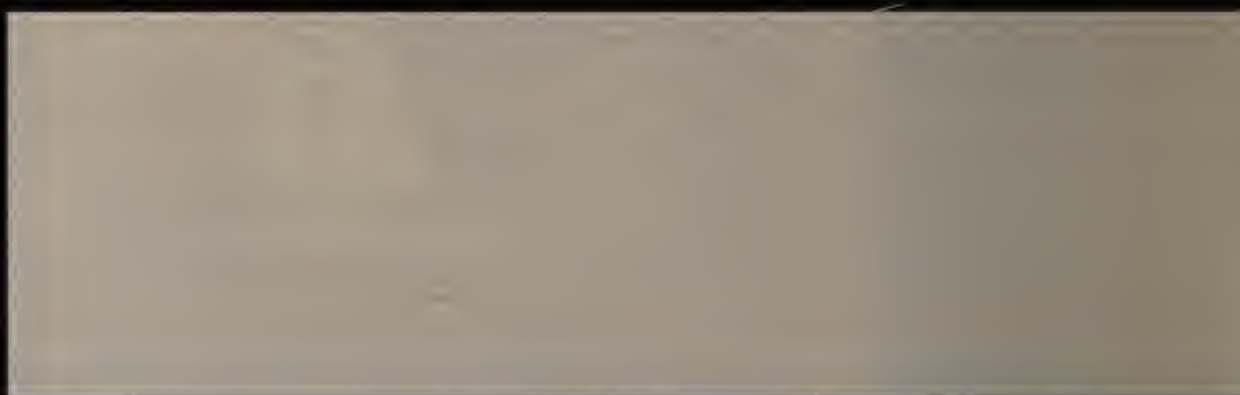
21" CRT, 19.8" viewable image size
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AND FEEL THE
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PC WORLD

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Cover Story

50 Pentium Upgrades: Worth the Wait?

Pentium OverDrives have arrived. But in our tests of eleven 486 systems, the chips delivered Pentium-level performance only under optimum conditions. Plus, a sneak peek at Intel's next-generation P6.

Monitors

102 Big Screens

These 17-inch monitors offer two-thirds more Windows work space than the 15-inch players. We test 30 of the latest models and single out three Best Buys.

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125 50 Spreadsheet Tips: What the Manuals Won't Tell You

Experts reveal secrets for Excel, 1-2-3, and Quattro Pro: macros, undocumented keystrokes, tips for spreadsheet-to-word processor hookups, and more.

Image Editors

144 Change Your Image

We review six Windows image editors, priced as low as \$149, that are revolutionizing the way we create graphics on PCs.

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Why bother with an upgrade? Two good reasons: built-in Stacker 4.0 disk compression and smaller RAM requirements.

56 The Sensible Way to Search the Net

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61 Lotus Extends Notes to the Rest of Us

Enticements include price cuts, connections to the Internet and voice mail, and a preview of Notes 4.0.

62 IBM and Digital: Two for the Road

Notebooks move a step closer to desktops with IBM's new expandable keyboard and Digital's full-powered 4-pounder.

Lotus: Get the Most From the Lotus Suite

100-L4 How Healthy is Your Business?

Common financial ratios let you take your company's pulse. Here's how to build these ratios in 1-2-3 and apply them to your business.

100-L15 Put Your Data on the 1-2-3 Map

Release 5.0's mapping tool lets you target your sales efforts, analyze customer needs, and pick the best sites for stores or service centers. Get started with this quick guide.

100-L19 Let 1-2-3 Track Time Off

Our worksheet lets you record employee vacations and sick leave.

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Cover Photography by Marc Simon



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Systems

168 Top 20 PCs: Survival of the Fittest

All four Best Buy PCs from last month fend off the latest challengers. At the top: the Micron P90PCI PowerStation, MIS Slimline 66, Toshiba T4900CT, and WinBook XP DX2/50. Also appearing this month: a new look for the *PC World* Top 20, including recommendations for best home PCs.

New Products

- 71 LaCie Joule Portables, SyQuest SQ3270, Iomega Zip removable storage
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With hundreds of businesses setting up storefronts online, you can shop 'til you drop via modem. Find out when it makes sense—and when it doesn't.

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205 Win a Dell OptiPlex XMT 590 PC

Fax in this survey for a chance to win a Dell OptiPlex XMT 590—a Best Buy system from this month's Top 20.

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PC World™ (ISSN 0737-8939) is published monthly at \$29.90 for one year (12 issues), \$59.80 for two years (24 issues), \$89.70 for three years (36 issues) by PC World Communications, Inc., 501 Second St. #600, San Francisco, CA 94107. Foreign orders must be prepaid in U.S. funds with additional postage. Add \$20 per year for Canada and Mexico; add \$46 per year for airmail for all other countries. Canadian GST Registration #R124669680. Second-class postage paid at San Francisco and additional mailing offices. Canada Post International Publications Mail Product, (Canadian Distribution) Sales Agreement No. 0463566.

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3B

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29D

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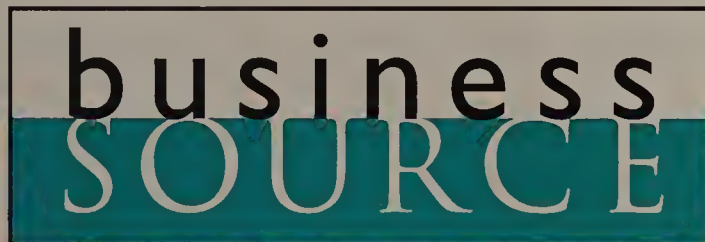
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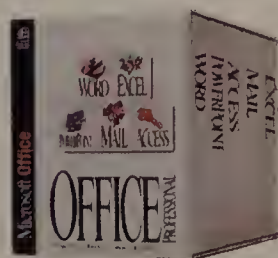
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— PC Magazine, September 27, 1994

It's true! The ZEOS Pantera is as good as it gets. Leading experts from top industry publications all agree that the ZEOS Pantera is the best PC available. Unparalleled in its field, the Pantera has continuously earned award after award—month after month.

There's no desktop system that comes close to the ZEOS Pantera in performance, reliability, and value. As *PC Magazine* said: "Overall performance leader...the Pantera line has a lot to offer—strong performance at a reasonable price, with excellent documentation."

Supreme Performance



The ZEOS Pantera, based on Intel's 486 and Pentium processors, is breaking record after record with its supreme power and awesome performance.

"Mark a new high on the performance

They said: "The clear winner is the ZEOS Pantera."

What makes the Pantera blow all others away? Superior engineering—starting with a ZEOS designed motherboard, created specifically to take full advantage of the latest technological advancements. The motherboard is stocked with exceptional features such as an on-board PCI Local Bus IDE Controller and support for up to four IDE devices. For the fastest video performance, we give you a Diamond Stealth 64-bit PCI video card with 1MB DRAM *standard*.

Valuable Extras

The Pantera is a first-rate example of ZEOS' commitment to provide you with an excellent value on an award-winning machine. With all the extras, options, and 100% compatibility with all major operating systems, you can't go wrong.

Many of our most popular money-saving Pantera packages are ready to ship *the same day you order*. We also give you the option to custom-design a system to your exact computing needs.

Either way, you can buy with confidence because of our on-going dedication to offer you high-quality features and state-of-the-art technology at an affordable price. As *PC/Computing* said: "...this is a deal you simply can't pass up."

And the value doesn't stop with your purchase. Nobody does more to support you after the sale. ZEOS has won seven *PC Magazine* Readers' Choice for Service & Reliability awards.

Unequalled in performance, reliability and value, the ZEOS Pantera "is the ultimate Power Desktop." *PC World* added: "It's lightning fast, beautifully configured, and priced right." To get your best buy, call a ZEOS Systems Consultant today at 800-554-5220.

chart!" *PC World* said the Pentium-66 and Pentium-90 Pantera PCs were "the fastest system(s) ever tested."

The ZEOS Pantera 66MHz and 90MHz also received the highest scores in all benchmark tests run by *Windows Sources*, and earned two Experts' Pick awards.



Pentium-66
April 12, 1994

DX4-100
June 28, 1994



Pentium-60
April 1994

Pentium-90
August 1994



486DX2-66

January 1994

February 1994

March 1994

June 1994

December 1994

January 1995

February 1995

DX4-100

October 1994

November 1994

December 1994

January 1995

February 1995

Pentium-66

December 1994

January 1995

February 1995

Pentium-66

June 1994

July 1994

August 1994

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Pentium-90

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February 1995

Pentium-90

August 1994

September 1994

October 1994

November 1994

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November 1994

January 1995

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Pentium-90

August 1994

September 1994

October 1994

November 1994

January 1995

February 1995



Pentium-66
May 1994



Pentium-66
June 1994

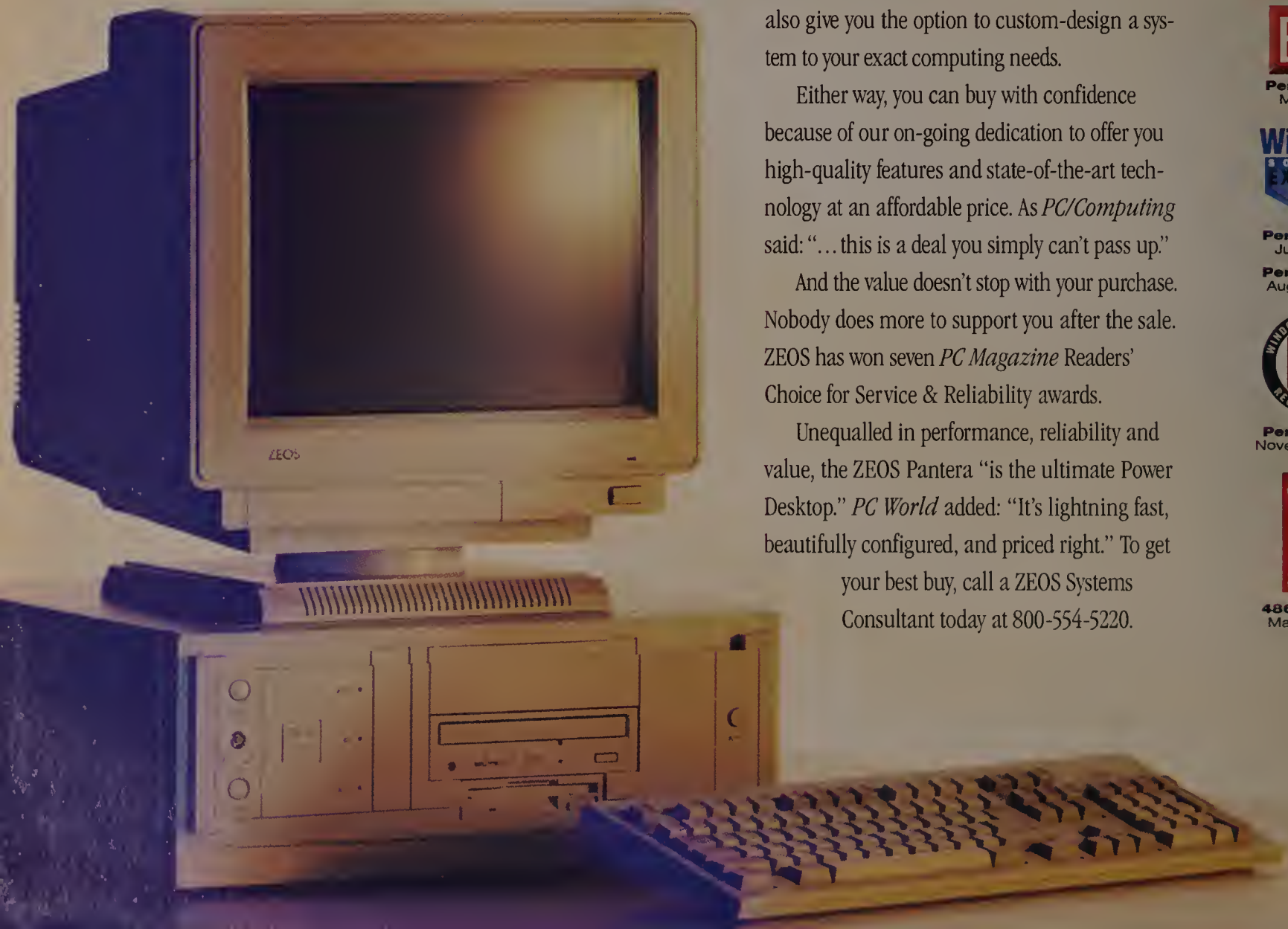
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486DX2-66
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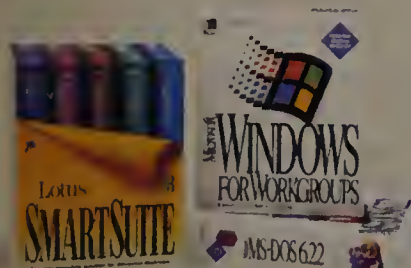
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77 Franklin St. #300, Boston, MA 02110

Phone: 617/482-8470 Fax: 617/426-0235

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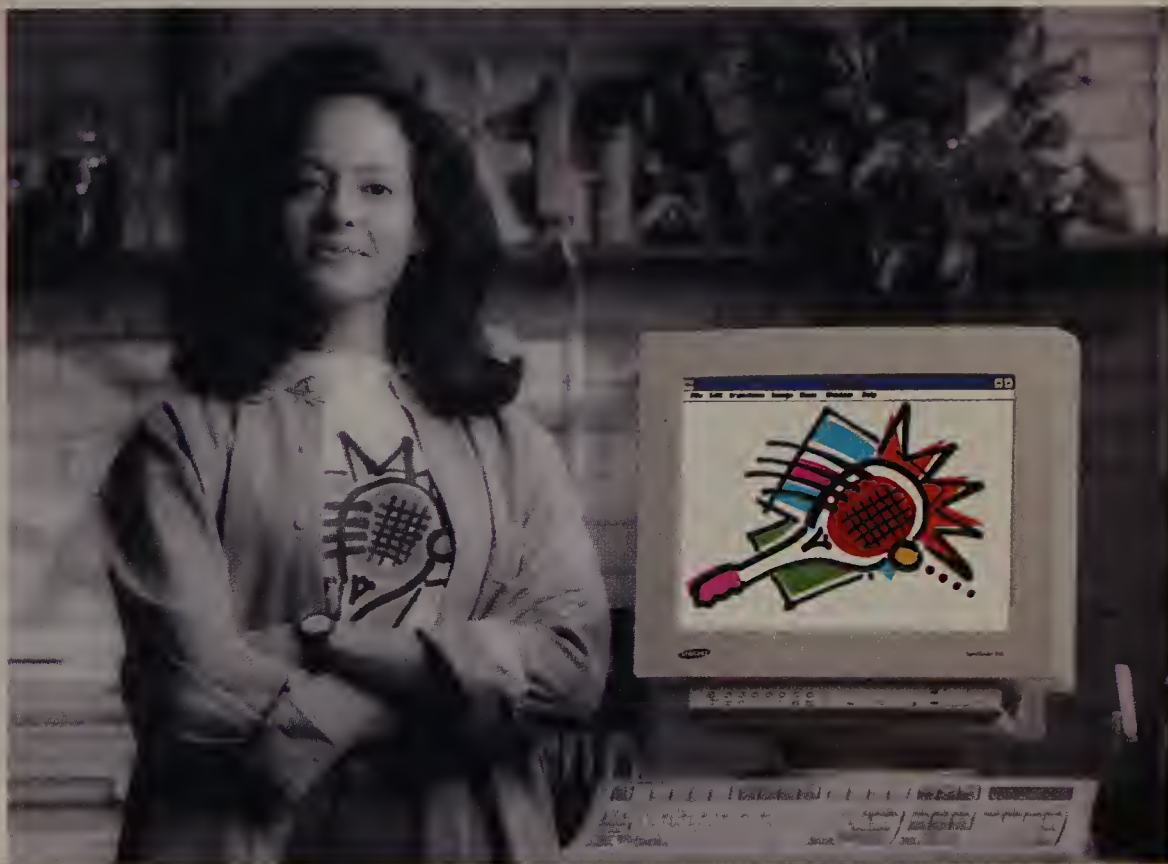
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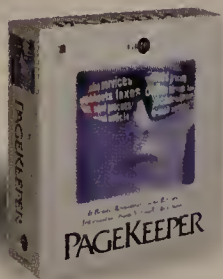
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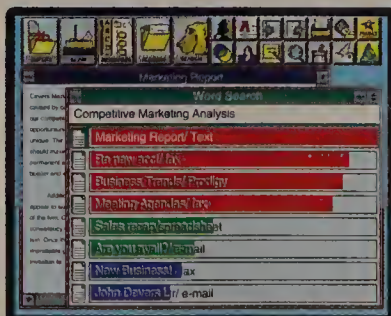
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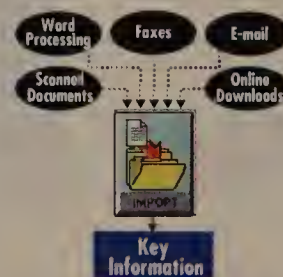
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Microsoft and the End of Choice



PC World has received numerous letters during the last year accusing the magazine of favoritism toward Microsoft.

To address concerns about *PC*

World's and my own objectivity in this matter, I'd like to state my views on Microsoft, its position in the industry, and the implications for PC users. A statement of views also seems timely because the Department of Justice is reviewing Microsoft's proposed acquisition of Intuit. And at press time, a federal judge rejected the Justice Department's proposed settlement to its antitrust investigation of Microsoft.

I can summarize my views of Microsoft with these three points: First, as it gets bigger the company is getting better and better at software development, turning out products that compare favorably with anything else available. Second, Microsoft's virtual monopoly on system software for desktops gives it overwhelming and unfair competitive advantages over other application developers. Third, Microsoft appears to have the strength and the will to leverage its domination of the desktop into domination of other sectors.

Overwhelming and Unfair Advantages

Control of Windows' application program interface (API) gives Microsoft a stranglehold over all other application software developers. Applications can be published only in Windows, making Windows, in effect, *the* distribution medium. Every change in the API requires changes in how software is written if it is to work with Windows, and whoever knows first about those alterations enjoys a huge advantage in bringing next-generation applications

to market. Microsoft's developers always get the news first.

To choose an analogy from magazine publishing, it is as though Microsoft were *Time* magazine and Lotus were *Newsweek*. One morning, *Newsweek* discovers it can be published only as an insert in *Time*. Struggling along as a mere insert in an archrival, *Newsweek* gets word from *Time* that the insert can't be published this month, because *Time* has switched to a new trim size and binding method. *Time* passes on the new specs so *Newsweek* can alter its production processes to conform to *Time's*, but until the changes are made, *Newsweek* is out of business.

Control of the PC's de facto standard operating system gives Microsoft this kind of power over its rivals.

Microsoft's contracts with PC makers—due in part to practices since discontinued under the terms of the Justice Department's original settlement—required payment to Microsoft regardless of whether its operating systems were even installed. This made it impossible for other operating-system vendors to compete. Companies that agreed to preload Microsoft operating systems found that they could make extraordinary deals on preloading its business applications. Last spring, I found I could not buy the PC of my choice without bundled Microsoft applications. The sales representative informed me that his company's contract with Microsoft required shipment of either Microsoft Office or Works on every PC, and he said I would save only \$70 by accepting the lesser package. (Would you like Microsoft or Microsoft with your Microsoft?) Microsoft's applications are good, but I resent having no choice in the matter.

Since Microsoft has always offered

excellent value to PC users, consumers have little to complain about. But business users must be concerned about the dwindling number of companies that produce business applications. Software houses in traditionally separate markets find themselves facing a Microsoft that offers software bundles and integration no one else can match—bundles that link desktop and server operating systems, server databases, and desktop applications. If the acquisition of Intuit goes through and the launch of Microsoft Network succeeds, Microsoft can extend this linkage from desktop financial applications

Would you like Microsoft or Microsoft with your Microsoft? Microsoft's applications are good, but I resent having no choice.

to online services, back-end databases, and financial transaction services.

Evidence of Microsoft's growing competence suggests it will be decades before Microsoft loses its monopolistic hold. The preservation of competition in the software industry—and of choice for computer users—requires that Microsoft's applications and system software businesses be truly separate.

Though many, especially in Bellevue, will decry this as government regulation in a perfectly functioning free market, markets aren't free when computer users are compelled to buy a particular company's applications to get the PCs they prefer. Besides, the alternative to government regulation seems to be regulation by Microsoft.

Phil Lemmons

Phil Lemmons, Editor in Chief

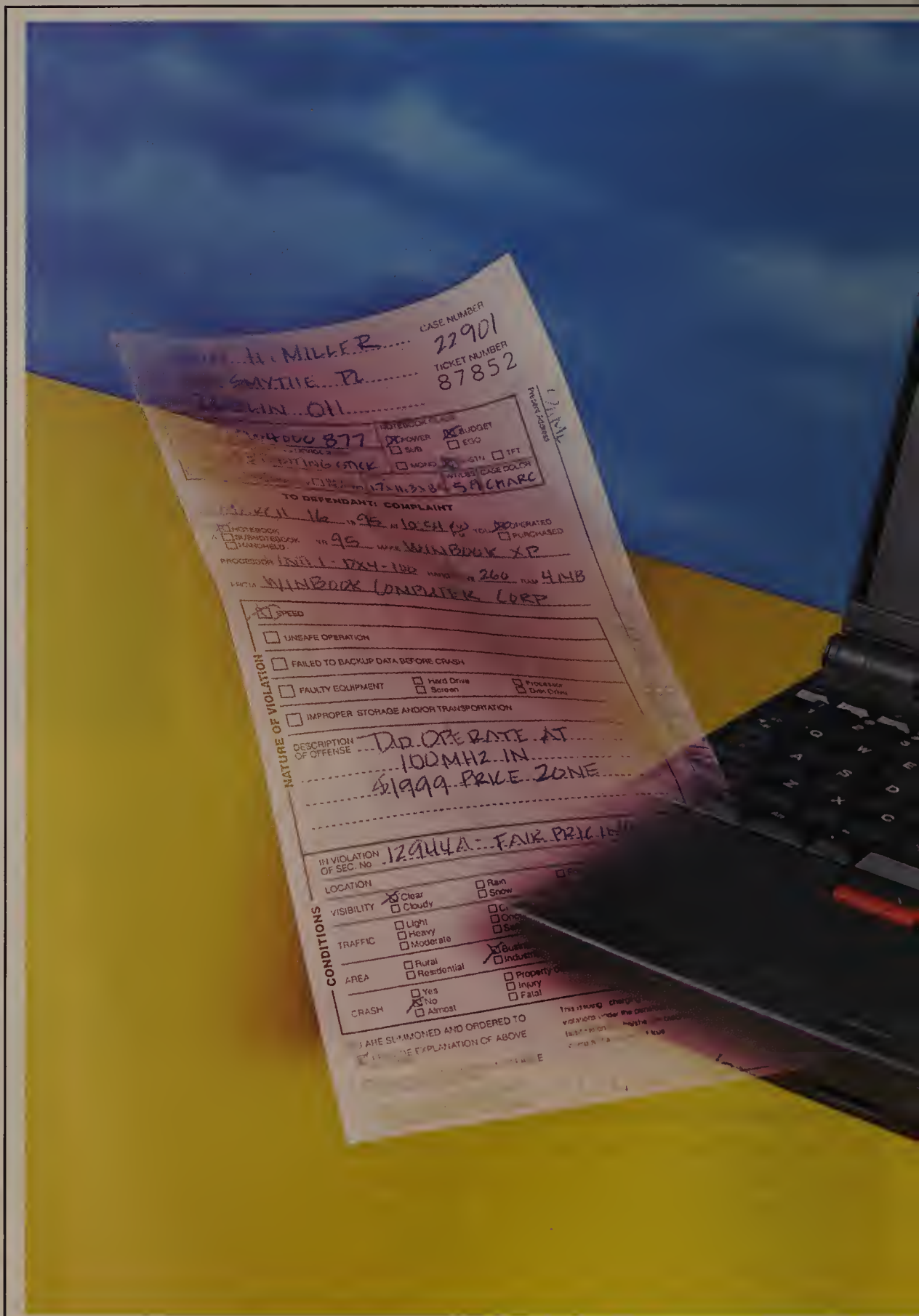
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Best MM:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- 16-bit sound card, stereo speakers
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 17" SVGA color monitor
- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-90 \$3795
Pentium-100 \$3995

Best MM Supreme:

- The above system modified to include:
- 24MB RAM
 - 1GB local bus IDE hard drive
 - Altec Lansing high-power speakers



Meridian™ 400C

DX4-100 \$2995

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- External 3.5" 1.44MB floppy drive
- STN color VGA 7.9" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 7.8" to 10.2" x 1.7"; 3.9 lbs.



Meridian™ 800C

DX4-100 \$3195

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- Dual-scan color VGA 10.3" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 8.9" to 11.7" x 1.9"; 6.3 lbs.

*Orders must be for *Computers Now!* configurations; we've listed just a sampling here. Since we continuously update this list of configurations, please call to confirm your system is on the list. This offer is good only as long as these pre-built systems remain in stock. Other ZEOS systems and custom configurations may take slightly longer—about a week. All orders are subject to credit approval. Monitor upgrades available on all desktop *Computers Now!* packages. Orders must be received by 1 p.m. Central Time, M-F.

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Circle 258 on reader service card

Entrée to Internet; Taking Warp for a Spin

Leg Up on the Internet

My sincere thanks for your story on Internet access ["The Internet: How to Get There From Here," January]. I'd wanted to get on the Internet for some time, but traditional online services didn't have good enough access, and my area had no local access numbers. Your comprehensive comparison of the online services, shell account providers, and SLIP/PPP account providers gave me the information I needed to finally get hooked up. *Aaron C. Conley, Internet*

This Is Warp Speed?

I'm a computer programmer and technician. When Warp came out, I decided to invest in it. My home system is a 386DX-33 with 4MB of RAM and a 420MB hard drive. Remember IBM's hype about how Warp would run on a 386SX with 4MB of RAM? Yeah, right. Once I'd installed the software that came with Warp, which took about 2 hours, I tried some programs. Some took 30 to 45 seconds to get going—all that lights up is the LED from your hard drive. You might think your machine is in an infernal loop.

Consumers who purchased Warp with 4MB of RAM are going to be very disappointed. If Windows 95 is as slow as Warp, the computer world is in big trouble. Warp does pack some terrific software, but you need the RAM to run it efficiently. I'll stay with Windows 3.11 until I can afford more RAM.

*Gerry Lapalme,
Asbestos, Quebec, Canada*

Health Before Profit

November's *Consumer Watch* on repetitive strain injuries got my mind working—and fuming.

While I don't have RSI, I do suffer back and neck problems from a decade of work in an improperly configured

workstation. Many times I wished I could look out a window to refocus my eyes, or stop typing for 10 minutes, or get up and stretch.

Every company wants everything now, right this minute. But what company will take the time and resources to make a worker's desk more usable? They'd rather use up their workers and hire someone fresh. Few companies let workers pace themselves to avoid RSI.

I had to buy what I needed myself to make my work space more comfortable.

*Kurt M. Nehrbass,
Buffalo*

Retooling a Response

In response to letters in your January issue about the editorial "IBM and Apple Fumble Windows Challenge," Phil Lemmons said:

"IBM is trying to win attention by getting OS/2 Warp preloaded along with Windows rather than instead of it. Why? Because buyers overwhelmingly want Windows. Why? Because they want Windows applications." His response is half right: Buyers overwhelmingly want "applications." The reason they overwhelmingly want Windows apps is that they're what's available.

People just want to get their work done. As long as developers produce only Windows apps, that's what people will buy. Yes, it would be suicide for developers to ignore such a market: In that light IBM has wisely chosen to make OS/2 an all-encompassing environment, running more apps than any other environment, including DOS, Windows, and OS/2 apps.

It's time for developers to take notice of OS/2 and break the bonds that tie

them to Microsoft's whims. OS/2 market share is finally reaching critical mass. I am one developer who hopes to see OS/2 succeed, if only to give the marketplace new choices.

David W. Terry, Internet

Local Motion

Regarding "The Local Angle" in December *Letters*: I agree that local stores can offer more in service, reliability,

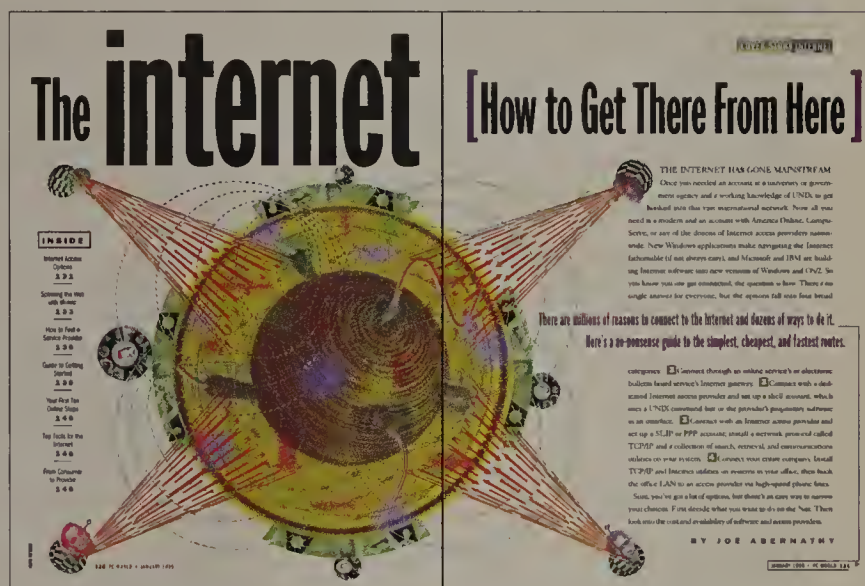
and cost than most direct, computer, or supercomputer stores. I deal with a local store owned and managed by people with great technical knowledge, who believe in helping customers to the point of advising against upgrades when they would be adverse to a customer's interest. They listen well and discuss every aspect of components in the finished product. Will I buy from this store again? You betcha!

*Edwin B. Kravat,
Englewood Cliffs, New Jersey*

Editor's note: For *PC World's* guided tour through the various avenues to buying a new PC, take a look at our March feature "Let's Make a Deal."

Trust CD-ROM Protection

Regarding January's *Consumer Watch* on copy protection: The solution to piracy is the distribution of software on



WHAT TO LOOK FOR IN A TOSHIBA, COMPAQ

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

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



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

AND IBM NOTEBOOK.



No sticker shock here.

The 910N costs less than the IBM ThinkPad 755C.

On the road, even a few ounces can make a big difference. The 910N is over half a pound lighter than a Compaq LTE Elite.



Standard memory, you ask? The 910N features 8MB RAM, compared to the 4MB RAM in the IBM ThinkPad 755C.

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

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

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

To see what's going on, there's a 10.4" TFT active-matrix color screen for crisp graphics. And on a single charge, the lithium ion battery lets you work six to ten hours.

As with every Ascentia notebook, the 910N comes with a 3-year world-wide limited warranty.* For a little extra reassurance, we provide a 48-hour repair service** and around-the-clock telephone support. It's what you'd expect from one of the world's largest computer makers.

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matrix or 10.3" DS-STN
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Type II or one Type III

Lithium ion battery:
6-10 hours use

Weight: 6.1 lbs.

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CD-ROMs. These discs are reliable, durable, compact, and fast. Most people won't part with their one-and-only CD program disc, so piracy will be stopped at the source. Soon, CD-ROMs will be the default medium for software.

AND THE WINNER IS...

PC World congratulates the following readers, who won prize systems when their returned Reliability and Service Monitor surveys were selected at random:

- James Duncan, February 1994, winner of a Zeos 486DX2-66
- Langley Robertson, March, winner of an Axik 486DX2-66PCI
- Carl Gustafson, April, winner of a Blackship BLK 486/66LB
- Bruce Harget, May, winner of a Inmac 466P
- Floyd Henderson, June, winner of a Micron 4100PCI Magnum

Now if only the vendors would exploit the capabilities of CD-ROMs. All the software I've obtained this way has been nothing more than floppies copied onto a compact disc. If it were compiled into one monolithic clump it would diminish the temptation to make a copy for Uncle Bob.

Consumer Watch mentions that some companies send out update discs every six months to registered users. This practice supposedly met with resounding customer approval. Most software companies do the same, except they call these semiannual installments "upgrades" and make us pay dearly for them.

Lary Harris, Rockville, Maryland

Hidden Corruption

Considering the furor over the Intel Pentium flaw and data integrity issues, why isn't there more concern over the potential data corruption of Enhanced IDE drives? The PCI spec strongly recommends parity throughout the whole computer system, and Enhanced IDE (unlike SCSI) is the only part of today's PCI systems that does

not have parity protection. Since we worry about data integrity in today's mission-critical applications, we should worry about all sources of potential data errors. Operating in today's high-speed computing environment without the protection of parity checking is a risk I'm not willing to take.

Robert Callaghan, CompuServe

Who's Zoomin' Who?

When you purchase a car, you don't need to obtain permission from the manufacturer to allow your spouse to drive it. When you buy software, on the other hand, it appears you don't own it; instead, you're given a highly restrictive permanent loan. Software companies have brainwashed their customers into thinking that giving a friend a copy of a program is tantamount to committing piracy. If that isn't bad enough, now we face another form of rip-off: upgrades. Bug-ridden software goes to market, and every six months or so an upgrade is released to fix the bugs, but often the upgrade creates other bugs that must be remedied by other upgrades.



MOVING?
JUST CALL
AHEAD

With the amount of money software companies make, they can and do hire battalions of lawyers to keep the consumers subjugated.

Allan Jay Silver, Corvallis, Oregon

Le Mot Juste

Almost every piece of software on the market now can draw round-cornered rectangles. But that name is a mouthful—we can do better. I suggest the term *oblloid* for the following reasons: It's a portmanteau suggestive of *oblong* and *ovoid*; it has the same number of letters as *square* and *circle*; and as far as I know, nobody owns it.

Richard S. Russell, Internet

Fear of Error Messages

I recently purchased a Pentium-60. As a novice, I felt a little uneasy about messing around with my Windows configurations, but then I read "Tips to Supercharge Windows" [December]. One night, with time to kill and a brew in hand, I put my fears aside. As I defragged my hard disk, ran MemMaker, and turned off the screen

saver, my confidence slowly grew. With every click I felt myself becoming more the master of my computer. My cursor moved deftly across the screen—want me to reduce my program groups? No problem, click, drag, click, drag, done!

However, my confidence was shaken when I tried to enable 32-bit access—all I could see was the word 'error' in the sentence that appeared on screen. I had to assume you would not suggest any actions that might endanger my computer—my companion, my vehicle to the information superhighway.

It's been several days since that incident, and I've recovered somewhat. But I'd like to know, why did changing my disk access setting result in an error message?

Frank Kang, Los Angeles

Editor's response: Microsoft's Windows 3.1 manual admits that the 32-bit disk access system's tests may fail to detect incompatible hardware, stating that "you will not know that anything is wrong. You just won't receive the benefit of 32-bit disk access." However, it continues, "If a later

test fails, an error message appears, warning you that something has gone wrong and advising you to reboot." Apparently, this is the error you encountered. To our knowledge, you were nevertheless protected from data loss, and the 32-bit access system improves performance for the vast majority of users. —*Shane Rau*

Corrections and Clarifications

The chart in "Buyers' Guide to Printers" [December] failed to note that LaserMaster's WinPrinter 1000 comes with PostScript. It also listed the printer's resolution as 400 by 400 dpi; that's correct for PCL and GDI modes, but it prints 1000 by 1000 dpi in PostScript emulation mode.

In February's "Top 20 PCs: Newcomers Reach New Heights," we listed incorrect contact information for the AT&T Globalyst 600. The correct phone numbers are 800/637-2600 and 513/445-5000.

PC World regrets the errors.

Letters welcomes your responses and ideas. For contact information see page 12. ■

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software as well as hardware. Which means you can avoid rocky starts and productivity roadblocks. For those of you who are in the early stages of moving, ask for our *Planning The Move* kit to answer your software questions. These are only a few of the ways we've made moving from DOS to Windows™ applications easier than ever. The next move is yours.



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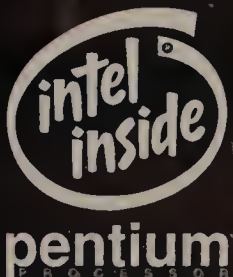
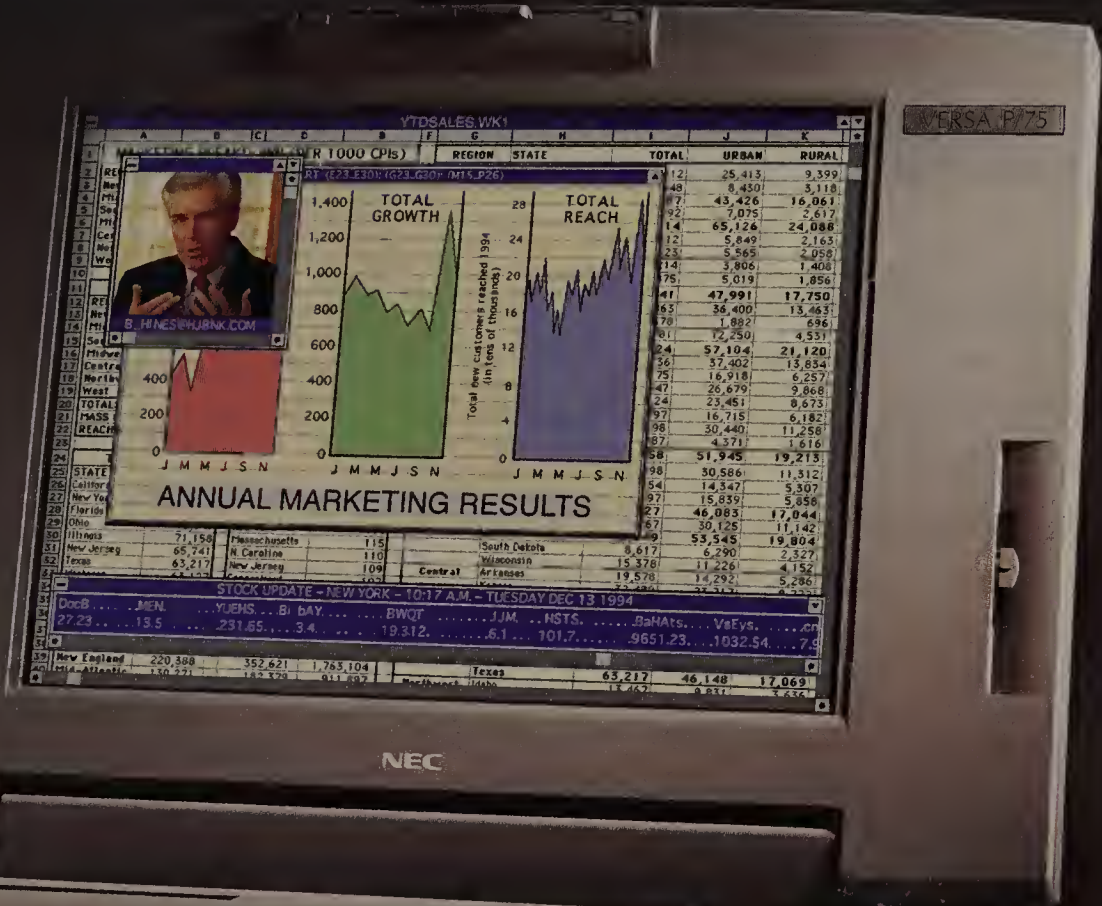
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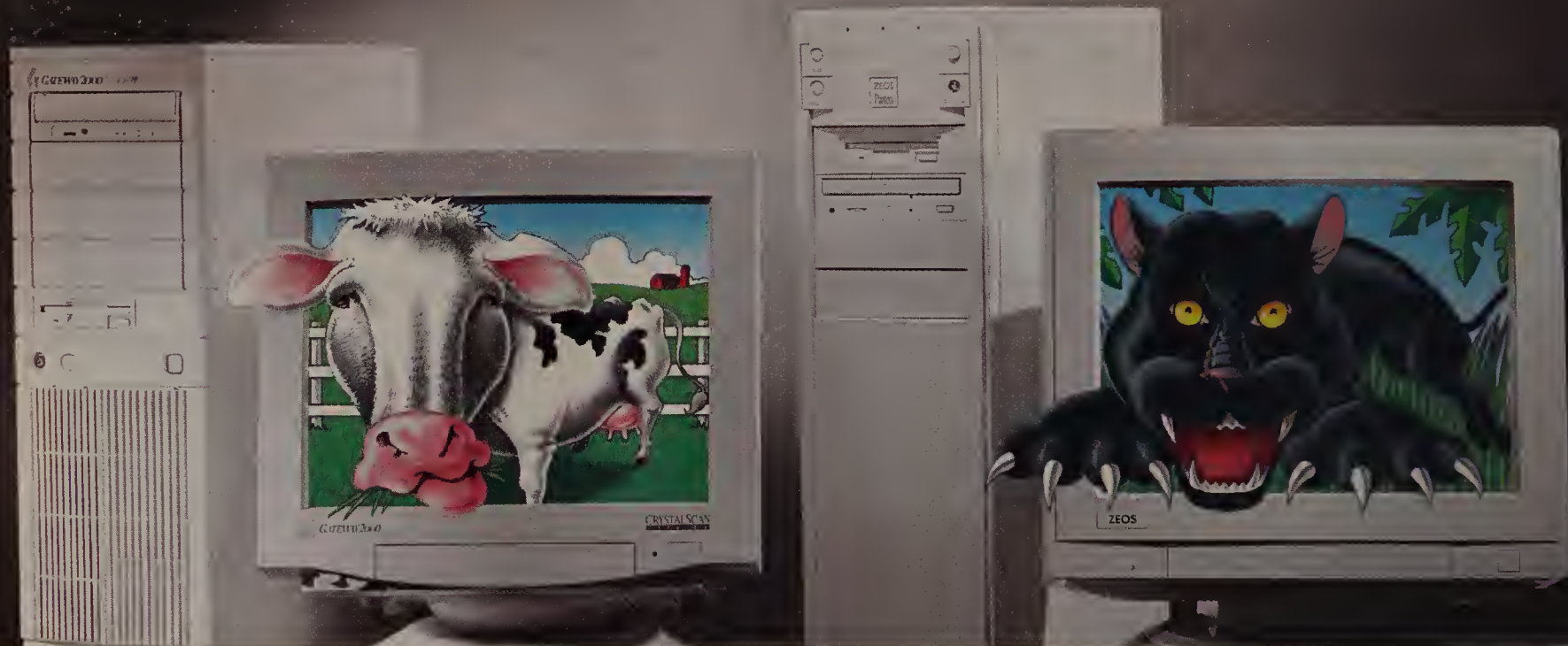
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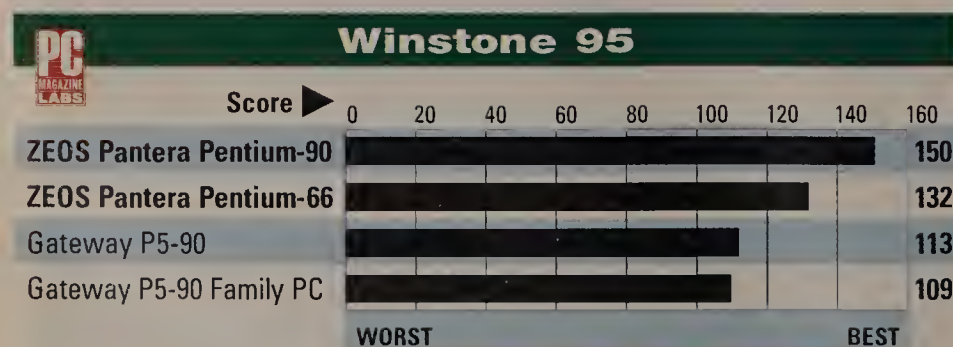
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The End of 'No Questions Asked' Returns?



You may not know it, but a battle is brewing—and the aftermath could very well change the way you buy your next computer. The war's being waged be-

tween PC hardware manufacturers and retailers. At issue: the liberal return policies that consumers count on when they're buying high-ticket items—and that hardware companies are determined to stop.

Money-back guarantees have become the norm among retailers selling everything from PCs to TVs, and customers love them. Can't get your new PC to work? Not satisfied with the quality of technical support? Find a better deal at the store down the street? No problem! Just take it back, show your receipt, and get a full refund—no questions asked. Sounds wonderful—to consumers, at least.

But PC makers tell a different story. "Every company is getting more returns than they feel are acceptable," says one PC company executive. "It may not be a hot topic at the customer level, but it is in our business." PC makers—along with manufacturers of just about every type of home electronics equipment—are on a mission to cut their losses. Their goal: to reduce the number of returns—or at least make retailers and customers share the cost of providing the service. Right now, the bulk of returned products go back to the manufacturer, who credits the retailer's account. (Though mail-order companies also have liberal return policies, they get to decide what's taken back and so can control costs.)

Just how high are the return rates be-

moaned by PC makers? That's tough to say, since companies are hesitant to disclose any figures. The public got a rare glimpse of the cost of returns several years ago, when Packard Bell made an initial public offering and reported that it took back products worth \$107 million in 1991.

Many Happy Returns

When was the last time you returned a home electronics item? For me, it was last December. I bought a TV-and-VCR combo, then a couple of weeks later found a better model on sale for less. Without thinking twice, I took the first set back, got my refund, and bought the other unit. And I didn't feel a bit guilty about it. The store advertises its no-questions-asked return policy, and I was simply exercising my rights under that policy.

As PCs move into the realm of home appliances, they're showing up in the same stores that sell TVs and stereos—and they're backed by the hotly competitive, and liberal, return policies that have become the hallmark of these retailers. Although 30-day money-back guarantees are the norm, many stores

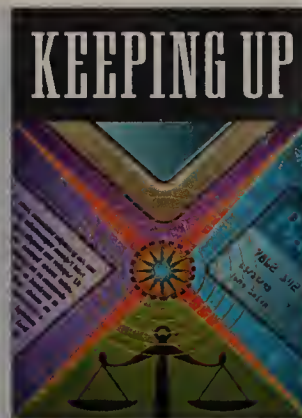
will accept returns beyond that period in the name of good customer service. Customers are taking advantage of—and some PC makers say they're abusing—this generosity.

The reasons products are returned range from the justifiable (a defect) to the fraudulent (for example, buying a PC to complete an important project, then bringing it back before the 30 days expire). But for most consumers, the reason lies in the gray area between these extremes.

The first-time home PC buyer may be confounded by the idiosyncrasies of multimedia and unable to get answers from tech support. In frustration, the buyer may pack up the PC and take it back to the store—an extreme but understandable step. Other customers discover their new PC can't satisfactorily run all the hot new CD-ROM titles that prompted the purchase in the first place. Back it goes (though it will likely be replaced by another, more capable model). Or a buyer may find a better deal elsewhere. And some may decide they can't afford a new Pentium after all—who hasn't suffered from remorse after an expensive purchase?

The U.S. Department of Education has funded a three-year project to research how computer technology can help disabled students learn effectively in schools. Project Connect will equip students with Macintosh PowerBooks and groupware from

Group Logic; they'll connect to a wireless LAN via Digital Ocean's network adapter, Grouper 100LT. Assistants using the same equipment will help students. Spokesperson Carolyn Knox-Quinn says while the project uses cutting-edge technology, the solu-



tion's relatively inexpensive... **Has Energy Star** changed public opinion about the computer industry's environmental correctness? Not according to *The Environmental Report*, a nationwide survey of 1000 consumers that was recently published by Environ-

mental Research Associates of Princeton, New Jersey. Six out of ten respondents couldn't name a computer company that stands out as environmentally responsible, and more than one out of four said there is no such company in the industry today.

By Roberta Furger



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Are these returns justifiable? Who should foot the bill? The answer depends on whether you're buying or selling.

Getting At the Cause

After a yearlong study, the Electronics Industry Association's (EIA) Consumer Electronics Group released a report last fall that delineated who's responsible for what and recommended steps retailers and manufacturers could take to reduce the chance of returns. The guidelines are voluntary, but they provide a clue to the changes in store. The report suggests manufacturers should:

- Improve the documentation that comes with home electronics equipment.
- Operate—or in the case of PC companies, beef up—phone support centers. The EIA recommends providing toll-free lines and prominently displaying the phone number in all documentation to encourage customers to call with questions, rather than take back the product.

• Improve training and support materials given to retailers. Statistics show that the more knowledgeable the sales staff, the less likely a customer will return a product.

Retailers should:

- Stop returning damaged products.
- Ask customers why they are returning products. There's also a recommendation to train customer service staff in how to refuse "unjustified returns," though the report doesn't spell out what that means.
- Check to see that all documentation, disks, and so on are returned.
- Limit the time period during which returns are accepted.

Some manufacturers have also talked about another possibility that was not mentioned in the report: getting retailers to institute restocking fees, used extensively by mail-order companies. You can still return the product, but you'll be charged anywhere from 5 to 20 percent of its cost.

A Right or a Privilege?

"The consumer has to take some responsibility," said AT&T vice president Stan St. John at a consumer electronics show. "You would never hear of someone's returning a car because they changed their mind or got a better deal," said another industry executive. "Why should they be

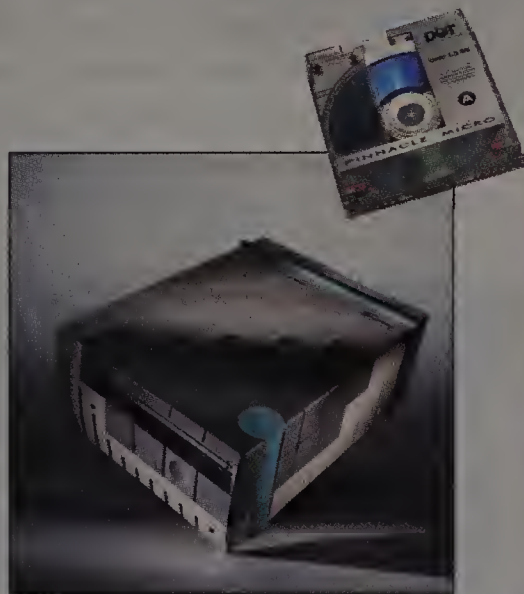
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able to do so with electronics equipment?"

Clearly, consumers need to make smart, educated choices—to read up on technology and assess their needs before finalizing a purchase. But manufacturers and retailers need to hold up their end of the bargain as well. For starters, that means not making unwarranted claims about products, ensuring that the sales staff is knowledgeable about all products' capabilities and does not recommend inappropriate equipment, and adequately staffing technical support and customer service lines with trained personnel. That's a tall order, but unless it's filled consumers will keep on returning products, and the industry will be left to fight over the bill.

Shop Talk

Still Sitting by the Phone

Last July, Mari Frank had problems with Dell ("The Rumors Didn't Hold True," January 1995), and the editor's note explained how Dell was correcting the problems. Considering my experience, I'd have

to say things have gotten no better at Dell. First it took me several days just to order the computer. It was impossible to reach the salesperson I'd been working with; all I got was an answering machine.

Once you've placed an order, Dell gives you another phone number you call to check the order's status. I waited on hold for over 50 minutes. When I finally got through, I mentioned how long I'd been on hold, and the representative responded, "We know. There's a board that tells us the number of people on hold and how long they have been holding." No apology or concern for my prolonged wait. This convinced me that Dell wasn't very customer oriented, and I canceled my order. After reading Frank's letter, I think I made the right decision.

What strikes me as odd is that *PC World* continues to rank Dell extremely high in customer service. In January's Power Top 20 ["Top 20 PCs: Welcome to the 90s"], *PC World* rated the Dell units 79 for service—the second-highest score. Considering my experience, Frank's report, and the

other dissatisfied customers *PC World* has heard from, Dell's reputation for outstanding service and support is simply unwarranted. I based my original decision to buy a Dell partly on the ratings in *PC World*, and I feel misled.

Andy Krochmalny, Tempe, Arizona

Editor's response: In the January issue, we reported an increase in the number of letters complaining about Dell's poor service. The letters were notable because of the company's long history of no complaints. We also reported Dell's assurances that things were on the mend. But letters like Krochmalny's, complaining about long waits on the sales and technical support lines, keep coming in.

Steve Smith, Dell's director of customer service, says a series of events led to the highest—and least predictable—volume of calls the company has ever experienced. According to Smith, Dell has sold more Pentium computers than any other vendor to date. So when Intel's announcement of the faulty Pentium chips hit the streets, Dell customers hit the phones. And they



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called the company that sold them the machine—Dell, not Intel. These calls, compounded by a barrage of postholiday questions from owners of new computers, resulted in one day when it was impossible to get through to the company at all. Smith assured us that these were exceptional circumstances, and that if the company had been able to predict the Pentium calls, it would have been prepared.

As for getting through to a particular salesperson, Smith recommends calling the main sales line and asking whoever answers to give you that salesperson. However, everyone in sales should be able to provide the same level of service.

It's important to note that the *PC World* service ratings are based on reader surveys, not editor evaluations, so it was *PC World* readers who rated the company.

And Behind Door A

Although I've used a computer for 25 years, I acquired my first IBM product—OS/2 Warp—last week. I don't want to buy another for at least 25 more years if

the experience is going to be like this one.

When I attempted to load Warp, I couldn't. My PC, like millions of others, designates the 5¼-inch drive as A: and the 3½-inch drive as B:. There was no way for me to load Warp because the operating system has to be loaded from the A: drive. I looked in the user guide but couldn't find one word about my predicament or how to work around it. I checked the README file, but again found no reference. I then phoned technical assistance—a toll call—and waited 35 minutes to be told that IBM, in accordance with current industry standards, designates 3½-inch drives as A:. The technician said the solution was to switch the cables on my two drives.

I was able to make the switch, but I'm wondering what millions of less experienced users will do when they open Warp.

John Coons, Visalia, California

Editor's note: An IBM spokesperson confirmed that the company is shipping Warp only on 3½-inch disks because that is the current industry standard. Customers with 5¼-inch A: drives can get directions for

switching floppy drive cables by calling 800/992-4777 and requesting document 2582. Or go to the IBM OS/2 support forum on CompuServe ([goto ibmos2](#)), and search the library section for **w5crdr.zip** (if you have Warp on CD-ROM) or **w5drdr.zip** (if you have a 5¼-inch A: drive). Once you have downloaded the correct file, you'll need to unzip it using the shareware decompression utility PKUnzip. The file will create 5¼-inch disks you can use to install the operating system.

48 Hours

Every now and then circumstances bring you to appreciate the efforts of others. Over the past few years, I have purchased eight or so computers.

I bought the most recent one, an Ambra T4661/VL 486DX2 M-Tower, in March 1994. At the time, it was one of Ambra's top computers. The system was configured with a CD-ROM drive, a tape backup unit, and an Ambra 15-inch FST monitor. It worked flawlessly—until a recent day when I was working on my computer. ►

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PC WORLD

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CONSUMER WATCH

Without warning, my monitor went blank. After several attempts to restart, I decided to call customer service. I was apprehensive about what I'd find on the other end of the line because of IBM's decision to phase out Ambra computers.

I called IBM technical support at approximately 11:30 a.m. The service representative was very friendly. Over the phone, we determined that the monitor had gone bad and would have to be replaced. The service representative took my name and shipping address, and in less than 24 hours a new monitor arrived at my front door! It worked fine. I called the shipper and packed my old monitor up (as per the in-

structions that came with the new monitor), and that very day the shipper arrived to transport the old monitor back to IBM. Incredible!

*Butch McConn,
Grand Forks, North Dakota*

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



Windows Calculator

Bug: The calculator applet included with Windows and Windows for Workgroups versions 3.1 and 3.11 has a little math problem of its

own that results in fairly significant subtraction errors.

Fix: Microsoft has uploaded a fix to a number of online services. You can find a revamped version in the self-extracting archive file **ww1138.exe** on CompuServe (**go msl**), GEnie (in the Microsoft Software Library), on the Microsoft Download Service at 206/936-6735, and via the Internet using ftp at **ftp.microsoft.com**.

Lotus Organizer 2.0

Bug: Organizer 2.0 users who downloaded the product from ZiffNet, as well as a few who purchased the early shrink-wrapped copies, have reported numerous problems including conflicts with some super-VGA and XGA video adapter drivers, a File Archive feature that doesn't work, portions of Organizer 1.x data files that aren't converted, difficulty printing, and a File Export feature that creates DBF-format files containing only memo fields.

Fix: Lotus has released a two-part update, Organizer 2.0a, that fixes the video driver and File Archive features. The file **org2upd.zip** contains the main portion of the patch. If you use Organizer 2.0's group calendar

and scheduling features, you'll also need **orgadm.zip**. Each file contains instructions. You can find the update files on CompuServe in the Organizer General Library (**go lotusb**) or on Lotus's own BBS in the Organizer file area. For a list of known problems, download the frequently asked questions (FAQ) file **orgfaq.txt** from CompuServe or the Lotus BBS (617/693-7000).

QEMM 7.5

Bug: The initial release of Quarterdeck's QEMM 7.5 (in which the QEMM386.SYS file is dated September 17, 1994, or October 12, 1994) has trouble resizing XMS handles, a glitch that can interfere with XMS-based disk caches (such as SmartDrive) and prevent you from exiting and then reloading Microsoft Windows.

Fix: Quarterdeck has released a patch for all the above glitches, as well as for problems that the company attributes to third parties. You can find the patch in a self-extracting archive file named **qpat2.exe**, located on CompuServe in the Quarterdeck forum (**go quarterdeck**).

—Scott Spanbauer

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

[?]

A black rope with white speckles hangs vertically from the top left. At the bottom, it is tied to a yellow handle, which is attached to a colorful toy figure. The figure has a purple body, orange and black wings, and a yellow head with large eyes.

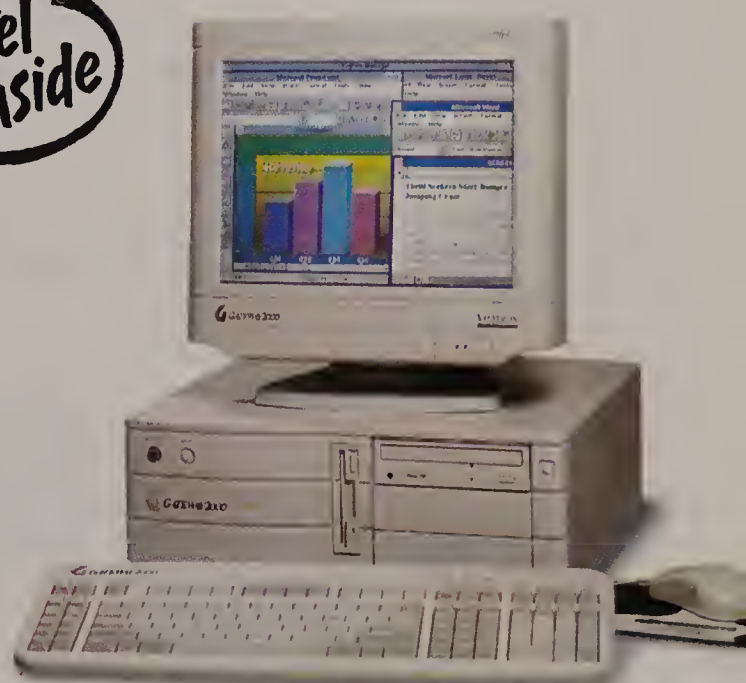
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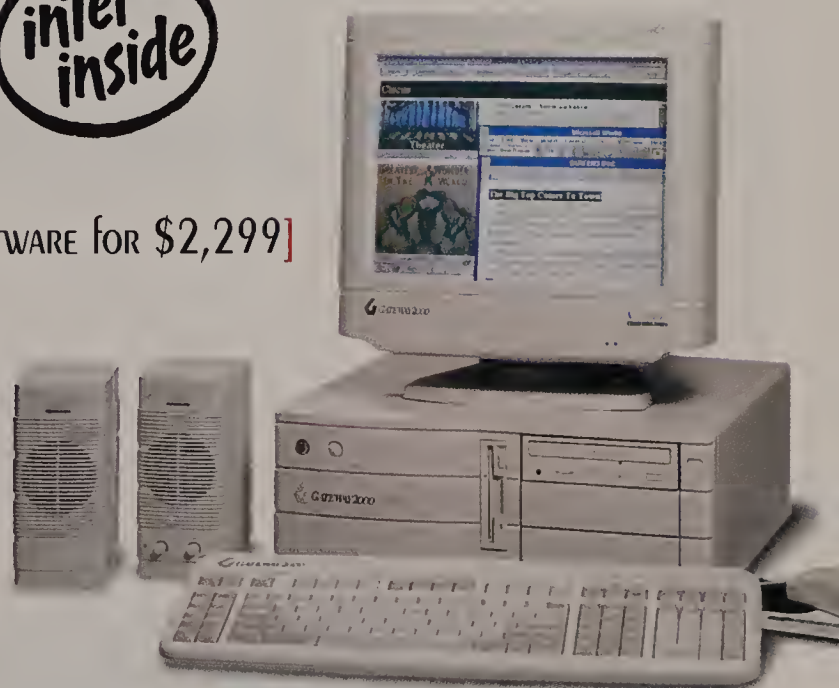
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system, since I don't have to listen to instructions or prompts to figure out a feature. Plus, I can dial into it remotely and see on my laptop exactly what I would see on my desktop screen. No more pouring quarters into phone slots in a futile attempt to access voice mail. And for the price of an expensive fax machine—around \$5000—the company can add fax capability, something we plan to do next year. That way, instead of hanging out at the fax machine waiting for a confidential fax to come through, I can access it through Word 6.0.

Cure for PC Allergy

I'm not the only manager delighted by this product. Even those who were allergic to PCs like it. Many find Visual Mailbox so easy, they've warmed to the PC in general and are doing more with spreadsheets, word processors, and other software.

Best of all, Visual Mailbox came with the VMX 200 system we already were buying—we didn't have to purchase additional equipment or phone lines. (I understand big telecommunications companies are beginning to offer such products to their corporate customers. AT&T's Intuity system, for example, has similar capabilities.)

But not even Visual Mailbox is perfect. It doesn't tie into our E-mail system to give us a central place to look for messages (we hear Octel is working on a upgrade that would integrate the two). More annoying, incoming callers must still toil through the voice-mail maze; they have no access to Visual Mailbox (though the VMX 200 system itself is less complicated than our previous system). But Visual Mailbox does bring callers one immediate benefit: Since it's easier for us to check our voice mail, we respond to calls faster. And that translates into more time we can spend talking to customers, suppliers, and important contacts and less time fiddling with voice mail—a win-win situation for all.

Edited by Bronwyn Fryer

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

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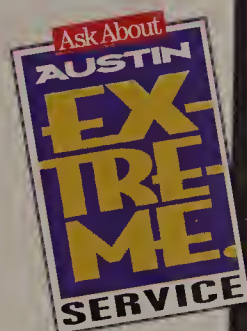
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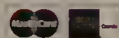
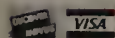
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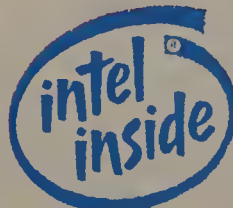
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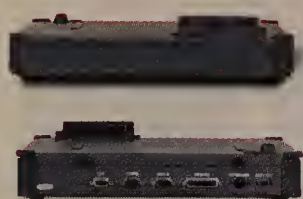
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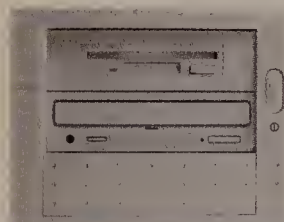
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Microsoft Sex: Coming Soon?



I have two exciting words for you: Microsoft Sex.

Sex is hot. It's a three-letter word. It's the logical extension of Microsoft Bob. You heard it here first.

I promise to return to Sex after a few words about the wildly overhyped Bob. Bob is Microsoft's motley agglomeration of function-deprived programs wrapped in something the company calls a "social interface." Citing dimly relevant academic studies purporting to show that "the human-computer relationship is fundamentally social," Microsoft grandly claims this thing is some sort of design breakthrough.

It isn't. If Bob came from anywhere but Microsoft, it would be lucky to attract anything but snide chuckles. The "social interface" is mostly a bunch of cartoon animals that spout dialog balloons. They're not so-called "intelligent agents": Their combined intelligence would not equal Stimpy's. Actually, they're not even agents, because they can't do anything except show you tips and menus.

Simply Bad, Bob

Lots of programs have reduced features for "simplicity," and it just about never works. My favorite was a word processor called QWERTY: It used an incredibly simple "typewriter" interface that in effect turned your machine into an IBM Selectric.

Bob's "simplicity" does not extend to interface standards. Even in Monty Python's Complete Waste of Time, <F1> gets you at least a proud boast about the lack of help and sometimes an outright insult. Bob only insults

your intelligence; pressing its <F1> key usually does nothing at all.

Maybe Microsoft plans to be the General Motors of software. Every time I rent a GM car I have to waste time figuring out how to turn on the headlights, because no two switches work the same way. Likewise, Bob reverses the long-established left-right conventions for OK and Cancel buttons in simple dialog boxes. A Microsoft spokesperson claims user tests show it doesn't matter. So if it ain't broke, why "fix" it to work differently from every other Windows program?

Useless Usability

But then, Microsoft's usability lab seems to be able to produce results for all occasions. For months now, we've heard the company boast about how user testing led to the Windows 95 Taskbar, which lets you switch between programs without having to learn the dreaded <Alt>-<Tab> combo. Even current Windows programs offer a Switch To option if you know enough to find it at the close box.

Not the usability-tested Bob. Bob does let you open multiple programs at once, but only if you know how to <Alt>-<Tab> out of them. The only way a newcomer can find out about that—no help, remember?—is to wait until a cute wittle aminal gets around to offering a tip balloon.

So which is it? <Alt>-<Tab> is impossible for newcomers, or <Alt>-<Tab> is great? The answer from Microsoft's crack test labs: Yes.

Used this way, usability tests become little more than marketing hype. Who knows, if you really tested carefully, you might discover that the best user interface for novices would have a separately labeled key for every function,

not unlike those giant cash registers for mathless teens at McDonald's.

So Bob's successor has to be Microsoft Sex. I can just hear the rationale: "You know, something clicked when we read this study by three professors at the Wilford Academy of Beauty. According to their pioneering research, the human-computer relationship is fundamentally sexual.

"We've proved it in our usability labs. We studied top programmers. Just as our Bob research showed that computers are too confusing, we discovered that sex is just too doggone difficult. A potential partner is like software. There are so many options most people don't know where to begin."

It's coming, I tell you! Chuck the Chicken or Dilly the Duck will waddle

Sex is just too doggone difficult. A potential partner is like software. With so many options, most people don't know where to start.

out and ask you how many partners are available. Then, as in Bob, Sex will step you through umpty-seven menus and clicks' worth of hand-holding.

But it may not let you hold hands. Dopey Bob can't do envelopes or page numbers. Likewise, with Microsoft Sex many classic techniques will be unavailable. Even if you master <Alt>-<Tab>, you probably won't be able to kiss and hug at the same time.

The way Microsoft will explain it, such radical full-function multitasking would probably just confuse you.

Stephen Manes is a columnist for the New York Times and coauthor of Gates: How Microsoft's Mogul Reinvented an Industry (Touchstone/Simon & Schuster, New York, 1994).

By Stephen Manes

PENTIUM UPGRADES: WERE THEY WORTH THE WAIT?



After a two-year wait, Intel's Pentium upgrade chip for 486 systems finally landed in our test lab. Now we know what "Pentium upgradable" really means.

Edited by Russell Glitman

Think back. If you bought a 486 system in the last two years or so, the ability to upgrade to "Pentium technology" was probably a key selling point. It meant that

one day you could pop a new Pentium chip into your old 486 and give it a new lease on life. Right?

Well, not exactly. Now that Intel's first Pentium upgrade for 486s has finally arrived—more than two years after it was first announced—we've learned the whole story. According to our benchmark tests, Intel's initial release of its Pentium OverDrive upgrade rarely delivers Pentium performance. Instead, in all but a small minority of 486 PCs, you're far more likely to experience only 486DX4-75 performance. Moreover, 3 of the 11 systems we tested refused to function when the Pentium OverDrive was installed.

Looks Like a Pentium but...

The Pentium OverDrive does have a Pentium core, and like other OverDrive processors, it multiplies the bus speed—in this case by two and a half times. The initial version works in 486 systems with a 25-MHz bus—that is, 486DX2-50, 486DX-25, 486SX2-50, and 486SX-25 systems—for an internal processing speed of 63 MHz (the Pentium OverDrive for 33-MHz-bus systems, which has an 83-MHz core, is due midyear). Under optimum conditions, the 63-MHz Pentium OverDrive's WinWord, Excel, and Freelance test results are comparable to the average 60-MHz Pentium's. (The disk-intensive Paradox test results, however, are significantly worse.)

The problem is that optimum conditions for the Pentium OverDrive seldom exist. Plug this upgrade chip into the 238- or 237-pin socket found in the vast majority of 486DX2 systems (and in many 486DX and 486SX systems), and you're more likely to see an average boost in overall DX2-50 system performance of 22 percent—about 1 percent better than that offered by a DX4-

75 (see the Test Report's write-through results). Despite the similar performance levels, Intel offers the 63-MHz Pentium OverDrive at a list price of \$449, while the 75-MHz DX4 OverDrive lists for \$299.

Stuck in Second Gear

Shoehorning a Pentium into a 486 PC always seemed dicey. For one thing, the Pentium is designed to feed a 64-bit data bus, so a 486 system's 32-bit data bus is a classic bottleneck. A key part of Intel's strategy for boosting the Pentium OverDrive's performance was to enlarge the chip's internal cache to 32K—twice the size of the cache in an ordinary Pentium chip—so it would spend less time fetching data from the 486 system's slow memory.

From the beginning, Intel chose to equip the Pentium OverDrive with a high-performance write-back cache instead of the slower write-through cache found in its 486-class chips. However, for compatibility reasons, the Pentium OverDrive also has a write-through mode. Three of the systems we received for testing—an SX-25, an SX2-50, and a DX2-50—could toggle the Pentium OverDrive between caching modes, so we were able to determine that write-back mode made these machines perform on average 15 percent better than did write-through mode. Only in the optimum write-back mode would these PCs yield Pentium performance.

It was only about a year ago that 486 PCs with write-back support began to appear—and few of those have 25-MHz buses. Intel product marketing manager Bob Bennet admits that "somewhere under 10 percent" of 486DX2-50, 486DX-25, 486SX2-50, and 486SX-25 systems support the Pentium OverDrive's write-back mode. In our search for Pentium OverDrive test sys-



Breaking News

JUDGE REJECTS MICROSOFT DEAL: In an unusual ruling, federal judge Stanley Sporkin has rejected the Department of Justice's proposed settlement of its antitrust investigation of Microsoft. The Justice Department immediately moved to appeal the decision.

Ruling in February, Sporkin said he was unable to find that the settlement met the minimum legal test of serving the public interest.

"Microsoft should see this as a harbinger of the need to police itself," said Karl Wong, principal analyst at Dataquest. He said he doubted the ruling would interfere with the release of Windows 95, but it might halt Microsoft's merger with Intuit.

Microsoft has been under investigation since 1990, when the Federal Trade Commission opened inquiries into claims that Microsoft monopolizes the market for PC operating systems. After deadlocking in 1993, the FTC handed off the case to Justice, which in July 1994 reached a settlement with Microsoft that would require the company to modify its "bundling" agreements with computer hardware vendors.

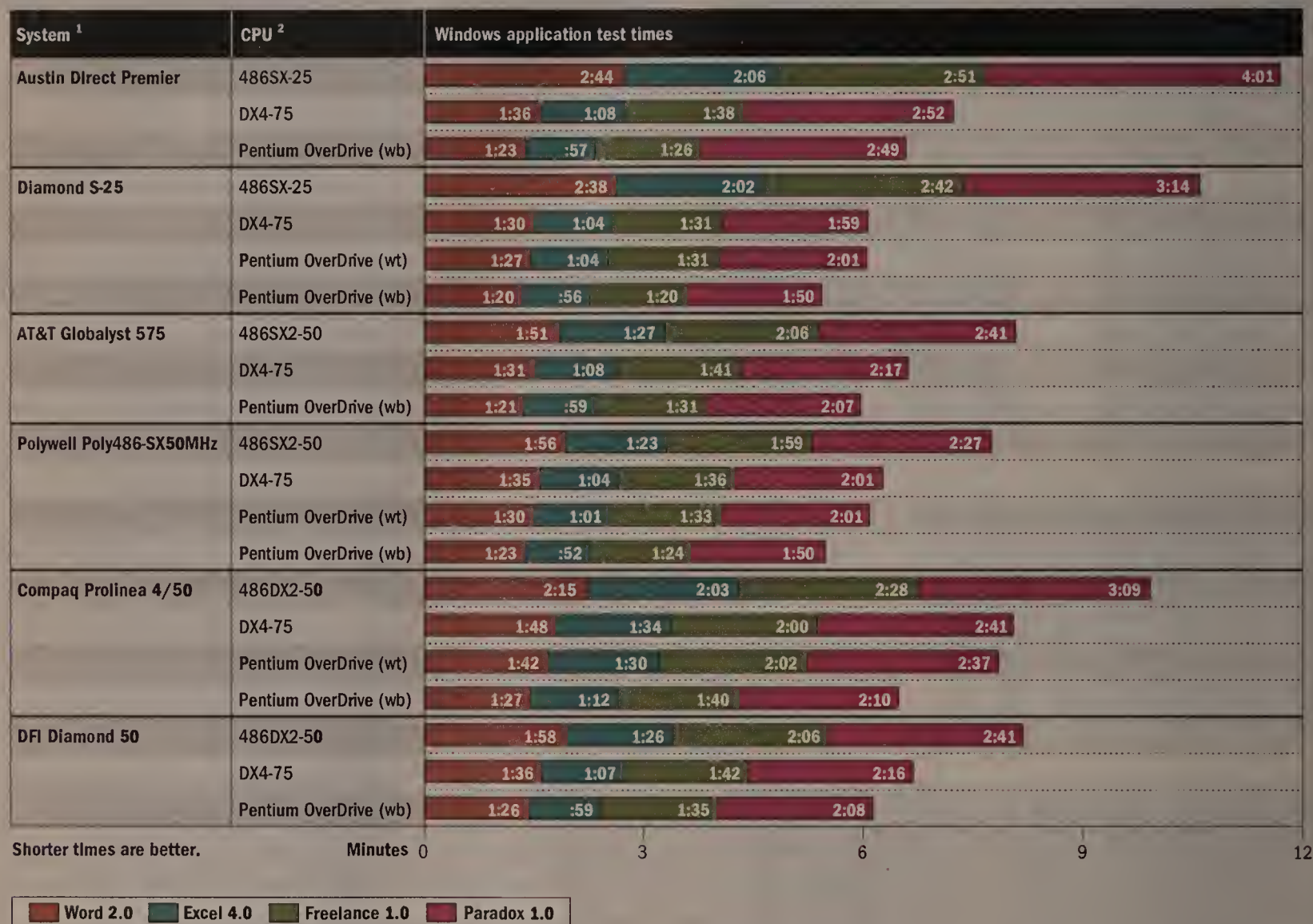
Sporkin said the settlement addressed only future practices concerning Microsoft operating systems and did nothing to remedy the monopoly the company had already attained.

"Simply telling a defendant to go forth and sin no more does little...to address the unfair advantage it has al-

(continued on page 53)

TEST REPORT

Pentium OverDrive Offers Slight Speed Advantage Over DX4-75 Upgrade



¹ All systems tested with 8MB of RAM and a 256K secondary cache.

² wb = write-back cache used, wt = write-through cache used.

A representative sample of systems tested. Results from PC World Test Center application benchmark tests.

tems, we found six shipping PCs with 25-MHz buses that support the Pentium OverDrive's write-back mode.

The Pentium Retrofit

Although we were unable to obtain other commercially available systems with 25-MHz buses, we received a number of PCs that had been specially configured for us by vendors. Surprisingly, three of these systems bombed completely when we installed the Pentium OverDrive and could not be revived until we swapped the 486 chip back in. A fourth machine required considerable troubleshooting before we finally got it up and running.

Of the systems that failed, all could probably have been resurrected with a BIOS upgrade, although even then none would enable the Pentium OverDrive's write-back cache. Moving jumpers, changing BIOS settings, and even occasionally changing the BIOS will be standard procedure for anyone trying to install a Pentium upgrade. In the words of Steve Tobak, director of corporate marketing for OPTi, a major motherboard chip set vendor: "Anyone who goes with the Pentium OverDrive should be aware that there may be an issue of getting it to work."

If for some reason you think that the Pentium OverDrive is worth a shot, your

best insurance is to call Intel's fax-back service (800/525-3019) first to find out whether Intel has tested and verified your system as being compatible with the Pentium OverDrive. You can also call Intel at 503/629-7000. According to Bennet, however, "Intel does not track whether specific systems support the Pentium OverDrive's write-back mode." If you have trouble getting the Pentium OverDrive to work in a system verified by Intel, the company's technical support will help you, or Intel will refund your money. You should also check with your system vendor to verify that write-back mode is supported.

What if your PC isn't on Intel's list? In

that case, the company may not have tested your system yet, or it may have tested it and gotten unpleasant results—Intel won't reveal which computers fail its tests, only those that pass.

The Upgrade Shuffle

The saga of the Pentium OverDrive began in late 1992, when Intel supplied specifications for the upgrade chip, including details of the write-back cache, to system manufacturers. Makers of systems, motherboards, and chip sets (those small constellations of chips that support the CPU and control the expansion bus) all committed to supporting the chip, even though no one saw silicon until relatively recently. Starting in November 1993, Intel's Verifications Labs charged \$5000 per system design to test for compatibility using a simulator that emulates the chip.

"Specs are always open to interpretation," notes Chas Rimpo, a strategic marketing manager for desktop products at

VLSI, another major chip set manufacturer. "Until you have silicon, you never know if it's really going to work." Patrick Lee, president of Prima, a motherboard maker in Fremont, California, agrees. In defense of two of his company's motherboards, neither of which could support the Pentium OverDrive's write-back mode in our tests, Lee protests, "We can't get a Pentium OverDrive from Intel, that's

"Anyone who goes with the Pentium OverDrive should be aware that there may be an issue of getting it to work," says OPTi's Steve Tobak.

the problem. Until you have a chip, I don't see how you can test the motherboard."

Of course, until the first samples were circulated late last year, no one else had a Pentium OverDrive. What hardware manufacturers did have was a ream of specifications from Intel, an empty OverDrive socket in the systems that they shipped, and a marketing message successfully designed to comfort buyers who were afraid of being bypassed by the onrush of new technology.

So who's to blame for the Pentium upgrade that seldom acts like a Pentium? Certainly Intel, for releasing an upgrade chip that barely kisses Pentium-60 performance, and then only under ideal conditions. But several component suppliers who asked not to be identified said that some chip set and system manufacturers are also culpable: Fully supporting the Pentium OverDrive was a low priority because write-back caching support cost more, they expected few users to upgrade, and there was always the chance that Intel would change the specification.

In the ultimate irony, Intel even admits that the company's own older Saturn 1 and Saturn 2 486 motherboard chip sets lack write-back support for the Pentium upgrade. "Well,



Breaking News

(continued from page 51)

ready gained," Sporkin wrote. "The decree is too little, too late."

Attorneys for Justice and Microsoft had no immediate comment. Further hearings were set for March 16.

PENTIUM PROBLEMS MAY PERSIST: Thought you dodged the Pentium bullet by getting a replacement chip? Maybe not. Spreadsheet calculations conducted by processors with the division flaw are likely to carry over when you install the new chip. That's because most spreadsheet software assumes that any calculations performed in the past are correct and don't need to be done again. One notable exception is Quattro Pro. To fix such past errors in Excel, open the offending file and press **<Ctrl>-<Alt>-<F9>**. For 1-2-3 the solution is more roundabout: From the Tools menu, select **User Setup • Recalculation**. Select **By Column** and recalculate the spreadsheet. Return to the Recalculation menu, select **Normal**, and recalculate the spreadsheet again. Voilà.

EASIER FAX, PHONE, AND E-MAIL: Want to retrieve voice mail, faxes, and E-mail from a single graphical in-box on your PC? New groupware products will deliver this "universal in-box" capability this year. Currently Novell's GroupWise software provides a single in-box for E-mail and faxes. In the fall Novell will ship software that routes

(continued on page 55)

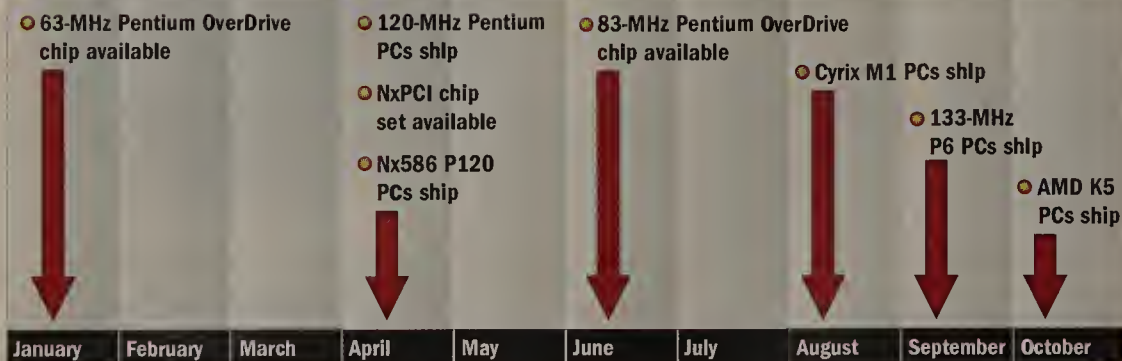
Anatomy of a Pentium OverDrive



THE 63-MHZ PENTIUM OVERDRIVE has a removable fan. If it breaks, the CPU advises you via an on-screen message and powers down to 25 MHz.

Top of the News

Processor Progress: Computing at a Glance



the sockets are there,” jokes VLSI’s Rimpo. “The socket vendors are getting rich.”

An OverDrive Future

The best news about the Pentium OverDrive is that it has driven down the price of more attractive upgrades. For example, the DX2-66 OverDrive now has a suggested list price of \$249, while the DX2-50

OverDrive lists for a mere \$149. More to the point, if you have a system with a 25-MHz bus that lets you change the clock speed to 33 MHz by moving a jumper, you can install a DX4-100 OverDrive in your system for \$349 and expect the same performance you’d get from the Pentium OverDrive in its elusive write-back mode.

Intel claims that better Pentium Over-

Drives are due next year for Pentium systems. It appears they will be straightforward clock multipliers, in the fine tradition of Intel’s DX2, SX2, and DX4 OverDrives.

In the meantime, DX4-class performance won’t thrill 486 users who banked on upgrading to blazing Pentium speed. Take Michael Brooks, executive director of Local Development Corporation of East New York, who says he feels “seriously duped” by what he calls a “bait and switch.” Brooks bought a Gateway DX2 in late 1993. “Gateway created the impression that the system I bought was upgradable to Pentium performance—and it’s not,” he says. “At this point, I feel I should be able to trade in my old DX2 motherboard and have it count toward the purchase of a new Pentium motherboard.”

—Eric Knorr

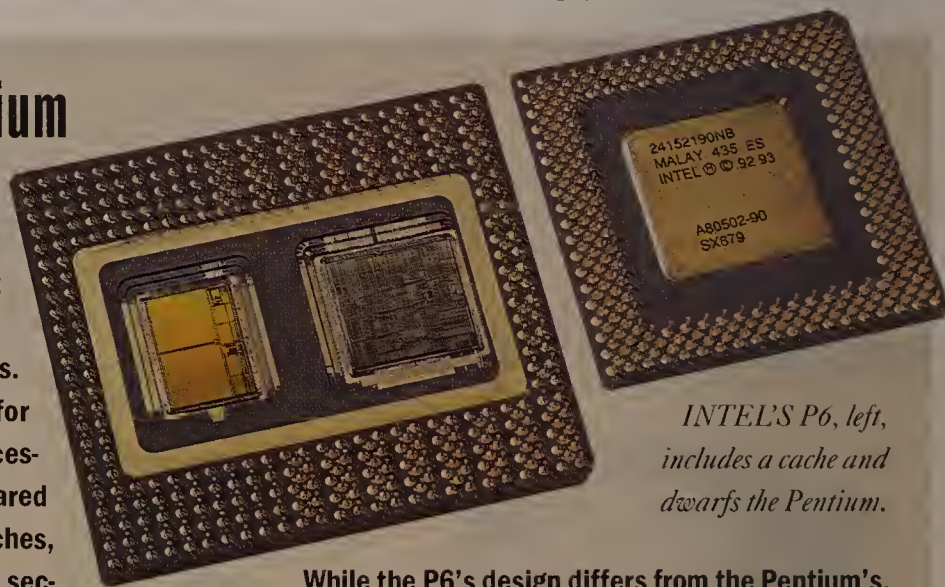
Testing by Ulrike Diehlmann and Kirk Steers

P6 Is Intel’s Next-Generation Pentium

The real Pentium upgrade will arrive this fall when the first PCs that use the P6 chip, Intel’s successor to its current Pentium line, ship. The P6 will come out of the gate at 133 MHz and with twice the raw power of today’s Pentium-100.

The P6’s design is significantly different from the Pentium’s. The new chip is larger because it includes two cavities, one for the processor and one for a secondary cache. The 32-bit processor is in the right cavity and has 5.5 million transistors (compared with the Pentium’s 3.1 million). The chip contains two 8K caches, one for instructions and one for data. The left cavity houses a secondary 256K cache, which operates at the same speed as the processor. Intel estimates that 90 percent of the time, the P6 will find the data it needs in the primary or secondary cache, greatly enhancing performance. The chip has 387 pins and runs at 2.9 volts. Like the Pentium, the P6 has a 64-bit external bus that can operate at one-half, one-third, or one-quarter the CPU speed.

The P6 crunches instructions using what Intel calls *dynamic execution*: In essence, it simultaneously chops up multiple, long x86 instructions into multiple sets of micro instructions. It processes what it can and holds the rest in a queue until the necessary data is available. Once an entire instruction is processed, the P6 reassembles the instruction and carries out the action. To keep the chip processing, the P6 also uses speculative execution and branch prediction to make a best guess at which instructions and data will be required to perform an operation.



INTEL’S P6, left, includes a cache and dwarfs the Pentium.

While the P6’s design differs from the Pentium’s, its architecture actually resembles that of AMD’s Pentium-compatible K5, slated to appear in systems this fall. According to AMD, initial versions of the K5 will perform 30 percent faster than a Pentium-100, and the chip will be pin compatible with the 90-MHz and 100-MHz Pentiums. Because the K5 uses a technique similar to dynamic execution, it doesn’t have to process instructions in the order in which it receives them. The K5, however, translates instructions into smaller, RISC-based components, which it then reassembles in the x86 instruction set. Intel claims its process is more efficient, because the instructions remain x86 based.

Intel is providing P6 samples to PC makers. It’s also readying a 120-MHz version of the Pentium, due in PCs before summer. And Intel has dropped volume prices on its chips: The Pentium-100, for instance, is now just \$673—down from \$905 in January.

—Russell Glitman

IBM Does DOS 7

TEST DRIVE

Perhaps someday DOS users will sit in their rocking chairs, sip herb tea with Metamucil, and recall tales of bravery to their grandchildren about how they survived the horrors of the command-line interface, the arcane backslash, and the dreaded 'Abort, Retry, Fail' error message. Perhaps someday...but not today.

IBM's PC DOS 7 represents the latest advancement in the evolution of DOS, with integrated Stacker 4.0 disk compression, improved help and antivirus utilities, enhanced PC Card (formerly known as PCMCIA) and Plug and Play support, and a smaller conventional-memory requirement. And since Novell has discontinued its DOS development and Microsoft is focusing on Windows 95, PC DOS 7 may be the only upgrade path available to DOS devotees. First-timers will pay \$127; upgrades should cost less than \$60 on the street.

As with most recent DOS upgrades, version 7's best new feature isn't an operating system enhancement but rather a bundled utility: Stacker 4.0. Stac Electronics' well-regarded disk compression tool can double

a hard drive's storage capacity. And IBM integrates the *complete* shrink-wrapped version of the \$99 utility.

Stacker 4.0 is a logical upgrade path for users of older disk compression software, including MS-DOS's DoubleSpace and DriveSpace. For instance, I loaded DOS 7



THE STACKER 4.0 UTILITY is integrated into IBM PC DOS 7 to make compressing your hard disk easy.

on my 386SX notebook with a DoubleSpace-compressed 40MB hard drive, and after installing Stacker, I gained 10MB of storage capacity.

Other PC DOS 7 utilities are also useful—but you'll need about 15MB of free disk space to install them all. (You can install them selectively as well.) Options include IBM's AntiVirus for DOS and Windows, which detects over 2000 viruses.

Die-hard gamers may also want to upgrade to PC DOS 7, which has reduced the memory footprint of some of its drivers and TSRs. Many DOS-based computer games need all the conventional RAM you can give them, and DOS 7 provides memory-saving switches that load certain files into upper memory. Keep in mind, however, that you'll still have to use a separate memory manager to tweak the CONFIG.SYS file to get the most conventional RAM. After all, this *is* DOS we're talking about.

—Jeff Bertolucci



Breaking News

(continued from page 53)

voice mail from PBX systems to Group-Wise In-boxes. No pricing was available. In March Lotus will ship fax server software, which will add faxes to Notes or cc:Mail in-boxes. This will cost \$2499 for the Notes edition and \$1475 for the cc:Mail edition.

MORE PLUG AND PLAY MONITORS:

Though NEC has been shipping Plug and Play monitors since last fall, other vendors have largely ignored the technology until now. In March Nanao will ship the Plug and Play FlexScan F2 series of monitors. The vendor would not disclose prices. When Windows 95 arrives, the Plug and Play monitors will set the best refresh rate automatically, instead of requiring manual adjustment.

BUY SOFTWARE ON THE INTERNET:

Software firms are circumventing retail outlets and embracing the Net for commercial software distribution. Database giant Oracle made the first move by announcing a new distribution channel based entirely on the Internet. And CyberSource announced it would distribute titles over the Net, including Symantec's Norton Utilities. In most cases, consumers will download full working copies of the titles, which work for only a month or so unless the consumer calls to register.

Edited by Randy Ross

Contributors: Joe Abernathy, Russell Glitman, and Laurianne McLaughlin

IBM PC DOS 7

DOS lives. IBM's latest version of this old standby offers a variety of worthwhile enhancements for DOS devotees.

Key Features: Integrated Stacker 4.0 hard disk compression • Smaller conventional-memory requirement • Detects more than 2000 software viruses • Improved help utility

Pricing: Upgrades under \$60

Availability: Immediate

IBM, 800/342-6672

The Sensible Way to Search the Net

TEST DRIVE

To surf the Internet productively, you need a variety of search tools and a rapid way to file your discoveries. A comprehensive solution still is not on the market, but a new suite called SuperHighway Access for Windows from Frontier Technologies goes a long way toward solving the disjointed organization common in competing suites such as Internet Chameleon and Internet in a Box.

A suite like SuperHighway Access is convenient for Internet cruisers because

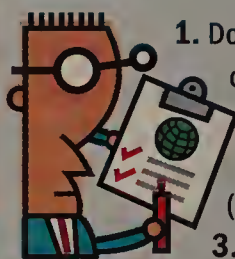
each element of the technology and information mishmash that makes up the Net—E-mail and news groups, databases and search tools, graphical World Wide Web pages and file libraries—usually requires a different type of software to access.

SuperHighway Access's WinTapestry software lets you organize your search by subject, rather than by the type of tool you use to access the information or service. Bookmarks for gopher databases, Wide-Area Information Server (WAIS) databases, Archie and Veronica searches, and World Wide Web pages are gathered into customizable groups in WinTapestry's Internet Organizer. If a bookmark refers to an image, sound, or other executable file, you can associate file viewers with that file type so that you can simply double-click on an item to transfer it across the Net and open it on your desktop.

Other capabilities include telnet, drag-and-drop ftp for file transfers, a serviceable Usenet news reader, and a multimedia-enhanced E-mail tool.

SuperHighway Access has preconfigured more than 100 regional and national service

How to Pick Your Internet Software



1. Does it automatically configure your desktop communications?
2. Does it run as a VxD (virtual device driver)?
3. Does it include all the Internet services you'll need? It should have a news reader, E-mail tool, World Wide Web browser, telnet, and an ftp client for file transfers.
4. Is there a charge for customer support? Are support lines adequately staffed?
5. Will you need an upgrade path?

providers to take the sting out of setup.

Frontier Technologies also offers SuperTCP Pro for Windows, a corporate-oriented version of SuperHighway Access that includes multisession VT320 and tn3270 terminal emulations, network printing, fax client-server and modem server capabilities, and other tools for coexisting in a UNIX X-Windows environment.

—Joe Abernathy

SuperHighway Access for Windows

New suite of Internet access software offers advanced information management.

Key Features: Organize Internet searches by subject • Link bookmarks to viewers • Rich variety of search tools

Pricing: \$125

Availability: Immediate

Frontier Technologies Corp.,

800/929-3054, 414/241-4555

Reader service no. 829



Reality Check

Will You Buy PCs When Intel Is Not Inside?



► **Name and rank:** Dan Tannenbaum, MIS director for Helicopter Support and Aviation Components Support, brokers and manufacturers of helicopter parts in Orange, Connecticut.

► **1994 computer products budget:** about \$50,000.

► **PC vendors:** Compaq for most PCs.

► **Will you buy PCs with Pentium-class CPUs not made by Intel?** "Yes, when the big PC companies with top market share

sign on," Tannenbaum says. He'll consider PCs with the NexGen Nx586 chip or the upcoming AMD K5 and Cyrix M1 chips. "My concern now is not who makes [the chip], but what does it do, and how good is its design and construction," Tannenbaum says. The recent controversy over how Intel handled the Pentium math flaw hurt his

perception of the company, he says. He's had mixed success with non-Intel-based systems; 10 percent of his firm's 150 PCs are no-name clones with AMD, Cyrix, or IBM Blue Lightning chips. While the chips perform fine, the problem is that the vendors selling systems with these non-Intel processors generally don't have the reliability and service of the larger brand-name vendors, which mostly rely on Intel chips. His advice: Scrutinize the vendor's warranty and service policies. Tannenbaum is hopeful Compaq will offer some bargain PCs using AMD's upcoming K5 chip.

► **Tips on buying systems with non-Intel chips:**

1. Brand names count. Buy only when a big-name PC vendor signs on, Tannenbaum advises.
2. Don't put price first. Poor warranty or service policies can cost you.
3. Examine configuration. A vendor may sweeten the deal with extra hard-drive space and memory.
4. Start smart. Start with a few PCs and test them.

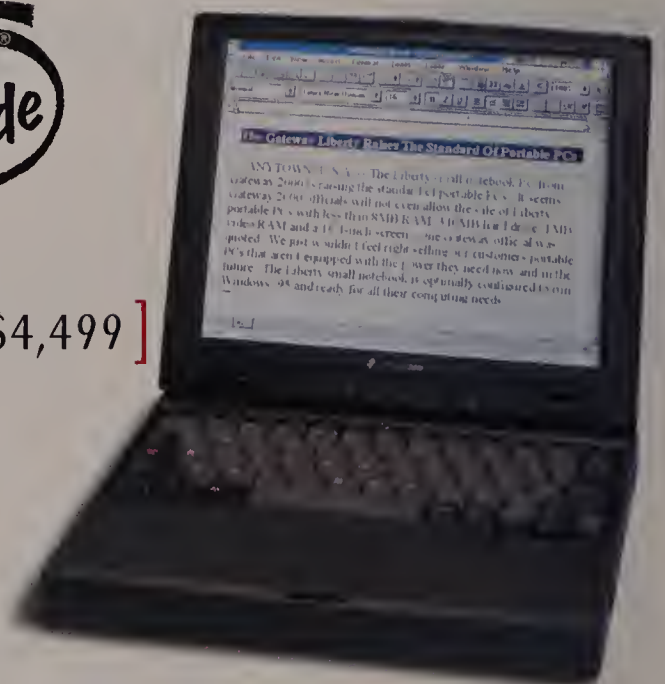




The 4.2-pound Liberty™ DX4-100 Best Buy features an impressive 10.4" screen, 720MB HD, 24MB RAM,

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TO CARRY AN OBJECT 50 TIMES
ITS OWN body weight?

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Gateway 2000®. It may be small in size, but
it packs a powerful punch that squishes the
competition!



14.4 fax/modem, IR abilities AND MS Office Professional for \$4,499]



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- Intel[®] 486 DX2 or DX4 Processor
- Instant On
- NiMH Battery & AC Pack
- 2 PCMCIA Type II Slots
- EZ Point[™] Integrated Pointer
- Removable Hard Drive
- 78-Key Keyboard
- Parallel, Serial, VGA & PS/2[®] Ports
- MS-DOS[®] 6.22 & WFW 3.11
- Microsoft[®] Works for Windows[™] 3.0 or MS Office Professional 4.3**

**MS Office Professional 4.3 includes Word, Excel, PowerPoint[®] presentation graphics program, and Access[®] database.

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10.4" DSTN Color Display, 8MB RAM, 340MB HD, MS Works
\$2799

LIBERTY DX4-100

10.4" DSTN Color Display, 8MB RAM, 540MB HD, 256K L2 Cache, MS Works
\$3299

LIBERTY DX4-100

Best Buy

10.4" DSTN Color Display, 24MB RAM, 720MB HD, 256K L2 Cache, TelePath[™] 14.4 XJACK[®] Fax/Modem, Leather Carrying Case, MS Office Professional 4.3**
\$4499

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- 5.7 Lbs., 11.65" x 8.5" x 1.77"
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- Intel 486 DX2 or DX4 Processor
- 8MB RAM (Expandable to 24MB)
- 1.5MB Video RAM (includes 512KB cache)
- Removable Hard Drive
- 3.5" Diskette Drive
- Integrated 16-Bit Sound and Speaker
- NiMH Battery & AC Pack
- EZ Point Integrated Pointer
- 2 PCMCIA Type II Slots
- 85-Key Keyboard
- Parallel, Serial, VGA & PS/2 Ports
- Padded Carrying Case
- MS-DOS 6.22 & WFW 3.11
- MS Works for Windows 3.0 or MS Office Professional 4.3**

COLORBOOK² DX2-50

8MB RAM, 540MB HD, Carrying Case, MS Works 3.0
\$2999

COLORBOOK² DX4-100

8MB RAM, 540MB HD, Carrying Case, MS Works 3.0
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COLORBOOK² DX4-100

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Lotus Extends Notes to the Rest of Us

Lotus is cutting Notes prices, introducing a new version, and developing new products that expand the power of Notes, connecting it to voice mail and the Internet.

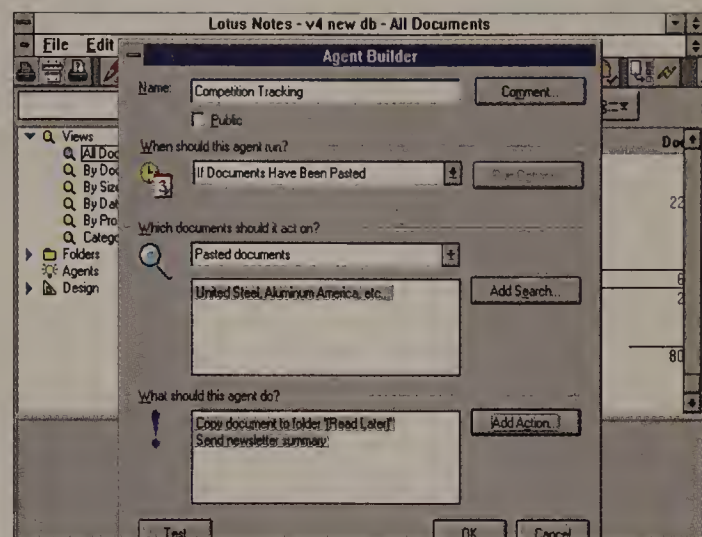
Lotus Notes, which helps companies manage internal information and work collaboratively, has 1.3 million users. But at \$330 per user, it's been expensive to de-

ploy. Now Lotus has cut the price to \$275 and introduced Notes Desktop, a \$155 client version that runs Notes applications but has neither administrative nor development tools. And Lotus will still sell Notes Express, a poorly received \$99 introductory package that works with a limited number of Notes applications and lacks database design capabilities.

Impressive Notes 4.0 Preview

Lotus Notes 4.0, due in the second half of this year, will have an improved interface with simplified menus, easier table formatting, and a three-pane window that expands to show details. OLE 2.0 capabilities will allow in-place editing of objects, such as charts, created in other applications. Agents will help with work flow, delegating tasks in reaction to triggers.

Replication improvements should save time and money. Notes 4.0 will support field-level replication, meaning that only



NOTES 4.0 will have a simplified interface, OLE 2.0 support, and customizable work-flow agents.

changed fields are transmitted. Also, you'll be able to customize replication schemes.

Notes 4.0 will help companies manage communication over the Internet. The Notes client will include a browser for the World Wide Web.

Lotus is also developing InterNotes Web Publisher, which converts Notes database information into HTML format; it ships this summer for \$7500.

—Laurianne McLaughlin

New Deals for Notes

- Notes Desktop, a \$155 Notes client, is available now.
- Lotus Notes 4.0 is due to ship in the second half of 1995.
- InterNotes Web Publisher, due this summer, will provide access to Notes databases via the World Wide Web.
- IBM will bundle Notes Express (a \$99 introductory version of Notes) with its OS/2 Warp operating system.
- Apple will bundle Notes Express with PowerBooks and Power Macs.
- AT&T and Lotus will integrate Notes and voice-mail systems.

USA Flex First With AMD DX4-100 Clone:

The USA Flex 486 Multimedia Value System with Advanced Micro Devices' AmDX4-100 was so much fun to review, I'd consider buying one. With all its goodies, it's a great value at \$2289.

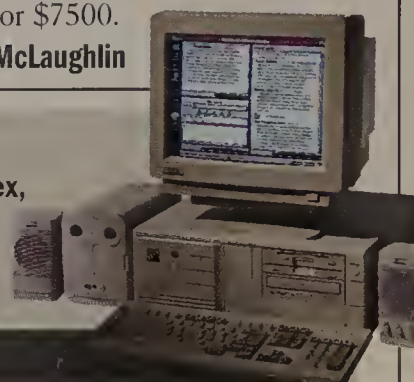
Call me superficial, but I was very taken with the sound system. The Flex includes Altec Lansing's three-piece ACS31 system, consisting of two desktop speakers and a toaster-size subwoofer. The subwoofer provides 25 watts of power for throbbing bass. A 16-bit Creative Labs Sound Blaster 16 MultiCD audio card sports a Turtle Beach add-on module, which adds wave-table-synthesis technology for the best musical sound.

The Flex has an 850MB hard disk, 16MB of RAM on 72-pin SIMMs (upgradable to 64MB), 256K of secondary cache, a 15-inch monitor, and a 14.4-kbps fax-modem.

The system is one of the first powered by AMD's 100-MHz DX4 clone. In PC World tests, it performed about as well as the average PC with Intel's DX4-100. There's a lot more in this package: A 32-bit VL bus provides high-speed communications with components, such as the included Paradise Bahamas 64-bit video card and the

Plus Data IDE drive adapter. USA Flex, 800/568-3539. Reader service no. 826

—Randy Ross



TEST REPORT

AMD's DX4-100: Acceptable Intel Alternative

System	Price	RAM (MB)	Cache (K)
USA Flex 486 Multimedia Value System	\$2289	16	256
<div>1:27</div> <div>:55</div> <div>1:24</div> <div>1:30</div>			
Average of eight Intel DX4-100 PCs	\$3332	16	256
<div>1:22</div> <div>:55</div> <div>1:20</div> <div>1:28</div>			

Windows application test times in minutes. Shorter times are better.

Word 2.0 Excel 4.0 Freelance 1.0 Paradox 1.0

Results from PC World Test Center application benchmark tests.

IBM and Digital: Two Cool Ones for the Road

TEST DRIVE

Two new notebook lines from companies that once defined big iron—IBM and DEC—offer revolutionary designs that pack power and features into compact, lightweight packages.

When most people first open IBM's ThinkPad 701C notebook, they're left speechless. Then slowly they smile and say, "Cooool." Meanwhile they

the notebook—hence the machine's code name, Butterfly. As you close the notebook, the TrackWrite splits in two to fit snugly into the unit's 7.9-by-9.7-inch frame.

The system's overhanging keyboard does have one slight drawback: It makes it hard to reach the notebook's power switch and access the 14.4-kbps modem and audio jacks located on the unit's side.

The IBM 701C delivers a 10.4-inch active-matrix screen that hardly leaves room for a frame and delivers 640 by 480 VGA resolution with more than 4000 colors (a 10.4-inch dual-scan version is also available). *PC World's* tests clocked the 701C's battery at a respectable

4 hours and 43 minutes, and toting this slim, 4.3-pound machine is no sweat. Processor options, however, are limited to either a DX2-50 (which is what we tested) or a DX4-75; both systems use a 25-MHz motherboard.

The 701C comes with either a 360MB or 540MB removable hard drive and 4MB to 16MB of RAM. The 75-MHz version will come with 8MB of RAM and both Windows and OS/2 Warp. we recommend at least 8MB of

TEST REPORT

More Power per Pound

System	RAM (MB)
IBM ThinkPad 701C	4
2:30 2:43 3:11 10:55	
Average of two DX2-50 notebooks	4
3:12 3:34 4:40 8:01	
Digital HiNote Ultra CT 450	8
2:01 1:30 1:56 2:35	
Average of six DX2-50 notebooks	8
2:34 1:58 2:24 3:20	

Windows application test times in minutes. Shorter times are better.

Word 2.0 Excel 4.0 Freelance 1.0 Paradox 1.0

Results from PC World Test Center application benchmark tests.

memory. The unit we tested had only 4MB, which contributed to the system's horrible Paradox test results. This score marred the system's otherwise above-average performance in Windows applications.

Price was still not set by IBM at press time but should range from \$3800 to \$5800.

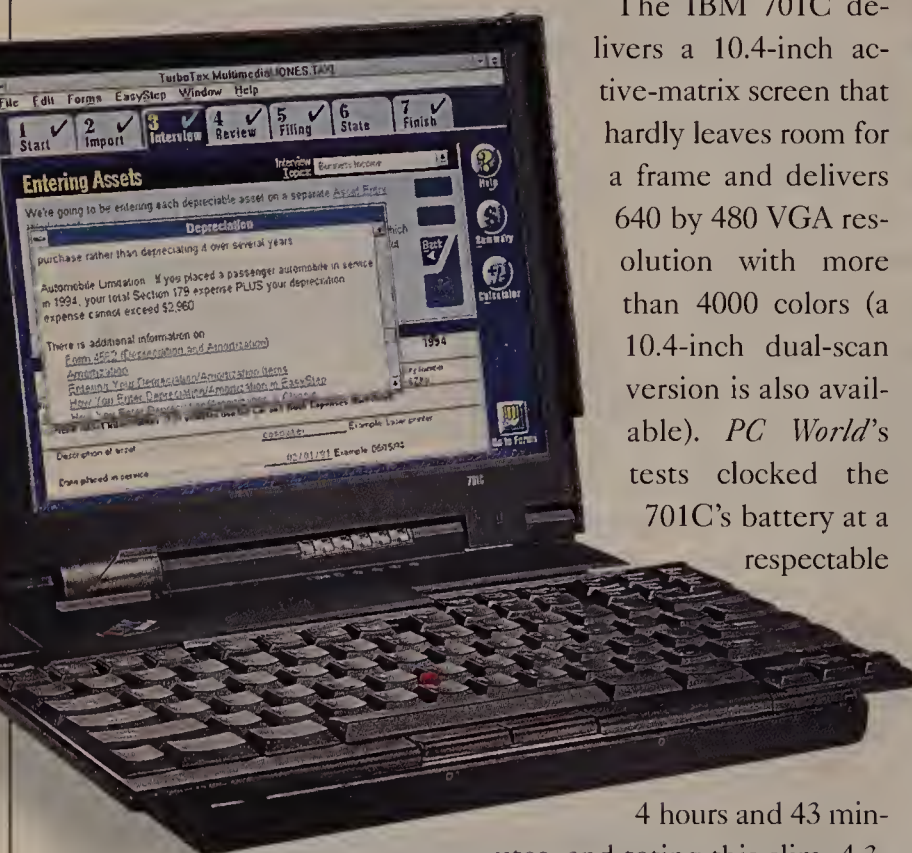
IBM throws in other goodies to sweeten the deal: You get answering machine functions and Sound Blaster-compatible audio. The notebook comes with two PC Card (formerly PCMCIA) Type II slots, which can

accommodate a single Type III card. An infrared port at the rear of the unit (also on IBM's ThinkPad 755) provides point-to-point data transfers at up to 1150 kbps and works with both Hewlett-Packard and Sharp infrared devices.

An unusual bonus is the MultiPort II port replicator that comes with the IBM ThinkPad 701C. The MultiPort II includes serial, enhanced parallel, mouse, keyboard, and monitor ports as well as microphone, line-in, and line-out audio connections. An external floppy drive and a

IBM'S THINKPAD 701C has a unique keyboard that expands when you open the notebook.

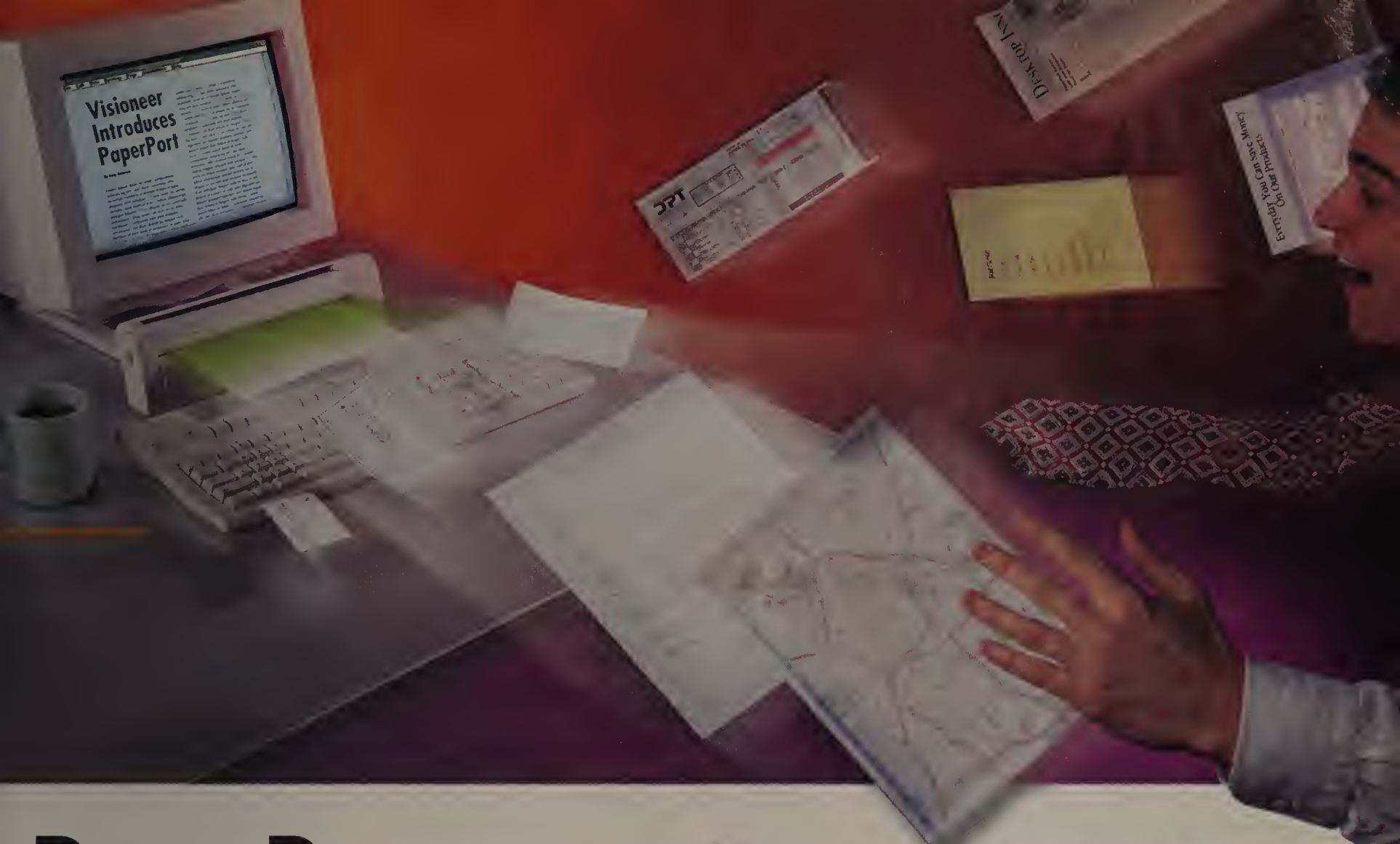
JOHN GREENLEIGH



probably think to themselves, Why didn't I think of that?

The 701C is ingenious in the deceptive simplicity of its solution to a problem that has long bedeviled notebook designers: how to provide a full-size keyboard in a package that's little larger than a steno pad. The answer is IBM's TrackWrite, an expandable keyboard that emerges as you open the 701C. Once extended, the 90-key, 11.4-inch keyboard overhangs about an inch on each side of





PaperPort.™ The fastest way to get paper into your computer.

Okay, so you have no trouble getting paper out of your PC. But what do you do with the articles, letters, receipts, and business cards—the important papers—that cross your desk every day? You use PaperPort, that's what! The first truly simple, super-small input device that converts your paper documents into electronic ones. **Always ready to go.** Just plug PaperPort into your PC's serial port (there's no card required) and then feed in a piece of paper. PaperPort grabs the paper, scans it and launches the software automatically—there isn't even an ON button! **Instantly useful.** At six seconds per page,

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it's PaperPart-able!



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folders using long file
names. Then one click will
print it, another will fax it,
and a third will convert it
to editable text. What
could be easier?



Upgraded version. Formerly called PaperMax™

Top of the News

very thin AC power adapter round out the hardware.

Lightweight and powerful, with a great screen and a full-size keyboard, the 701C will make any executive dance like a butterfly and sting like a bee.

IBM ThinkPad 701C, Digital HiNote Ultra

Exceptional designs set these notebooks apart from the competition.

IBM Key Features: Expandable keyboard • 10.4-inch color display • 4.3 pounds

Pricing: Not set

Availability: Spring

IBM, 800/772-2227

Digital Key Features: 1.2 inches thick • 4 pounds

Pricing: \$2899 to \$4999

Availability: Immediate

Digital Equipment Corp., 800/722-9332

Reader service no. 827

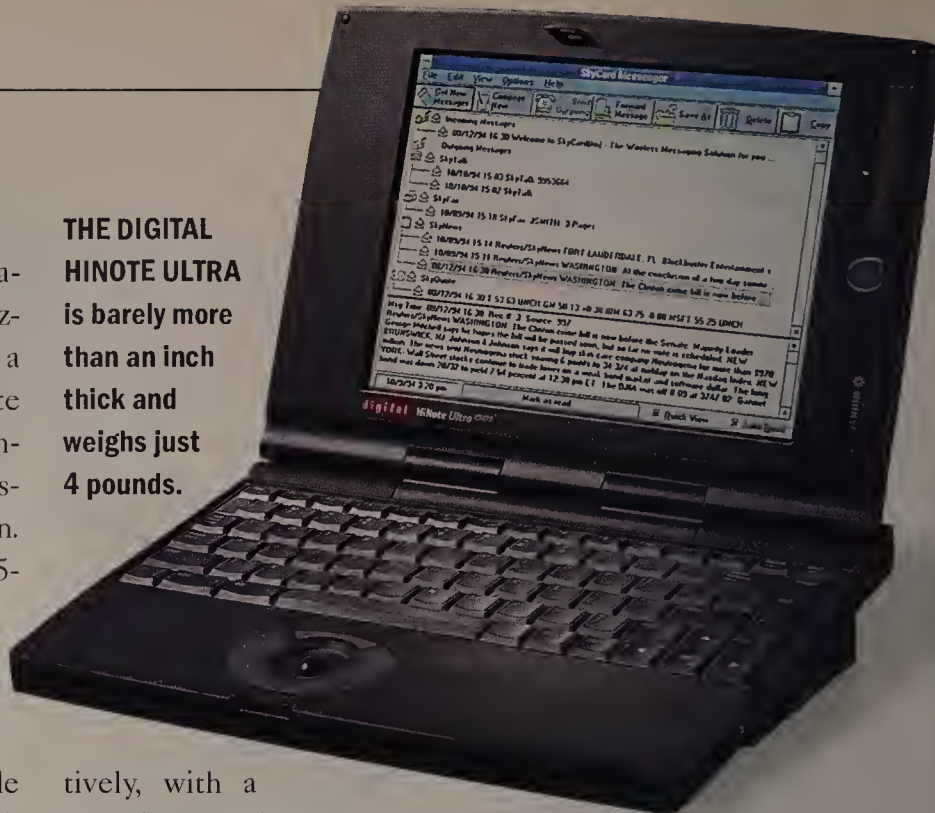
Digital's Ultra Thins

Digital Equipment Corporation's notebooks pack an amazing amount of features into a tiny space. Digital's HiNote Ultra line includes 1.2-inch-thick active-matrix color systems, the slimmest we've seen. These cleverly designed 8.5-by-11-inch notebooks weigh just 4 pounds and include a 9.5-inch screen and a full-size keyboard.

The Ultra's hot-swappable lithium-ion battery at the back of the note tilts down to place the system at a slight angle, creating space for a slim snap-on 1.44MB floppy drive.

We liked the quality of the active-matrix displays on the HiNote Ultra CT 475 DX4-75 and CT 450 DX2-50. Well suited for presentations, they provide 16-bit audio, 32-bit local bus video, and 1MB of video memory. These two notebooks cost \$4999 and \$4599, respec-

THE DIGITAL HINOTE ULTRA is barely more than an inch thick and weighs just 4 pounds.



tively, with a 340MB hard drive and 8MB of RAM upgradable to 24MB.

Digital says a 520MB hard drive and a multimedia docking station will be available later this spring. PCMCIA slots accommodate two Type I or Type II PC Cards or one Type III PC Card.

As for speed, we found the CT 475 to be an above-average performer on Windows applications. The active-matrix systems should run for 3 to 5 hours,

according to the company.

Digital also offers less expensive HiNote Ultra models. The \$2899 HiNote Ultra CS 433 486SX-33 with a 240MB hard drive and \$3299 HiNote Ultra CS 450 DX2-50 with a 340MB hard drive provide dual-scan color and weigh 3.9 pounds. These models come with 4MB of RAM expandable to 20MB.

—Russell Glitman and Laurianne McLaughlin

Toshiba Brings Mobile Multimedia to Notebook Line

TEST DRIVE

▶ Cramming a CD-ROM drive into a notebook requires engineering savvy. The drive must be light, durable, and miserly with battery power. Toshiba's CD-ROM-equipped Satellite Pro T2150CD scores well on all counts.

Hot on the heels of IBM's ThinkPad 755CD and Panasonic's V41, the T2150CD offers a 75-MHz DX4 processor, a 500MB hard drive, and a 10.4-inch color display. But the integrated multimedia features are the real news. The double-speed CD-ROM drive on the note's right side requires no disk caddy. Other features include 16-bit audio, a speaker, and a microphone, as well as headphone, microphone, and line-in jacks.

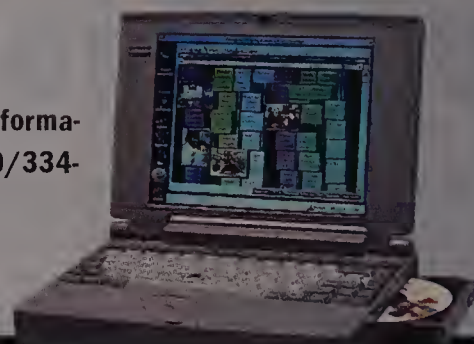
The Toshiba has its compromises: The floppy drive is an external unit. The CD-ROM drive uses about as much battery power as a floppy drive, and Toshiba says you can expect about 2½ hours of computing with the system in full-power mode.

The Toshiba T2150CDT ran *PC World's* application benchmarks roughly 22 percent faster than other comparably equipped 75-MHz DX4 notes we've tested. The T2150CDS with a dual-scan color screen is street priced at \$4249; the T2150CDT with an active-matrix color display costs \$5549.

• Toshiba America Information Systems Inc.; 800/334-3445, 714/583-3000

Reader service no. 828

—Jeff Bertolucci



TEST REPORT

Fast Multimedia to Go: Toshiba's T2150CDT

System	Price	RAM (MB)
Toshiba Satellite Pro T2150CDT	\$5549	8
Average of six DX4-75 notebooks	\$4319	8

Windows application test times in minutes. Shorter times are better.

Word 2.0	Excel 4.0	Freelance 1.0	Paradox 1.0
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Results from PC World Test Center application benchmark tests.

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AcerPower™ Pentium™/100MHz Minitower

■ Intel® Pentium/100MHz Processor

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- 1.2GB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE

■ Quad-Speed CD-ROM Drive

■ 2MB VRAM Diamond Stealth 64 PCI Accelerator Card

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- 4 PCI 32-Bit Expansion Slots, 4 ISA 16-Bit Slots (1 Combination PCI/ISA Slot)

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- High-Speed I/O Parts
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■ Quad-Speed CD-ROM Drive

■ 2MB VRAM Diamond Stealth 64 PCI Accelerator Card

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- 4 PCI 32-Bit Expansion Slots, 4 ISA 16-Bit Slots (1 Combination PCI/ISA Slot)
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Flash BIOS

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Micrasoft Windows for Workgroups, MS-DOS 6.2

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039SDIR10



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1MB Local Bus Video

1.44MB Diskette Drive

4 ISA 16-Bit Slots

Flash BIOS

High-Speed I/O Parts

Micrasoft Windows for Workgroups, MS-DOS 6.2

3-Year Limited Warranty with First Year On-site

15" .28mm Non-interlaced Flat Screen Color Monitor†

\$1,695

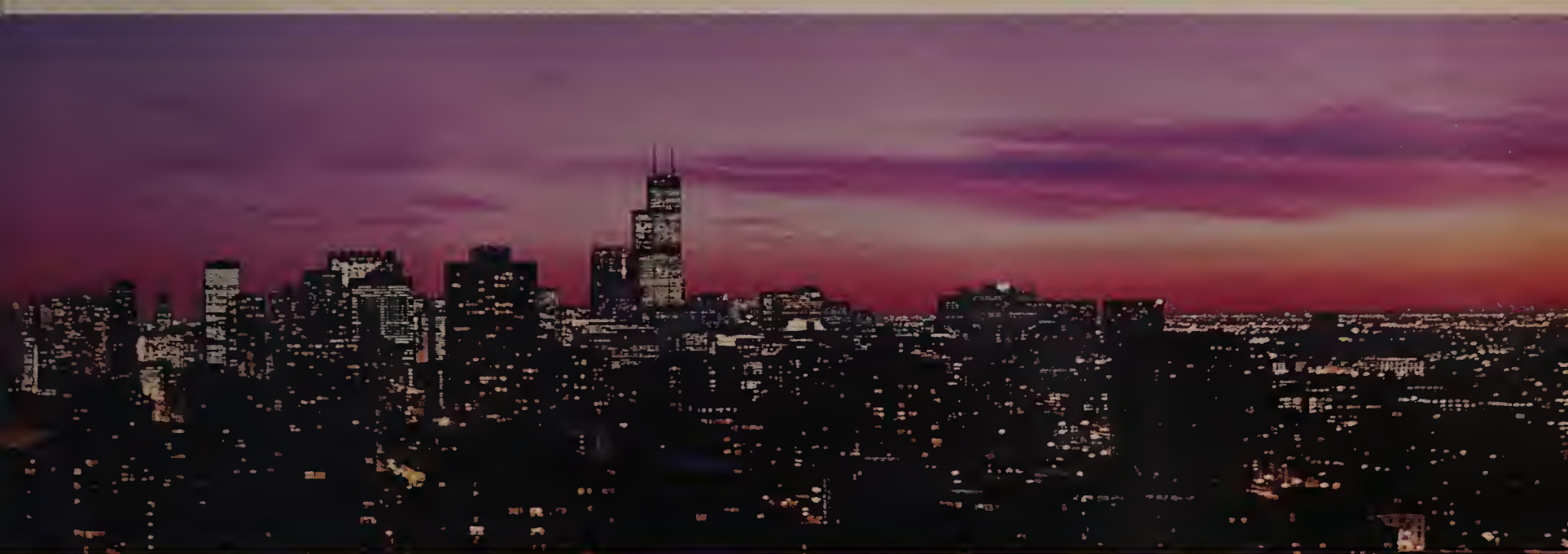
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† Monitors are protected by a one-year warranty.

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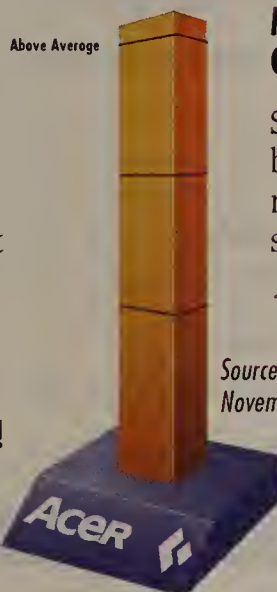
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Source: PC World,
November 1994

**PC World Magazine Reliability
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Circle 229 on reader service card

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- Slim 8.66" x 11.4" x 2.1" Case Weighs 6.4 lbs, Including NiMH Battery
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AT 600 DOTS PER INCH IT MAKES YOUR LETTERS LOOK PERFECT. (AT THIS PRICE, IT ALSO MAKES YOUR NUMBERS LOOK PRETTY DARN GOOD.)

For less than \$800, the new NEC SuperScript™ 660i printer will make everything look exceptional. Including your budget.

In fact, everything will look great except for the Hewlett-Packard® LaserJet® 4P printer. It simply falls a bit short by comparison.

First off, let's talk about one big difference. Speed. Our 660i is simply faster. It prints 6 ppm. Their 4P printer turns out only 4 ppm. And that's significant when you think of the time you could save during your typical, no-time-for-lunch, a-thousand-things-to-do-workday. Like today.

Another difference you'll notice is the availability of optional PostScript™ emulation software. It costs only \$99* to upgrade with our 660i printer. If you want to upgrade the 4P printer, it costs hundreds of dollars more.

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all the advantages we've listed, (and more) we ask less than \$800.

SuperScript 660i

Prints 6 ppm

PostScript emulation upgrade \$99*

2-year limited overnight warranty

Average Street Price \$800

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PostScript emulation upgrade \$412***

1-year return to dealer policy

Average Street Price \$920**

Hewlett-Packard, on the other hand, asks you to part with more. Quite a bit more, to be honest.

By the way, with our 660i you will get a two-year limited overnight

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A New Spin on Removable Hard Drives

Removable mass storage drives are getting smaller, cheaper, and easier to use. Whether your buying decision is based on price or capacity, some innovative products from three well-known vendors provide unique storage solutions.

Iomega and SyQuest offer 3½-inch drives using removable cartridges, which resemble chubby floppy disks. This technology provides inexpensive, highly expandable storage—to add disk space, you just slide in a blank cartridge.

The Iomega Zip drive sells for under \$200 on the street—a price previously unheard of in removable-storage circles. A 100MB Iomega cartridge sells for a street price of \$19.95, making the price per megabyte lower than a floppy disk's. Iomega plans to introduce a

a Sony Discman than like a removable-cartridge drive.

If you need a faster, larger-capacity model, consider SyQuest's SQ3270. This product is a 270MB, 3½-inch version of the classic Winchester magnetic-cartridge hard drive revered by desktop publishing service bureaus everywhere. The SQ3270 sells for \$599; the cartridges, which fit neatly into a shirt pocket, cost \$59.

With a 13.5ms access time, the SQ3270 is about as fast as a typical hard drive. The Zip is substantially slower, but acceptable, at 30ms. Both are available in SCSI and parallel port versions; the SCSI models deliver faster data transfer rates. Though the parallel port drives are slower, you can plug them into any parallel port. Now *that's* portability.



MEGA STORAGE FOR LESS: Iomega's Zip drive stores 100MB of data on removable 3½-inch disks and costs under \$200.

200MB cartridge later this summer. The whole package (drive, cables, and cartridge) weighs just over a pound, so it's portable. The Zip drive's slick blue plastic casing with cut-away window should also appeal to your aesthetic side as well as to the technophobes in your office—it looks more like

Even Higher Performance

LaCie Limited's line of Joule Portables offers a higher-performance option for removable mass storage. LaCie encapsulates full- and half-height Quantum hard disks in a rugged, soft plastic casing and bundles a proprietary, portable SCSI docking unit. Slide out



HARD DRIVE TO GO: LaCie's line of Joule removable hard drives feature a rugged black casing and a SCSI docking station.

the drive, and off you go—you can leave the 10-ounce dock behind or bring it with you. The dock itself plugs into a SCSI host adapter (no parallel port version is available). You lose the convenience of a simple parallel port connection, but you gain SCSI-2 performance and expandability.

Joule capacities range from the 2½-inch, 170MB module (\$299) up to the full-height, 3½-inch, 4.3GB unit (\$2569). Prices include the dock but not the SCSI host adapter. LaCie offers the option (at additional cost) of stacking up to six modules vertically on a proprietary base that provides a single power source and SCSI connection to the tower.

The parallel port versions of the Zip drive and SyQuest cartridge hard drives offer easy installation at a low cost per megabyte. The SCSI versions of these drives, and the Joule Portables, offer faster performance at a higher price—along

with potentially more difficult installation. It's a convenience-versus-performance trade-off.

—Susan Silvius

Joule Portables

Up to 4.3GB of storage.

LaCie Limited

800/999-0143

Street price: \$299 to \$2569 including dock

Reader service no. 759

SQ3270

Removable-cartridge drive now in 3½-inch format.

SyQuest Technology

800/245-2278

Street price: \$599, 270MB cartridge \$59

Reader service no. 760

Zip drive

Low-cost, portable storage.

Iomega Corp.

800/777-6654

Street price: \$199; 100MB cartridge \$19.95

Reader service no. 761

Dual-Processor Pentiums: High-Speed Desktops

Given the recent bad press surrounding the Pentium chip, it's inevitable that some wags will simply dismiss the new dual-Pentium Celebris XLs from Digital Equipment Corporation as double trouble. But these feature-rich, 90-MHz and 100-MHz dual-Pentium minitowers have the ability to process the most demanding tasks at least 50 percent faster, and DEC hopes they'll become the PCs of choice for CAD/CAM, desktop publishing, and statistical analysis.

The Celebris XL models are available in four Pentium configurations. The 590 model has a single 90-MHz processor, and the 590DP includes two 90-MHz chips; the 5100 and 5100DP follow the same pattern but use 100-MHz processors. The dual-processor machines with a 1GB SCSI drive cost \$4998 for the 590DP and \$5298 for the 5100DP, not including the monitor.

Unlike the few other dual-Pentium systems on the market—such as AT&T Global Information Solutions' 3430 Dual SMP—the Celebris XLs were designed to be high-end desktops, not network servers. To get the most from them, you need a 32-bit multitasking,

multithreading operating system like Windows NT, as well as multithreaded applications designed for dual-processing PCs. At press time, a few such applications were available, including Microsoft's Excel and Word for Windows NT and Intergraph's MicroStation CAD package. Micrografx expects to ship Picture Publisher 5.0 for Windows NT by late summer.

The dual-Pentium systems come loaded with 16MB of RAM (upgradable to 192MB). Storage options range from 540MB up to 2GB hard disks.

—James A. Martin



DOUBLE POWER: Digital's new dual-Pentium systems offer performance potential previously reserved for network servers.

Three Fast SCSI Adapters Offer Easy Installation

Most people associate SCSI with great performance but difficult installation. Now a new trio of SCSI adapter cards offers fast data transfer rates without setup woes.

Speed freaks ought to check out AdvanSys's AdvanSCSI ABP-852 VL dual SCSI host adapter. With two full-speed SCSI channels, the \$479 ABP-852 has a fast transfer rate of 20 mbps (10 mbps per channel)—double that of other cards. The vendor claims two channels on one card increases the speed at which SCSI peripherals deliver data. For example, the ABP-852 reads from drives on the first SCSI channel while writing to the backup device on the second. Because it's dual-SCSI, it handles up to 14 peripherals in one VESA slot.

Adaptec's new AHA-1540CP SCSI host adapter supports Plug and Play, which Windows

95 is also expected to support. With a 10-mbps transfer rate, the \$249 AHA-1540CP slips into any available ISA slot. Adaptec includes EZ-SCSI 3.1 software to ensure both automatic SCSI installation and support for up to seven SCSI devices such as tape backup drives, hard disks, and scanners. You can configure the card via software, so there are no jumpers to deal with. Adaptec also offers the \$269 AHA-1542CP, which has floppy drive support.

If you're on a tight budget, consider Future Domain's \$125 PNP-1630SVP, a 16-bit SCSI-2 controller that fits into an ISA slot and supports Plug and Play. It has no DIP switches or jumpers to set, provides a 10-mbps transfer rate, and includes PowerSCSI software. It has a seven-year warranty.

—Steve Bass

AdvanSCSI ABP-852

Speedy SCSI board.

AdvanSys

800/525-7443,

408/383-9400

List price: \$479

Reader service no. 763

AHA-1540CP, AHA-1542CP

Easy-to-install board.

Adaptec, Inc.

800/442-7274,

408/945-8600

List price: AHA-1540CP

\$249, AHA-1542CP \$269

Reader service no. 764

PNP-1630SVP

Low-cost SCSI solution.

Future Domain Corp.

714/253-0400

List price: \$125

Reader service no. 765

Celebris XL 590DP, XL 5100DP

PCs with dual-CPU option.

Digital Equipment Corp.

800/722-9332

List price: \$4998 590DP,

\$5298 5100DP (without
the monitor)

Reader service no. 762

Say goodbye
to working in
an isolation
chamber.



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PC World, November 1994*

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have come together to help you get, move, and use information.*



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Circle 4 on reader service card

Sharp's Zaurus: A Very Small, Very Versatile PDA

Sharp's new personal digital assistant, the Zaurus, offers unusual versatility for a device in its class. This tiny organizer supports a variety of communications options and lets you navigate and input data with a miniature QWERTY keyboard or an electronic pen.

At \$749, the Zaurus isn't cheap, but it is small. The 13½-ounce, 1-inch-thick device fits easily in a jacket pocket or a

purse. It uses a Windows-like operating system and comes with a variety of applets, including a contact manager, a calendar, E-mail and fax programs, and a basic word processor. (It cannot run Windows or DOS programs.) Sharp expects more Zaurus applets to be available later this year.

For your communications needs, the Zaurus offers a compact 9600/2400-bps fax-modem that attaches to the serial port (it costs an additional \$100). A PCMCIA Type II slot provides room for extra storage, a cellular fax-modem, or a pager card.

An optional \$30 serial cable lets you exchange data between the Zaurus and a desktop PC. The device also has an infrared port; the optional



SHARP'S PRICEY PDA: The \$749 Sharp Zaurus offers a variety of useful applets and a choice of either keyboard or pen input.

adapter for your desktop PC costs about \$100.

The Zaurus is powered by a 16-bit Sharp processor and in-

cludes 1MB of RAM. The device will run for about 60 hours on two AA batteries.

—Laurianne McLaughlin

Sharp Zaurus

Multifunctional PDA.

Sharp Electronics Corp.

800/237-4277

List price: \$749, \$849
with modem

Reader service no. 766

Pocket Finance: Your Electronic Banker for the Road

The Pocket Finance is a \$99 device with capabilities beyond those of most hand-held organizers, sporting features found only in personal finance software like Quicken. The product also saves your ac-

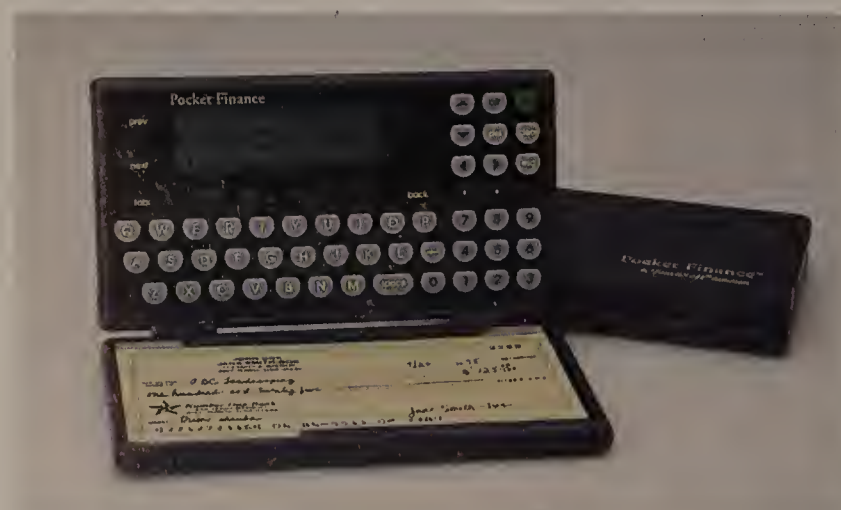
count files in Quicken Interchange Format (QIF), which you can upload to your PC via a serial port link (using the LinkLine feature, an option available for \$50) and import right into your finance package.

About as big as a paper check register, the Pocket Finance flips open to reveal a full alphanumeric keypad and four-line LCD screen on top, and a tray for blank checks below. Use the keypad to set up checking, savings, and other accounts, and to enter deposits and withdrawals. Unlike other hand-held organizers, the Pocket Finance lets you assign categories and subcategories to each transaction so you can view a report of, say, how much you spent on food last week. You can also store phone numbers and brief memos in its 32K of RAM.

My beefs with the Pocket Finance are minor but worth noting. The device won't permit you to transfer funds be-

tween accounts—you have to withdraw from one account and deposit into the other. Also, you can upload only one account at a time to your PC, and the data link is strictly one-way; if you change the data on your PC, you have to update the Pocket Finance manually to keep your accounts in sync.

—Daniel Tynan



QUICKEN PORTABLE: The Pocket Finance lets you keep track of your finances wherever you go, and upload the information to your PC.

Pocket Finance

Hand-held organizer for personal finance.

TouchSoft

800/900-0968 ext. 690

List price: \$99, \$149 with
Pocket Finance LinkLine

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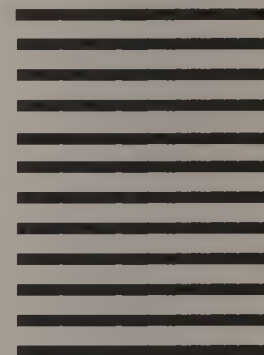
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IT'S NOT IF. IT'S WHEN.

486, Pentium, PowerMac...

No matter how fast your PC is, it can't outrun a power problem (Get Uninterruptible...starting at \$119)

Just don't have the time for power problems on your PC? Don't worry. They'll always make the time for you. It's not if a power problem will occur, but when. Due to household appliances, poor wiring, bad weather or even other office equipment, power problems are as inevitable as death and taxes.

**IN THE NEXT THREE MONTHS, MORE
THAN 30,000,000 PCs WILL BE HIT BY
POWER PROBLEMS...**

In fact, you have better odds of winning the lottery than of escaping the sting of power problems on your PC. One study discovered a typical PC is hit over 100 times a month, causing keyboard lockups, hard drive damage, and worse. And since sags and blackouts represent more than 85% of power problems likely to

APC UNINTERRUPTIBLE POWER MEANS SAFE DATA, HAPPY COMPUTERS

Sealed no-maintenance internal battery provides instant power in event of sag or blackout, protecting your data from loss

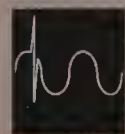
Surge protection backed by up to a \$25,000 insurance policy protects valuable computer hardware from loss

Site wiring fault indicators automatically diagnose dangerous wiring conditions

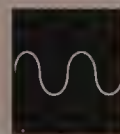
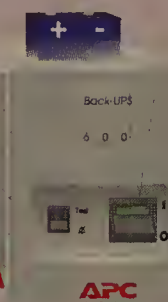
Audible and visual alarms alert you to power problems

Filters remove electromagnetic interference

Signals your computer, saves your data (APC software required)



Raw AC



Safe AC

APC Uninterruptible Power Supplies provide instant battery backup to protect your data from loss and your hard drive from damage. Units are even backed by up to \$25,000 in lifetime surge protection insurance.

hit your computer, standard surge suppressors are literally powerless to protect you. And a study in a recent PCWeek showed that the largest single cause of data loss is bad power, accounting for almost as much data loss as all other causes combined.

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Ask for APC at your computer reseller today or call for your FREE handbook.



Starting at just \$119, an APC UPS is serious protection no serious computer user should be without.

"Don't take chances...get the ultimate protection...from APC." --PCWorld

OVER 3,000,000 SATISFIED APC USERS...

"This is the best computer related purchase I have ever made! Has saved me hours of re-programming..."
Carol Irvine, Wizard Assoc.

"We reduced our maintenance costs the first year by 50% in repairs of equipment."
Valentin Gonzalez, Pfizer

"Our server was running a project when it lost power... messed up all the data files. It took four days to recover. But we don't worry anymore since we got APC..."
Tony Chen, DeAnza Systems

"We were working on a state bid when the power went off. APC saved the day and year and future...about 800 pages of data saved thanks to APC."
Ravi Iyer, Software Galleria

"A power surge did significant damage to all of our systems except those protected by APC. The APC units were undamaged..."
C. Jeffrey, C. Jeffrey Eng.

"APC has virtually eliminated downtime in our corporate network..."
Kurt Roemer, Searle Corp.

"Power went out while processing payroll! If not for APC we would have had a walkout!"
Suzi Higgason, OSI Inc



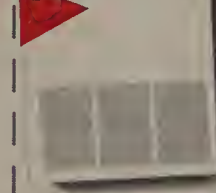
Home office user Don Traux knows first hand about APC reliability: "It ought to be against the law to buy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked."

"APC lets me sleep better at night. How much would you pay to get back that one file you worked all day to complete for the boss who gets on the plane at 8:00 a.m? You should assume that you'll buy a UPS, not that it's some luxury item."
R. Morella, Westinghouse

"A power surge wiped out the FAT tables on all PC's not protected by APC. Now have APC installed on all..."
Craig Post, Comm. Tech.

"Before I purchased the UPS I had to put in at least two hard drives at \$1000. With APC products...no new hard drives in two years!"
S. Foreman, LSP

Solutions



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Profit 2.0 Accounting Package Adds Speed and a Sporty Interface

This accounting package, formerly known as Microsoft Profit, is now in the hands of Great Plains Software, an accounting software developer that originally developed the program for Microsoft and recently took over its sales and marketing.

The new Profit 2.0 is noticeably faster than the first version introduced two years ago. Great Plains claims that Profit has 112 new features, though most are relatively minor improvements. The interface has been cleaned up, eliminating some of the too-cute-for-words cartoon characters that popped up in the original.

But this doesn't mean Profit 2.0's interface is dull. If you have trouble keeping track of your business bills and paperwork, you'll find they're never more than a few clicks away in Profit's innovative electronic filing cabinet.

This filing cabinet metaphor is designed to help you manage bookkeeping "paperwork." Click the file cabinet drawer and it slides open, revealing file folders on the right. Click the sales folder and select from a number of sales forms, including those for invoices and price quotes. They all look much

like their paper counterparts.

While the filing cabinet hides accounting complexities from the average user, the program is useful for experts, too. For instance, bookkeepers can click the accounting drawer, then debit and credit to their heart's delight.

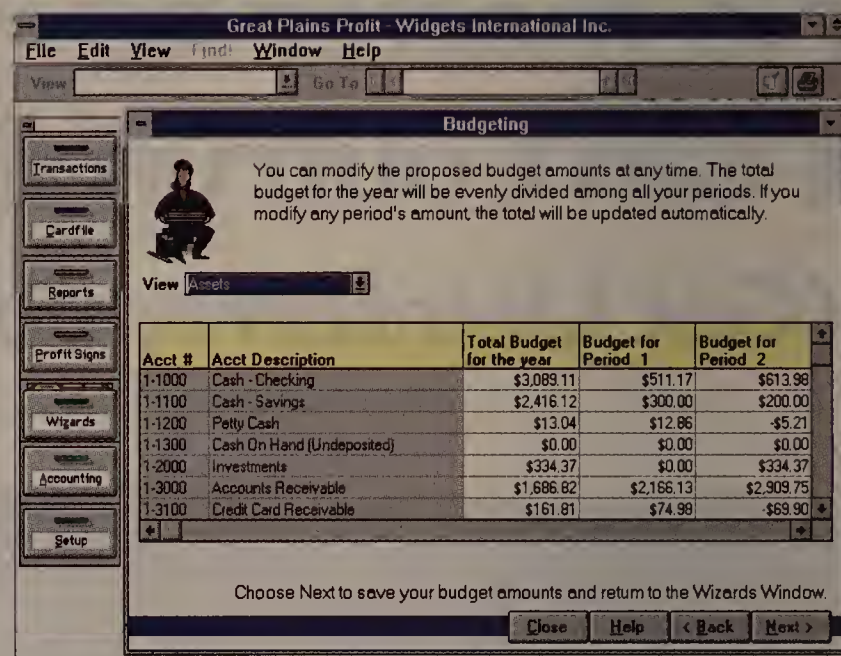
But Profit does more than just help you fill out forms and track numbers. It also makes it easier to look at the big picture and assess where your business is going. The Profit Signs drawer includes ratios and charts that measure your company's financial vital signs. These tools help you monitor cash flow and measure profitability in several different ways—by project, customer, or manager.

A customization Wizard steps you through the process of modifying invoices, customer billing statements, and checks. You can drag and drop sections of text and data fields to create a form that suits your needs. You can even add a business logo or other artwork.

The \$249 Profit 2.0 is networkable and handles most major accounting functions. Great Plains' Payroll module can be bundled with Profit 2.0 (total cost \$299), or be purchased separately for \$99.

Profit 2.0 is probably overkill for very small businesses with less than \$500,000 in annual revenue; Intuit's QuickBooks is more suitable for that. Profit 2.0 is aimed, instead, at businesses with up to \$5 million in annual revenue and up to 25 employees. If your business fits this profile, Profit could become your electronic accountant.

—Richard Morochove



GREAT PLAINS PROFIT 2.0's WIZARDS guide you through complicated accounting procedures, such as setting up an annual budget.

No More Sticky Notes

Before personal information managers (PIMs) became sophisticated relational databases hiding behind a snazzy interface (such as Lotus Organizer or WordPerfect InfoCentral), they were primarily free-form databases—great nets to catch schools of unrelated information, including to-do lists, phone numbers, appointment reminders, and so on.

Micro Logic's Info Select Express for Windows, which began life as Tornado Notes, harkens back to the simple, free-form days of PIMs. It lets you store numerous bits of information on the fly and search for them quickly. The package doesn't come with the bells and whistles found in most of today's PIMs, but it does dial phone numbers and let you set ticklers for appointments.

On the other hand, it doesn't come with the price tag of most

Info Select Express for Windows

An electronic shoebox for storing information in your computer.

Micro Logic Corp.

800/342-5930

List price: \$19.95

Reader service no. 745

PIMs. Micro Logic has kept Info Select Express under \$20 by packaging it in a box the size of a compact disc and forgoing printed documentation for online help.

If you use the card file program that comes packaged with Windows, or if you just want to store random bits of information that you can find easily, Info Select Express is a robust utility that can't be beat for the price.

—John P. Mello Jr.

Great Plains Profit 2.0

Formerly Microsoft Profit, version 2.0 adds some snappy new features.

Great Plains Software

800/926-8962

List price: \$249, with Payroll module \$299

Reader service no. 744

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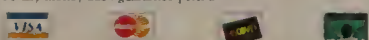


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ClarisWorks 3.0: A Beefy Alternative to Bloated Office Suites

Where's the beef?" used to be the complaint about everything-but-the-kitchen-sink integrated software packages. Vendors were so intent on stuffing every major application category into one box that each applet suffered from limited functionality. But Claris Corporation learned from these mistakes: Its latest integrated package should give the pricier office suites a run for their money.

ClarisWorks 3.0 might not be as beefy as full-featured software suites such as Microsoft Office, Lotus SmartSuite, or Novell's PerfectOffice, but it does offer surprising muscle, a sleek and intuitive interface, and an appealing \$99 price tag.

Such features may explain why many small businesses increasingly rely on integrated packages such as ClarisWorks instead of the disk- and RAM-hogging application suites. A full installation of Microsoft Office, for example, consumes 65MB of hard disk space. ClarisWorks takes just 9MB.

Besides the usual major apps, ClarisWorks 3.0 offers outlining and presentation management. The program's new Assistants guide you through common

tasks, such as creating a name-and-address database, as well as more-complicated procedures, such as formatting footnotes or designing a newsletter. And moving objects from one ClarisWorks app to another is a seamless point-and-click affair.

ClarisWorks 3.0 is being released simultaneously for Windows and the Macintosh, so users can open documents created on either platform—perfect for dual-platform offices.

For users who don't need an office suite, this package is a price-performance winner.

—Michael S. Lasky



POWERFUL INTEGRATION: ClarisWorks 3.0's desktop publishing tools let you create professional-looking documents.

ManagePro 3.0: Project Manager for Workgroups

Other than death and taxes, a manager's life has two certainties: overseeing employees and meeting goals. As neither is always easy, it's nice to know there's a software package available that can help with the complexities of project management.

Introduced in 1992, Avantos Performance Systems' Windows-based ManagePro was originally designed to help managers establish goals and monitor employees' progress.

Version 3.0 is built for collaborative computing. Its new MultiLink feature allows managers across an organization to share information about common projects. MultiLink lets users link their Goal Planner databases, which chart the status of projects, so that everyone on a team is working from the same set of expectations.

The new version also incor-

porates suggestions from users. A new Report Customizer, for example, allows you to edit the program's report templates or create a personalized report from scratch. An improved project manager calculates the cost and duration of a project, taking into account holidays and weekends. And a refined calendaring feature now lets you see text descriptions of the day's activities. If there's a conflict in your schedule, a color-coded "busy bar" shows you where it is.

The new version of ManagePro also comes with 20 reference databases that outline tasks for different kinds of managers. If you're a product manager, for example, your database provides you with information about writing a business plan, developing product specifications, getting packaging designed, and so forth.

ManagePro 3.0

Improved project manager now lets users share information across a network.

Avantos Performance Systems, Inc.

800/282-6867

Street price: \$189, upgrade \$99

Reader service no. 747

ManagePro's personal information manager is still a 90-pound weakling compared with those in other packages, and you'll probably need help setting up DDE links to other Windows packages. On the other hand, since ManagePro helps you organize and concentrate on specifics, you'll spend less time putting out fires. And that just might help you get promoted.

—Bronwyn Fryer

ClarisWorks 3.0

Powerful integrated package with word processing, spreadsheet, database, and graphics programs.

Claris Corp.

800/325-2747,

408/927-8227

List price: \$99

Reader service no. 746



**"¡Increíble! I've saved
hundreds of hours!"**

We have a two-inch-thick employee manual that is also sent to our European offices. Power Translator helped me translate it into the local languages of our branch offices. It even imported the original word processing file, so I didn't have to waste time typing. Now all our employees feel they're part of the team, and I'm a hero!



**"C'est facile! I'm learning
French faster!"**

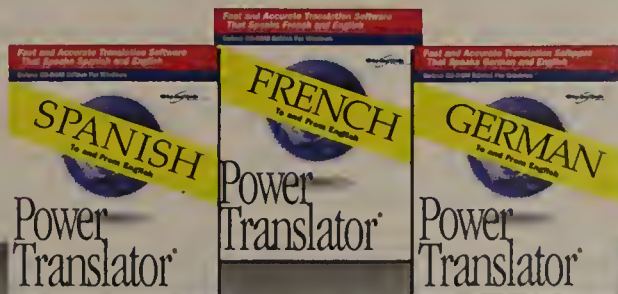
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**"Spitze! We didn't have
to settle for the ordinary!"**

We wanted something unique for our honeymoon. With Power Translator we sent letters out to small bed and breakfasts on the Rhein. We spent two wonderful weeks at a vineyard along the river. Power Translator made it easy to plan a romantic adventure in Germany!

PerForm for Windows Helps Small Businesses Design Forms

Returning to its small-business roots, Delrina has released a new version of PerForm for Windows, its popular electronic forms design package. A slick little program, PerForm is targeted at the business user who currently uses a word processor, spreadsheet program, desktop publishing package, or drawing program to create and fill out invoices, purchase orders, expense reports, or any other business form.

Following the lead of Microsoft and other software companies, Delrina includes helpful tools—called DelrinaExperts—that guide you through the process of creating professional-looking documents in PerForm. Once you answer some simple questions about your preferred design style and form components, PerForm creates customized forms.

However, you'll probably want to refine what PerForm creates for you. The invoice form, for instance, is designed for businesses that bill customers for goods purchased. If you're a service provider, you'll want to remove the "Ship to" text box.

PerForm comes with a bevy of tools for customizing the in-

cluded forms templates and for designing forms from scratch. You can use design elements such as rounded or square-cornered rectangles, solid and dotted lines of varying widths, and opaque or transparent shading of various tints and colors. As a shortcut, you can add preformatted tables to your forms design. And you can import ten different graphics formats. Moving these elements around the screen is a simple drag-and-drop affair.

The text tools let you scale characters up to 127 points, color or shade letters, and rotate words vertically.

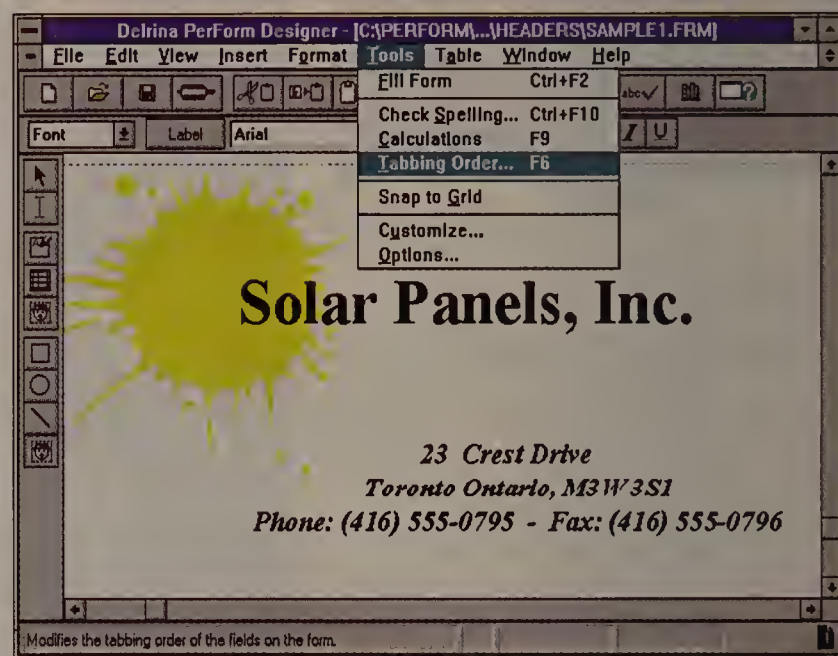
PerForm comes with a measly 43 sample forms—not a lot for an electronic forms program. An earlier version of the program included 145 forms templates but occupied an additional 10MB of hard disk space. Ah, trade-offs.

PerForm has features not found in most other forms programs. For instance, you can use calculated fields to add taxes, apply variable discounts, and include shipping charges. PerForm stores the data as multiple records in a searchable, flat-file database, but it doesn't have Boolean operators or other sophisticated search functions.

Unlike its sister product, Delrina FormFlow, and other high-end forms programs, PerForm isn't designed for work-group computing. You won't find tools to route forms to different users over a network.

But PerForm adds up to a handy, easy-to-use forms program for small-business users with simple needs.

—Reid Goldsborough



PUT AWAY THAT WORD PROCESSOR: Delrina's PerForm for Windows has an easy-to-use interface for creating electronic forms.

Delphi Takes On Visual Basic

Event-driven programming for Windows has been hot news since the introduction of Microsoft's Visual Basic, which greatly simplified application development. But Borland's upcoming software development tool, Delphi Client/Server, will offer developers an important alternative.

Although targeted at developers of client-server applications, Delphi is capable of creating virtually any kind of Windows application. And while Delphi and Visual Basic both provide powerful tools that simplify interface design, Delphi can create faster, stand-alone executable (EXE) files, Borland claims.

Unlike Visual Basic, Delphi can produce its own reusable DLL and control extension objects, meaning that developers will have less need to resort to the C++ language or third-

Delphi Client/Server

Visual development system for client-server and general Windows applications.

Borland Int'l

800/331-0877

List price: Under \$2000

Reader service no. 749

party add-on libraries.

Based on object-oriented Pascal, Delphi will include a full set of SQL and other database access tools. Support features for Windows 95 should ship on the heels of Windows 95 itself, Borland says.

Two flavors of Delphi should be available by the time you read this: a full-scale client-server version and a desktop version without network and database features. Delphi is expected to cost less than \$2000.

—George Campbell

PerForm for Windows

Single-user electronic forms package with slick automation features.

Delrina

800/268-6082,

416/441-3676

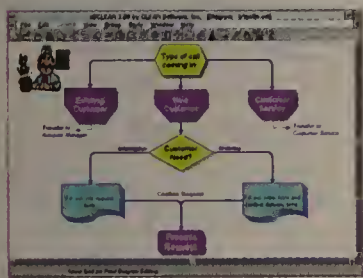
Street price: \$75 to \$80

Reader service no. 748



Tolstoy became infuriated whenever asked to edit or revise his work. Reminds us of someone using our competitors' flow charting software.

Leo Tolstoy had a standard reaction to editors' revisions: unbridled rage. And we can hardly blame



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him since we all know what a pain revising and editing can be – especially if it's a complex flow chart you're working on. That's the beauty of new

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Monocle+ Offers Tips and Tricks for Mutual Fund Investors

For some time now, savvy investors have used financial software to help them play the stock market. Unfortunately, affordable Windows-based analytical tools have been slow in appearing. One such new tool is Monocle+, a mutual fund investment program from Manhattan Analytics.

Monocle+

Mutual fund analysis.

Manhattan Analytics

800/251-3863

List price: Software \$149,
quarterly BBS subscription
\$75, disk-based updates
\$10 monthly

Reader service no. 750

Mutual funds offer an alternative to traditional single-stock investing by letting you pool your money with others under the care of a fund manager. By investing in a number of stocks, the fund spreads the risk, while its manager tries to outperform the market.

Manhattan Analytics maintains a five-year historical database of every mutual fund and lets users dial in daily via modem for fund updates. This allows you to graphically analyze a portfolio of funds. You choose one fund or market index as a baseline, and Monocle provides comparative analyses. You'll be able to see when a fund consistently outperforms other similar funds.



TRACK YOUR MUTUAL FUND INVESTMENTS with Monocle Plus.

With a readable manual and a cleanly designed user interface, Monocle+ is a good tool for conscientious investors. But

combine it with a subscription to the *Wall Street Journal* and your own research.

—Joe Abernathy

StaffWorks Helps Managers Plan Employee Schedules

Ask any retail manager: Having too many employees on a shift wastes money, yet having too few compromises service. Smart managers

should consider using Campbell StaffWorks 3.0, an employee scheduling package for the retail industry that makes its Windows debut and offers a va-

riety of enhancements over the previous version.

StaffWorks produces an optimized work schedule by balancing the needs of a company with those of its employees. A manager configures StaffWorks with the company's employee information, work rules, and past scheduling and sales-traffic data, then selects a scheduling priority, such as minimizing payroll or distributing shift hours evenly. Each week thereafter, the manager enters workload requirements and makes adjustments based on employee availability; StaffWorks then calculates a schedule. After making any necessary changes, the manager can print weekly schedules for both the staff and individual employees.

Campbell StaffWorks 3.0

Automated retail employee scheduling software.

Campbell Software, Inc.

708/328-3200

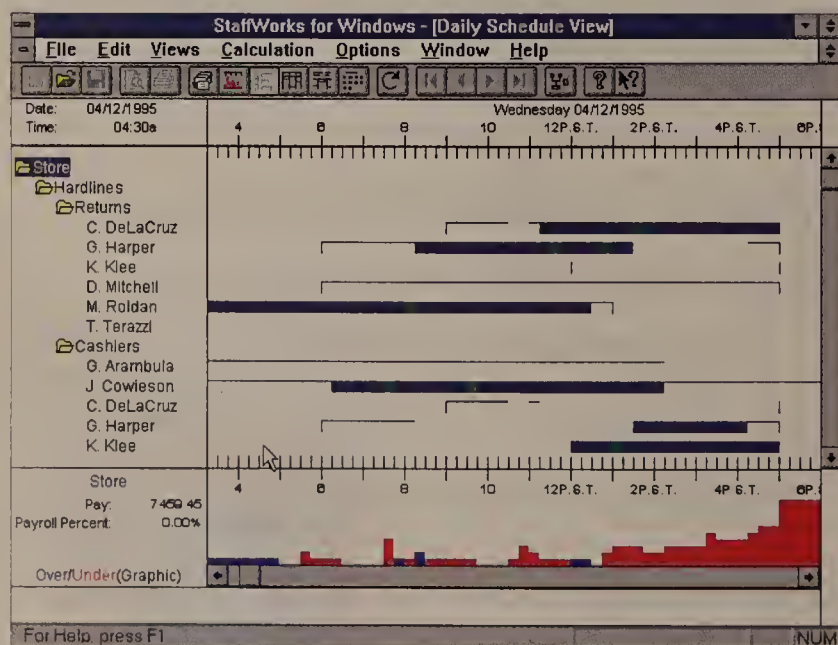
Price: Starts at \$2000 for a 100-employee business

Reader service no. 751

Version 3.0 supports up to 10,000 in-store departments and job classifications. It can adjust business hours based on seasonal changes, and its search feature retrieves sales and scheduling records.

Pricing for StaffWorks 3.0 begins at \$2000 for businesses with 100 employees. DOS and UNIX versions are available.

—Shane Rau



STAFFWORK'S 3.0's DAILY SCHEDULE VIEW graphically displays employee work hours—helpful for harried managers.

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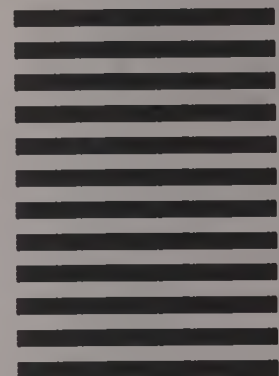
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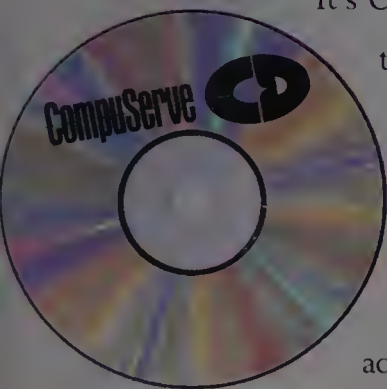
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Circle 33 on reader service card

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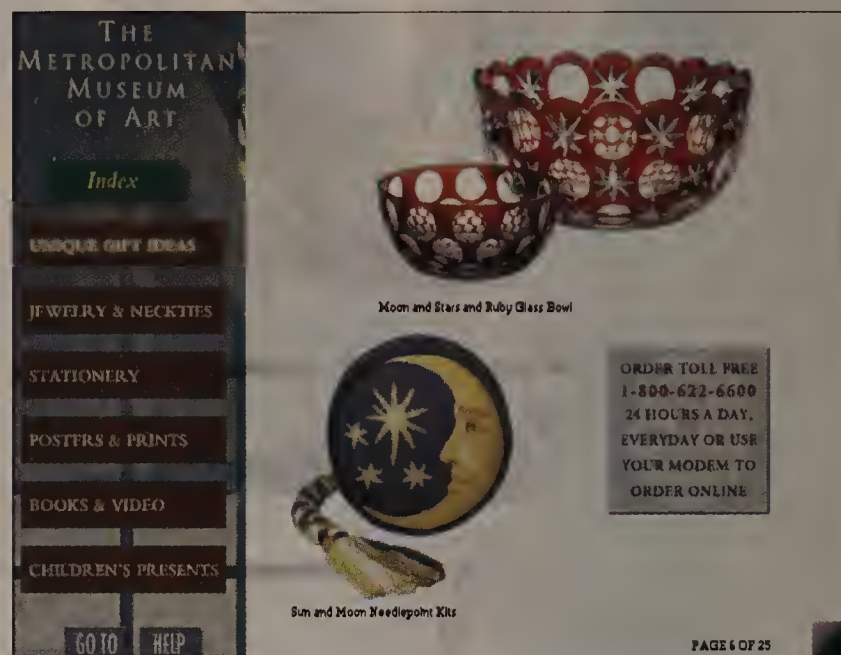
2Market Lets You Shop From Your Desktop

Online shopping has a long way to go. Without the tactile sensation of in-store shopping—picking up a product, kicking the tires, trying on something new—consumers have little real-world information to rely on. While the 2Market shopping service can't offer the touch-and-feel ambience of, say, Sears Roebuck, its

new CD-ROM collection of catalogs features video and audio clips that give cyberspace customers a better idea of what's for sale.

The CD-ROM version of 2Market features electronic catalogs from a variety of well-known mail-order merchants, including Hammacher Schlemmer, The Nature Company, and The Sharper Image. The service is also available via America Online, but the CD-ROM is the better option; it allows you to browse more than 20 catalogs, learn about the products through video and audio clips, and order by phone or fax.

2Market has its drawbacks. For instance, the service pro-



SHOP TILL YOU DROP with 2Market, an electronic general store.

vided only a subtotal of my charges when I placed my credit card order—taxes and shipping fees are determined

by individual merchants and will remain a mystery until my next billing statement arrives.

—Richard Overton

2Market

MULTIMEDIA Electronic catalog collection.

2Market, Inc.

800/622-6600

Price: CD-ROM with three quarterly updates \$25

Reader service no. 618

Smart Moves Helps You Relocate to a New City

The company's transferring you from San Antonio to San Diego, and you don't have a clue about your new city's housing prices, neighbor-

hoods, crime rate, schools, and other vital facts. PHH Corporation's Smart Moves can help. This \$39.95 CD-ROM contains detailed information on

more than 2000 U.S. cities presented in colorful, easy-to-follow maps, graphs, and charts.

Simply select a city from Smart Moves' Pick Destination box, and up pops a map of the region, color-coded to identify desirable locations: Areas in red are best; blue ones are worst. Communities are judged on housing market conditions, quality of public and private schools, crime rates and trends, and taxes, among other criteria. Smart Moves' data comes from a variety of sources, including the U.S. Census Bureau, the FBI, and PHH's own Homequity Relocation Network.

I was impressed with Smart Moves' powerful search capabilities. Finding the right area is easy, whatever your standard.

Smart Moves

Valuable data to choose your new neighborhood.

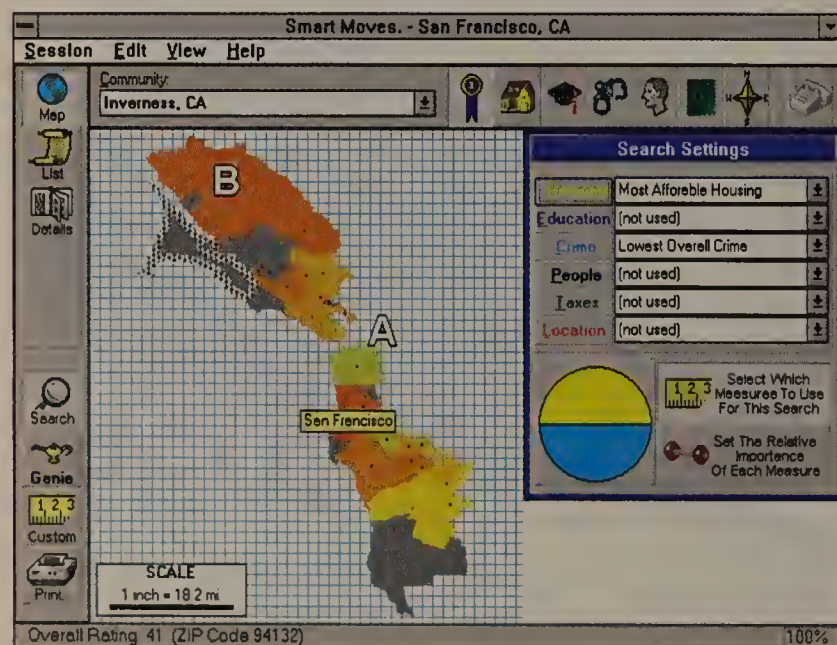
PHH Corp.

800/210-8852,

913/661-0808

List price: \$39.95

Reader service no. 619

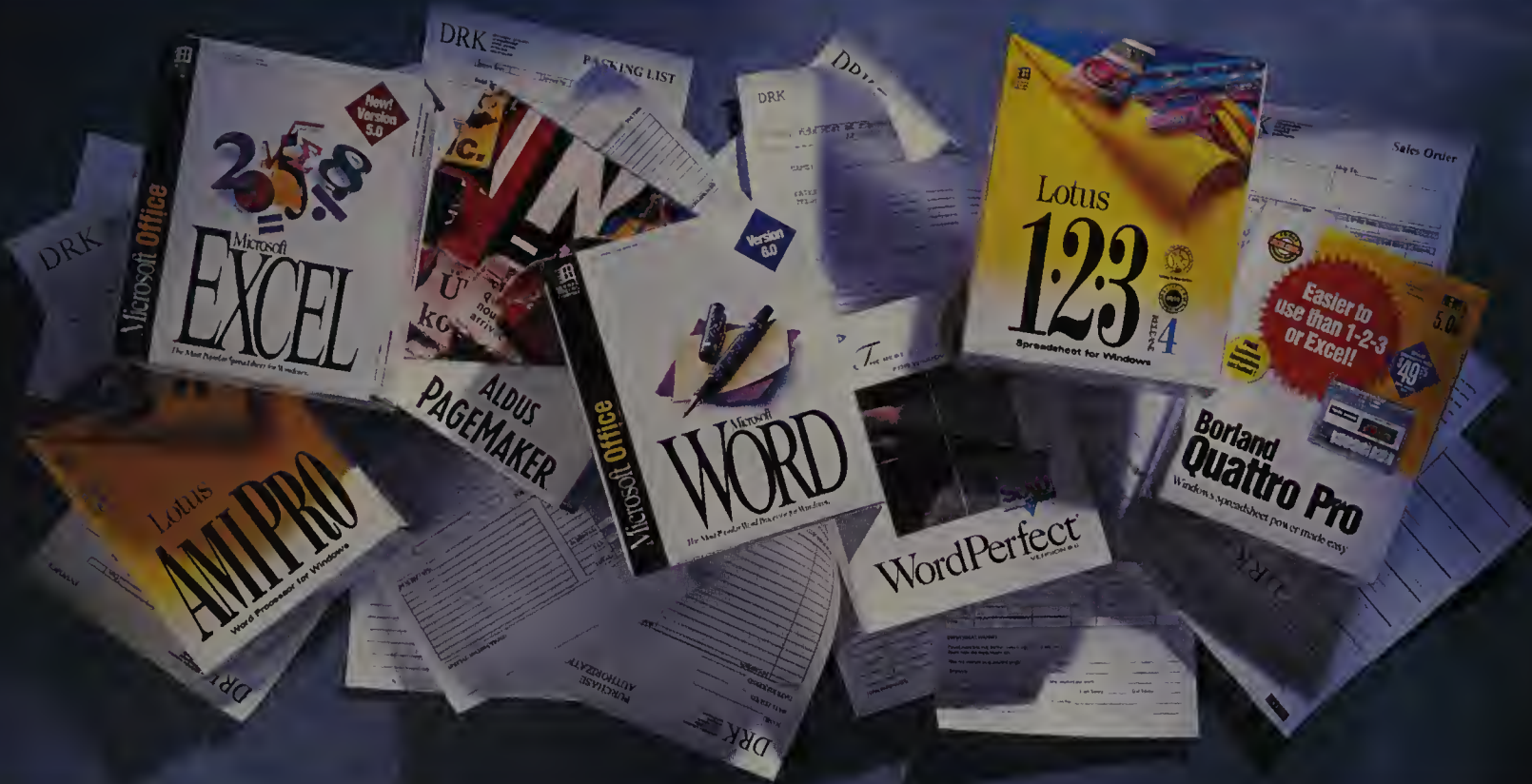


GET SMART BEFORE YOU MOVE: Smart Moves' data on thousands of U.S. communities helps you find the right neighborhood.

For instance, clicking an icon brings up a color-coded map of a region's housing prices.

But Smart Moves doesn't stop there. You can find practically everything—from basics like where to find the most-affordable one-bedroom apartments to esoterica such the areas with the highest concentration of solar-heated homes.

—Jeff Bertolucci



No wonder people hate forms. Just look what they use to create them.

There's a better way to make business forms. With new Delrina PerForm® for Windows.™

Until now, people were forced to make forms with software designed for something else. A painful, time-consuming experience with less than ideal results.

But now there's Delrina PerForm for Windows, an entirely new kind of software designed specifically for creating, filling and printing the kind of forms you use every day. An alternative that's faster, easier and more powerful than the software you use now. Here's why.

First, PerForm comes with dozens of professional, ready-to-use forms. As well as the DelrinaExpert™ that guides you through choosing and customizing the ones that are best for you. Nothing is easier.

It has powerful form design capabilities. With outstanding drawing, text and graphic controls. And it intelligently files

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completed forms so you can instantly retrieve them based on any piece of information they contain. Go try that with your word processor.

With PerForm, you get forms that look better, fill better, print better, even fax better using Delrina WinFax PRO.™ In short, forms that just plain work better than those made any other way. And we'll help you prove it.

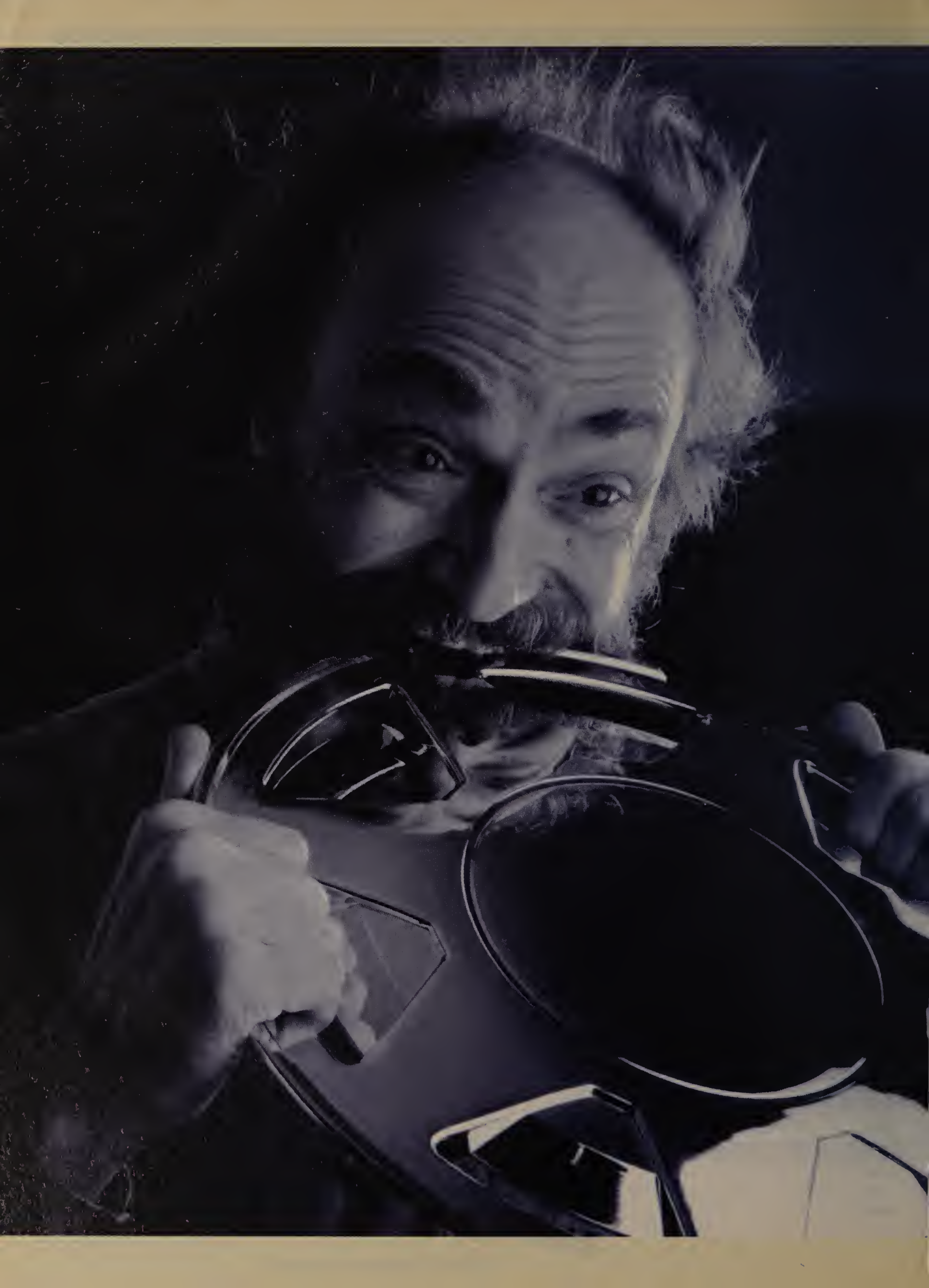
If you use any other application to make your forms, buy new PerForm now (list price \$129 *), and we'll give you \$20 back. See your dealer today.

With new PerForm for Windows, making better looking, more effective forms is fast and easy.



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Since 1975, Ivan Opachevsky's somewhat unorthodox diet has included, 6 cars, 10 shopping carts, 8 TV sets, 3 computers, 1,000 record albums and a twin-engine airplane.

Because he seems to thrive on doing things the hard way, he is undoubtedly one of the few people not interested in Delrina Communications Suite.

Mr. Opachevsky knows there are easier ways to get his daily dose of iron. So he probably won't care that Delrina Communications Suite™ is the easiest way to fax and go on-line. You, however, will be pleased to learn that the world's best-selling fax software, Delrina WinFax™ PRO, and the powerful



Delrina Communications Suite includes both WinFax PRO and WinComm PRO.

communications software, Delrina WinComm™ PRO, are now available together in one economical, easy-to-use package – Delrina Communications Suite. WinComm PRO gives you push-button connections to most major on-line services, like CompuServe™ and MCI Mail™. You get all the important file transfer protocols, the most popular terminal emulations and a whole lot more. It lets you send and receive Internet e-mail off-line. Plus learning it is a piece of cake, since both applications share the same intuitive interface. WinFax PRO lets you send and receive faxes with your PC from any Windows application – eliminating countless trips to the fax machine. Sending a fax is as easy as printing a document. You can even receive faxes in the background while you work in another application. And you can organize and manage your faxes with handy drag-and-drop folders. So visit your local software dealer today, or call us at 1-800-270-8031 to order or upgrade. Once you try Delrina Communications Suite, you'll be so much more productive with your PC, you won't be tempted to eat it.



Talk about fast food... Ivan O. devoured the 290-horsepower, dual carb '60 Corvette pictured below in a mere 4 months. More important, WinFax PRO saves you from eating up time hiking back and forth to the fax machine – since you can conveniently send and receive faxes right from your PC. Plus WinComm PRO gives you double-click access to many



on-line services, and features Delrina's Internet Messenger™ for sending and receiving Internet e-mail. You can get WinFax PRO and WinComm PRO together in Delrina Communications Suite.

AirAccess Promises Easy Remote Access but Fails to Deliver

AirSoft's AirAccess 2.0 offers a tantalizing premise: fast, seamless access to files on your office PC or LAN, regardless of whether you're computing at home or on the road. Rather than using a file transfer utility, such as those in Traveling Software's Lap-Link and Symantec's pcAnywhere, you can have AirAccess retrieve a file and load it directly into a word processor, spreadsheet, or other program on your remote PC. Unfortunately, in my hands-on testing of a shipping version, I found the program long on promise but short on usability.

To use AirAccess, you first must load it on your office and portable (or home) PCs. During installation, AirAccess can connect both systems via modem and copy the file structure of the office PC to the portable. Say you're on a business trip and want to edit a document that's stored on your office machine. You simply load the notebook's word processor and select the document from the "virtual drive" that AirAccess uses to represent the office PC; for instance, drive D: could represent the office PC's C: drive. AirAccess automatically dials the office system and moves the file to the notebook.

The program saves the document on the notebook, so the next time you select the same file from the D: drive, it'll load quickly—no modem connection required.

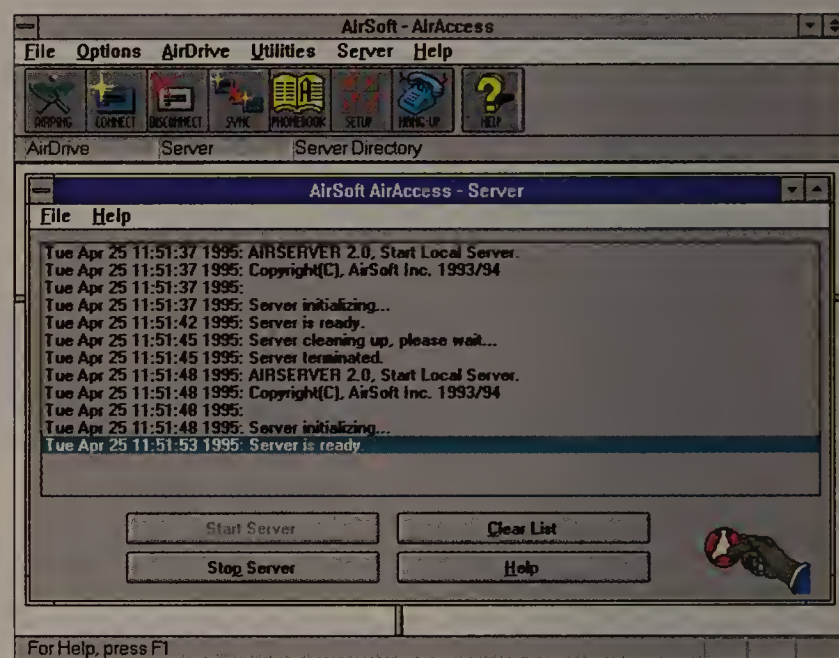
That's the theory, anyway. In reality, AirAccess proved difficult to set up and frustrating to use. The software crashed several times during installation on both my office and notebook PCs and also crashed my notebook (an AST Ascentia 910N) whenever the portable went into power-saving mode.

When I switched to a different modem, I still wasn't able to connect my portable and desktop machines. After calling AirSoft's technical support, I discovered that I needed to type C:\ rather than simply C: in the server directory box—I'd forgotten the all-important backslash. (The server directory is the drive that you want to access on your office computer.) The manual doesn't tell you to include the backslash, but the software should be smart enough to understand what C: means.

Once I finally got the software installed properly, AirAccess successfully retrieved files from my office PC about half the time. In many instances, the program failed to copy a text file but still listed the file's name at the top of the screen, as if the document had been moved successfully.

Despite my problems with AirAccess, I believe it can be a useful tool for business travelers. But wait for the next version—AirSoft needs to clean the bugs out of version 2.0.

—Jeff Bertolucci



AIRSOFT'S AIRACCESS lets you set up your office PC as a server, allowing your remote PC to phone in to access files.

Free Mutual Fund Info

Networth, a free new Internet service, provides comprehensive investing advice on more than 5000 mutual funds. This sophisticated yet friendly research tool offers information ranging from the down and dirty details of a fund's prospectus, performance, and promotional materials to a weekly market outlook, newsletters, and the complete Morningstar database, which gives objective analyses of funds. Pricing quotes are obtained directly from the markets via Standard & Poor's, while interactive discussion forums put you in touch with industry professionals.

The way you access Networth is through the World Wide Web, the point-and-click multimedia interface that takes the drudgery out of Internet access. If you're already using the Web, you need only point

Networth

A graphical mutual fund investment center arrives on the Internet.

Galt Technologies Inc.

Access: <http://networth.galt.com> on the World Wide Web

List price: free

your browser to the address <http://networth.galt.com>.

I liked Networth a lot and would rather work with it than with most mutual fund investment counselors. However, that doesn't mean that it's all things to all people—it's more for those who have some idea of what they're doing. As always, exercise due caution when anyone, or any company, tells you how you should invest your money.

—Joe Abernathy

AirAccess 2.0


Promises easy remote access but is hard to use.

AirSoft, Inc.

800/708-4247, 408/777-7500, 408/777-7527 (fax)

List price: starts at \$199

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Circle 140 on reader service card

Cordless PCMCIA Fax-Modem Frees You From the Phone Jack

If you'd like the freedom to use your modem anywhere in a room, no matter where the phone jack is located, you're going to like the Airplex 2705 Faxmodem. This PCMCIA Type II fax-modem uses infrared technology to send data from your notebook PC to a receiver attached to the phone jack—no more fooling with phone cables. The Air-

plex is great for use in hotel rooms and conference centers, where phone jacks aren't always accessible. However, this convenience comes at a cost: The \$599 Airplex is rated at 14.4 kbps, while PCMCIA modems operating at 28.8 kbps list for about \$400.

The Airplex uses a small infrared adapter that attaches to the inserted PCMCIA modem card. This adapter communicates with the infrared receiver unit, which is the size of an index card and weighs 10½ ounces. You plug the receiver into a standard phone jack. When you want to use the modem, you call up your communications software, and you're ready to send or receive.

Airplex 2705 Faxmodem

Cordless PCMCIA fax-modem uses infrared signal.

K and M Electronics

800/442-4334

List price: \$599

Reader service no. 742



THE AIRPLEX CORDLESS FAX-MODEM uses an Infrared signal to send data from a notebook to a receiver attached to the phone jack.

The Airplex works in areas up to 1000 square feet in size, useful for conference rooms. Because it employs diffuse in-

frared technology, physical objects won't block the transmission, the vendor claims.

—Laurianne McLaughlin

Two New Telecommuting Devices Bring the Office to You

Multi-Tech Systems has announced two new communications devices with options for remote users. Telecommuters should consider the MultiMux MMV101, which can forward LAN, fax, and phone traffic simultaneously from your office to your

home over a single phone line, according to the vendor. You'll need to buy two of the \$1299 units, however—one resides in your office and attaches to a PBX phone switch and LAN, and the other resides in your home and connects to a phone (for voice calls) and your PC's

serial port (for fax and data). The units, which each require a communications device, such as a modem, can be connected by either a regular phone service or a high-speed digital service, like ISDN or Switched 56. The MultiMux is expected to ship this spring.

For mobile types, there's the MultiModem MT2834LT, a 28.8-kbps PCMCIA fax-modem with all the latest features. Like any desktop modem, the \$399 product includes two RJ-11 jacks—one to connect the cord from your phone and the other to connect your phone line from the wall. An upgradeable flash ROM lets the unit accommodate future communications standards, possibly including the rumored V.34bis for

MultiMux MMV101, MultiModem MT2834LT

An Innovative telecommuting device that forwards phone calls and LAN and fax traffic from your office to your home; a PCMCIA fax-modem with all the latest features.

Multi-Tech Systems

800/328-9717,

612/785-3500

List price: MMV101 \$1299, MT2834LT \$399

Reader service no. 743



MULTI-TECH'S MULTIMUX DEVICE forwards phone, fax, and LAN traffic from an office to a remote location.

33.2-kbps communications. As with many PCMCIA products, installation was a pain, and I had to call Multi-Tech's technical support for assistance.

—Randy Ross

What makes SAMTRON MONITORS such a great value?

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Producing high quality monitors is our only business. In fact, our commitment to quality has been

JANUARY 1995 recognized by the
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MONITOR

to the NTSL lab report in the January 1995 issue of BYTE magazine, "The Samtron SC-728SXL earned the best overall image quality rating". In their December 1994 issue, Windows Magazine wrote "It's not often that

WINDOWS high quality comes at a midrange price. But Samtron's SC-728SXL, with its truly flat 17-inch screen is an exception. Right out of the box, the quality of this 17-inch monitor was apparent."

TECHNICAL SUPPORT

Our commitment to quality doesn't end when you buy a Samtron monitor. Our professional Customer Service Representatives are available for unlimited technical support. Call our toll-free technical support line at 1-800-SAMTRON.



SC-728SXL

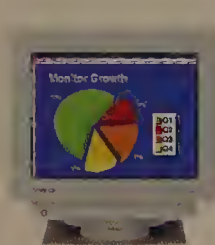
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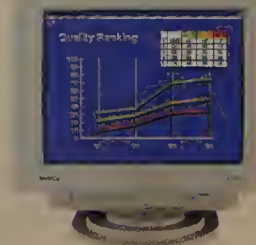
SC-528UXL

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MPR II



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17" 0.26 Dot Pitch
1280 x 1026 (76 Hz)
MPR II Mac Compatible



SC-208DXL

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MPR II Mac Compatible

Resellers circle 204 on reader service card

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SOUND GREAT,
THEY PUT PRODUCTIVITY
IN MOTION.



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The right multimedia notebook can give you a decided advantage in your work. That's why we made the TravelMate M Series notebook computers.

These powerful multimedia machines give you desktop PC capabilities in a portable package, including the industry's first truly portable, battery-powered CD-ROM Docking System. So you have the freedom to use them anytime, anywhere.


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And the optional, battery-powered CD-ROM Docking System gives you access to the growing libraries of CD-ROM software, no matter where you are.

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August 1994
TM4000M/25



July 1994

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Circle 220 on reader service card

PowerBrain

No, we're not talking about the guy down the hall who went to MIT. PowerBrain is a hardware-software product that acts as a power management system for your PC. PowerBrain's hardware consists of a 9-volt power supply, a controller unit about the size of a cigarette pack, and a small power module that plugs into an electrical outlet. Plug the PC and the power supply into the power module, then connect the controller to both the serial port and the power module (cables are included). The product comes with DOS and Windows utilities that let you turn the PC on or off at specific times. PowerBrain also lets you automate certain computer tasks, such as downloading files from bulletin board services. While some new Energy Star-compliant PCs (such as IBM's Aptiva) already offer similar features, PowerBrain makes them available to all PC users. It lists for \$175. Quantum Composers, Inc., 800/556-9686, 406/586-3159.

Reader service no. 729

Drag and Zip 5, Drag and File 2

Canyon Software's latest versions of its well-received file compression utilities include such useful features as a built-in virus scanner for zipped files and links to popular Internet World Wide Web browsers such as Mosaic and Netscape. Both Drag and Zip 5 and Drag and File 2 make it easier for Windows users to compress and expand files using the PKZip utility. After you download a file from the Internet using your Web browser, the

\$30 Drag and Zip pops up automatically and lets you view or extract the file immediately. The \$69.95 Drag and File is a handy file manager that includes all the features of Drag and Zip, as well as a new DOS command line that allows you to enter DOS commands without leaving Windows. Canyon Software, 800/280-3691, 415/453-9779, 415/453-6195 (fax).

Reader service no. 730

Teac SuperQuad Combo Drive

Running out of drive bays? Teac's new SuperQuad Combo Drive packs a quadruple-speed CD-ROM drive and a 3½-inch floppy drive into a single device that fits in a half-height drive bay. The \$499 SuperQuad features a CD-ROM data transfer rate of 600 K/sec and a 195ms access time, according to Teac. It also has a 64K CD-ROM data cache and uses a proprietary ISA bus interface card. The SuperQuad's floppy drive offers the usual features and supports both 720K and 1.44MB floppies. Teac America, Inc., 800/888-4923, 213/726-0303.

Reader service no. 731

Typestry 2 for Windows

The last word in 3-D type manipulation, Pixar's Typestry 2 builds spectacular text creations and even AVI or QuickTime animations for logos, presentations, newsletters, and the like. Type in your desired text (or import an Adobe Illustrator file); pick a font; and apply configurable bevels, lighting and shadow effects, and wall and floor background colors and textures. You can select indi-



TYPESTRY LETS YOU PICK A "LOOK"—texture, color, and pattern—and apply it to the text or background to create stunning effects.

vidual letters and use your mouse to rotate, extrude, and move them in three dimensions. Get creative and turn letters into neonlike tubes, or set them atop a wavy rubber sheet and add just the right amount of wind (with settings for speed and gustiness) to impart an appropriately breezy air. It's easy to apply "looks"—customizable colors, patterns, reflectivity, and opacity—to any element in a Typestry creation. A 32-bit application, the \$299 Typestry runs under Windows 3.1 (when you install the bundled Win 32s module) and Windows 95. Pixar, 800/888-9856, 510/236-4000.

Reader service no. 732

VirusScan 2.1

McAfee's popular antivirus software for LANs and standalone PCs is now faster, easier to use, and less memory hungry, the company claims. VirusScan 2.1 features a new Windows interface that's designed to shield novices from the earlier versions' command-line interface while allowing power users to continue using it.

McAfee has improved VirusScan's performance by separating the virus scanning engine from the virus data files; this means the scanning engine doesn't need to be recompiled and retested for each update to the virus data file. VirusScan 2.1, which detects more than 3000 viruses, has a street price of about \$50 for a single-user copy; multiuser pricing is also available. McAfee, 408/988-3832, 408/970-9727 (fax).

Reader service no. 733

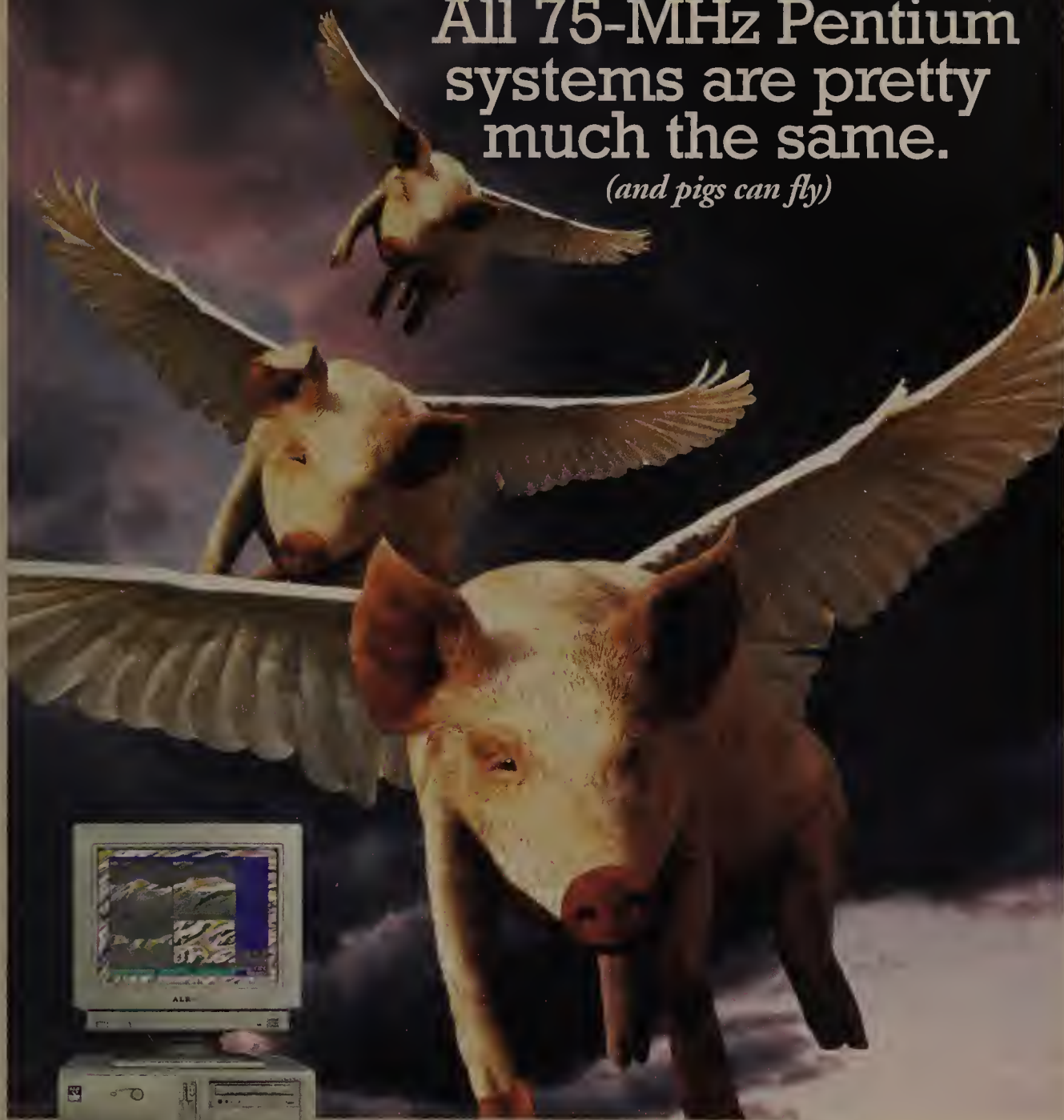
HotFax Menu

Any fax software user can tell you: Nothing's more annoying than having to reconfigure the Windows printer driver every time you want to send a fax. Smith Micro Software's HotFax Menu saves you the trouble by adding the word *Fax* to the File menu of your favorite Windows applications. Even better, HotFax Menu works with most popular Windows fax software, including WinFax Pro, FaxWorks Pro, Trio DataFax, BitFax Pro, Eclipse Fax, SuperFax, and Smith Micro's own QuickLink Gold and

All 75-MHz Pentium
systems are pretty
much the same.
(and pigs can fly)



Rated 10 out of 10 for "Service and Support" by PC Computing, these systems keep serving your needs for years to come. We've backed them with the industry's longest most comprehensive warranty- 5 year/36 months with one year of on-site service for free*.



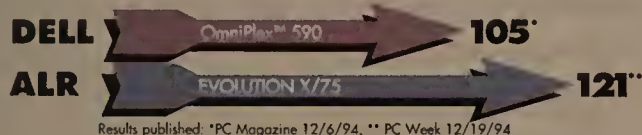
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We use only genuine Intel microprocessors in our quality computer systems.



Contrary to what other manufacturers would like you to believe, all 75-MHz Pentium systems are *not* the same. For proof, take a look at the ALR EVOLUTION X/75. While most 75-MHz machines settle for being just slightly faster than 66-MHz systems, the value-priced EVOLUTION X/75 actually outperforms some 90-MHz Pentium PCs.

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Higher Score is Better
Winstone 95 Ver. 1.0 tests to measure the machines' performance when running typical Windows applications.



The secret to this added performance is our award-winning, 64-bit Flex architecture enhanced with 256-KB of write-back cache. Thanks to this design, the cool running 75-MHz Pentium processor can soar to new heights of performance.

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QUAD 100-MHz PENTIUM
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Complementing this advanced CPU architecture is one of the most advanced implementations of PCI local bus technology available today. The EVOLUTION X/75 comes equipped with an enhanced Mode 3 PCI/IDE interface, providing up to 300% better disk performance than systems using standard IDE technology. It even supports future 8.4-GB IDE drives. And thanks to our dual channel IDE implementation, the ALR EVOLUTION X/75 supports up to four IDE devices. That's enough support for an ALR IDE CD-ROM drive, two hard drives and a removable storage device.



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- Prices Start at \$1595 & \$1995 (SRP) for 75- and 90-MHz Pentium Processors, respectively.**

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ALR Can be reached on COMPUSERVE - GO ALRINC. Advanced Logic Research, Inc. 9401 Jeronimo, Irvine, CA 92718-714, 581-6770 FAX (714) 581-9240 + Requires one time registration fee of \$9.95. Prices, configurations and specifications subject to change without notice. Systems shown with optional equipment. Pricing based on U.S. dollars. ALR is a registered trademark of Advanced Logic Research, Inc. Pentium logo and Intel Inside logos are trademarks of Intel Corporation. All other brand and product names are trademarks or registered trademarks of their respective owners. 1995 by ALR.

Circle 9 on reader service card

QuickLink II Fax. To fax a document, just choose Fax from the File menu, and HotFax Menu sends the fax automatically. You needn't change the default printer driver manually from the printer to the fax program. This \$19.95 utility is also included in the company's new HotFax communications program. Smith Micro Software, Inc., 800/964-7674, 714/362-5800.

Reader service no. 734

NEC MultiSync XV15

NEC has never been known for low prices: The company builds premium monitors, and it charges accordingly. But now NEC has introduced the MultiSync XV15—a low-cost monitor that lives up to the company's reputation for quality. Street priced at about \$455, this 15-inch model isn't the least expensive display you'll find, but compared to other NEC 15-inchers it's a steal. (For example, the high-end XP15 sells for just under \$700, while the midrange XE15 goes for around \$575.) And the XV15 has several features you won't find on cut-rate competitors: It displays resolutions of up to 1280 by 1024 (although such a high resolution is virtually unusable on the monitor's 13.8-inch viewable area) and supports an ergonomic 76-Hz refresh rate at 1024 by 768. NEC Technologies Inc., 800/632-4636, 708/860-9500.

Reader service no. 735

HotDocs 2.0 for Windows

HotDocs 2.0 is a low-cost utility that lets you create document templates using popular Windows word processors such as WordPerfect, Word, and Ami

Pro. To use HotDocs, first load the document you want to base your template on, then click the HotDocs button that the program adds to your word processor's button bar. Next, select the template's "variable text"—the text (such as a name, date, or address) that may change each time you use the template. HotDocs steps you through the template creation process. New features in version 2.0 include user-created template folders that let you organize templates by type—for example, Sales Brochures or Applicant Rejection Letters. HotDocs 2.0 has a list price of \$99, and upgrades cost \$39.95. Capsoft Development, 800/500-3627, 801/763-3900.

Reader service no. 736

EasyPhoto, EasyPhoto Reader

Adding photographs to Windows documents is snapshot easy with Storm Technologies' EasyPhoto. This \$49 program, available on CD-ROM with hundreds of sample images, enables you to insert color or black-and-white photos into documents. EasyPhoto works with any OLE 2.0-compliant application and accepts photos from a variety of media, including Photo CDs and images scanned in with the EasyPhoto Reader, a handy pint-size photo scanner aimed at the home market but equally useful for businesses. The EasyPhoto Reader attaches to your PC's parallel port (with a pass-through connector for your printer)—there's no interface



TRACKMAN GOES WIRELESS: Designed for presentations, Logitech's TrackMan Live is a radio-controlled pointing device.

card to install. It lets you quickly scan in photos; you then use the EasyPhoto software to resize and crop the photo or adjust its colors, brightness, and contrast. The EasyPhoto Reader (including EasyPhoto software) is street priced at around \$249. Storm Software, Inc., 800/275-5734, 415/661-6600.

Reader service no. 738

TrackMan Live

The TrackMan Live is a radio-controlled handheld pointer that's convenient for users who give computer-based presentations. Sleekly contoured and stylishly encased in black, the device fits in either hand. Your thumb controls the trackball and three oblong buttons. The receiver plugs into your PC's serial port, but you and the TrackMan Live can wander anywhere within the product's 30-foot transmission range. With Logitech's MouseWare utility, you can program the pointer's buttons to perform a variety of functions with a simple click. Since the TrackMan Live uses radio signals to relay information between the pointer and the receiver, it doesn't suffer from the line-of-sight problems that plague many infrared devices (such as TV re-

mote controls). TrackMan Live lists for \$169 and includes two AAA batteries. Logitech Inc., 800/231-7717, 510/795-8500.

Reader service no. 737

OnFile

Lost that file again, eh? Try Software Publishing's new OnFile, a handy file manager that helps you organize and keep track of the zillions of files on your hard disk. OnFile's file viewer enables you to view documents, spreadsheets, and other files without having to load the application that created the file—a real time-saver. The program also lets you organize files into folders that you open by clicking the mouse, and you can write text descriptions of up to 255 characters for each file. For example, the cryptic 4HOMBUD.XLS can become April 1995 Household Budget Spreadsheet—a much more civilized approach to file management. OnFile is street priced at around \$49. Software Publishing Corp., 800/234-2500, 408/986-8000.

Reader service no. 739

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

LOTUS

GET THE MOST FROM THE LOTUS APPLICATION SUITE

Map Out Your Strategies

When I first saw release 5.0's mapping tool, I thought it would join the long list of Great-But-Rarely-Used 1-2-3 Features.

Okay, desktop mapping is unmatched for studying where and how your customers live. A worksheet is a handy place to store the customer data. And release 5.0's implementation is workable. But aren't maps beyond the mainstream for most 1-2-3 users?

Wrong! Lotus tells us many release 5.0 users do maps—and no fewer than 10 percent of them are buying extra maps.

For help in opening your first maps, check out Richard Cranford's "Put Your Data on the 1-2-3 Map." If you're already deep in map mania, let us hear what you're doing—and how you'd like this tool strengthened. Drop me a note at 77 Franklin St. #300, Boston, MA 02110; or via fax (617/426-0235); or online (ebender@aol.com).

Eric Bender

Eric Bender, Executive Editor

How Healthy Is Your Business?

L4 Common financial ratios let you take your company's pulse and spot symptoms of trouble early on. Our quick guide gives you a lineup of basic profitability, liquidity, and activity ratios and shows how to apply them to your business. *

Put Your Data on the 1-2-3 Map

L15 You can target sales efforts, analyze customer needs, and choose the

best sites for stores or service centers—all within release 5.0. Moreover, you can purchase additional maps with demographic data tailored to your needs. Here's how you can get started with maps, plus tips on customizing them.

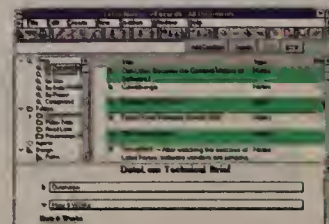


Let 1-2-3 Track Time Off

L19 It's easy to monitor employee vacations, sick days, and other types of leave with this simple worksheet for releases 2.3 and up. *

News

L2 Lotus provides glimpses of the dramatically overhauled Notes 4.0 and fixes bugs for a troubled Organizer 2.0.



Improving Your Skills

L22 Protecting Range Names

1-2-3 Tips

L25 Seven Ways to Fight Worksheet Mistakes

COMING IN MAY

- ▶ Sharing SmartSuite Data
- ▶ Ten Formulas You Should Know

Q&A

L28 Show File Name in Footer

Macros

L33 Prompt Users Through Your Macros *

Suite Success

L36 Create Organization Charts in Freelance

* The models and other files from these articles are available via PC World Online on America Online and CompuServe.

Notes Gains Power, Cuts Cost

Lotus has bet its entire future on Notes, its pioneering group application environment. Prospects seem bright this year as the company readies an impressive new release of Notes, adds full-blown companion products, presents dozens of third-party packages—and finally slashes the cost of bringing Notes to everyone on the network.

Notes 4.0 won't ship until the second half of 1995, but Lotus has already begun demonstrating the software's improvements, including many aimed at users of SmartSuite desktop programs. For instance, the new version of Notes sports the InfoBox context-sensitive control palette and supports OLE 2.0 data exchange and the LotusScript scripting language—three features being added to all the SmartSuite applications.

NotesMail now uncannily resembles cc:Mail, with file folders, an in-box, a mes-

sage log, and other features that should make the transition from cc:Mail to Notes far smoother. The primary interface for viewing both mail and shared databases has evolved into a cc:Mail-like three-pane display that lets you manage folders and view the documents in them without moving between multiple screens.

The folder concept has spread to the rest

of Notes 4.0. You can organize documents in any Notes database by dragging and dropping them into personal folders, rather than asking Notes to sort them. And you can also create "personal agents" that automatically find documents in multiple Notes databases based on criteria you've specified, then sort them into folders avail-

able only to you. Such tasks can now be completed by making a few clicks in dialog boxes, rather than by hammering out cryptic macros or groping your way through a new programming language.

Additionally, Notes 4.0 introduces Navigators—new kinds of visual browsers that provide alternatives to the usual file folder interface. For instance, a Notes database can show a map of the United States, wherein you can click on any state to get a list of documents pertaining to that area. Similarly, applications can organize

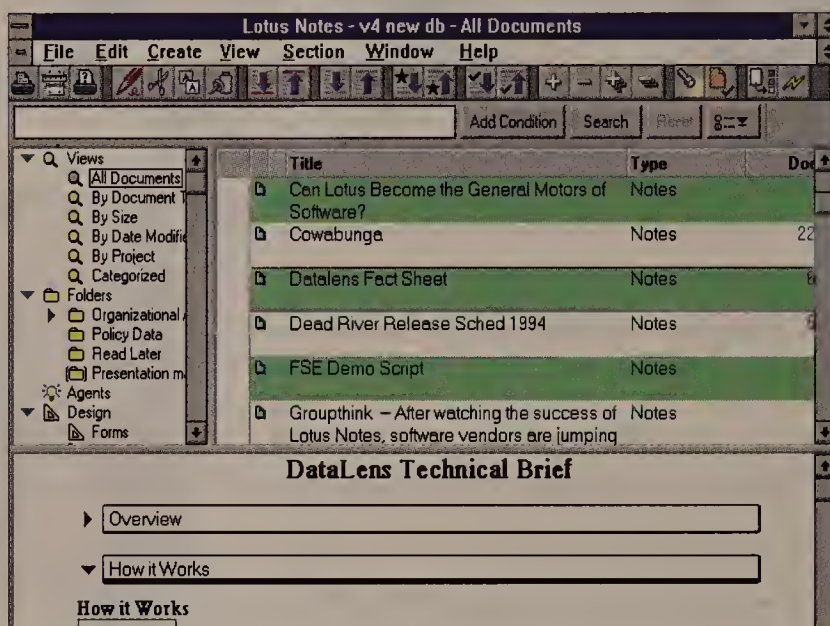
work-flow processes as flowchartlike boxes and arrows, rather than as folders.

Cutting the Client Cost

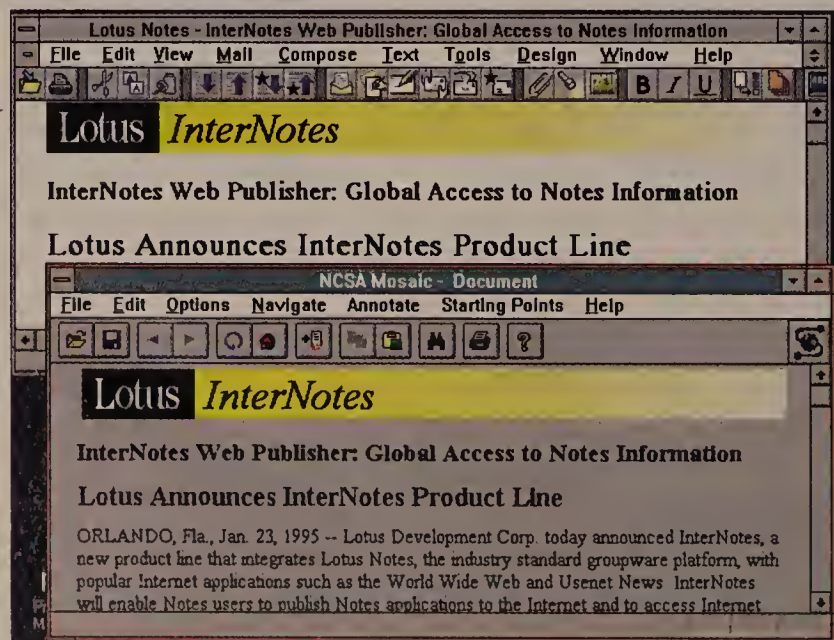
Lotus has dropped the price of the Notes client from \$330 to \$275 per user in volume purchases of 50 copies or more. The new Notes Desktop, a \$155 run-time version of the Notes software, can run any Notes application but lacks the development tools of the full-fledged package. Desktop's capabilities fall between those of the standard Notes client and Notes Express, a truncated client that met an unhappy reception from users last fall.

Ken Reid, a network administrator at Memorial Sloan-Kettering Cancer Center in New York, is among the users pleased by these moves. "Introducing a run-time version makes sense, since I can clearly discriminate between users who will never be doing design work and users who might eventually dabble a bit," says Reid.

Lotus has also greatly expanded its line of Notes add-ons. Its most striking move in this area is the launch of InterNotes, a set of add-ons that establish two-way commu-



NOTES 4.0'S THREE-PANE INTERFACE lets you work with folders and their contents without jumping from screen to screen.



WITH LOTUS'S INTERNOTES WEB PUBLISHER, organizations can distribute Notes databases across the Internet's World Wide Web.

nications between Notes and the Internet.

The initial InterNotes tools include InterNotes News, which allows Notes users to participate in Internet news group discussions, and InterNotes Web Publisher, which lets organizations distribute Notes databases over the Internet's World Wide Web, where they can be viewed using Web browser programs such as Mosaic and Netscape. Further down the road, Web Publisher will be joined by InterNotes Web Browser, which will let you explore the Web from Notes. —Harry McCracken

Notes 4.0—due in the second half of 1995—will introduce a dramatically easier interface, greater automation, more consistency and integration with other Lotus products, and a host of other improvements.

Notes Desktop, a \$155 Notes client, is aimed at users who don't need application development tools.

InterNotes, a line of add-ons, lets Notes communicate with Internet resources, including news groups and the World Wide Web.

Notes Fax Server, an add-on package, allows users to send, receive, and manage fax documents within Notes.

Video for Notes, an add-on package, lets Notes users capture, play, and distribute digitized video clips within Notes.

More than 100 new third-party add-on products and services are also in the works.

Organizer 2.0 Stumbles out of the Gate

When Lotus shipped Organizer 2.0 last December, loyal users of version 1.1 thought they'd gotten an early Christmas present. But after loading the program, some would gladly have chosen a lump of coal instead.

Organizer 2.0 sports monthly calendar views, support for overlapping appointments, and other slick and long-awaited features. However, many users immediately complained about slow performance, huge file sizes, and other problems that kept the program from running properly. And hundreds of messages, with names like "Don't Touch Organizer 2.0" and "Or-

ganizer 2.0 Is Beta!!!," have clogged the Lotus CompuServe forum.

The biggest beef relates to the program's performance. "The speed problems made it an unusable product," says Jim Hardeman, environmental radiation program manager for the Georgia Department of Natural Resources in Atlanta, who loaded Organizer 2.0 onto a 25-MHz Compaq 486 laptop with 12MB of memory. "Showing planner events within the calendar seems to affect the response time dramatically. It takes 10 seconds to flip from one month to the next."

Users also complain that the new Organizer requires more memory than the version it replaces, and that the size of converted files has grown as much as fourfold. Lotus blames the slower performance and increased file size on the new, more complex database format needed for shared calendaring.

Organizer 2.0a, an update released in January, addresses some of the reported bugs, but it's not a cure-all. Ed Sisson, an Organizer user in Akron, Ohio, hoped the update would eliminate the crashes that occurred when he moved from Organizer's address book to the to-do list. But instead of getting a list of the day's tasks, Sisson was greeted with a Windows General Protection Fault error.

Getting Reorganized

What should Organizer 2.0 users do? Lotus suggests that besides making sure you have the latest free bug fix (at press time another was planned for February), you take the following steps to avoid problems.

① Make sure your system has plenty of memory. Lotus recommends at least 6MB, but some early users of the product suggest more—especially if you want to multitask Organizer with other programs.

② If you're converting from version 1.x, follow the manual's procedures for optimizing, and make sure you run the compression utility ORGUTILS.EXE on your Organizer 1.x files before converting them. Once the files are in Organizer 2.0, reduce their size by choosing *File • Archive* to discard old and irrelevant information. "Some users are carrying around calendars that go back to 1992," notes Barbara Baird, director of product marketing for Organizer. As a final step in the conversion, Lotus suggests running ORGRBLD.EXE from Organizer 2.0 to rebuild indexes and in some cases compress files.

③ Any customers who have performance concerns should call Lotus technical support at 508/988-6400 and provide the company with information on their hardware and software setups. "What we don't have yet is a clear profile of [problematic] configurations so we can maximize on performance," says Lotus's Baird.

—Doug Barney



ORGANIZER HAS GROWN MORE POWERFUL, but it has also become slower and larger, says user Jim Hardeman.

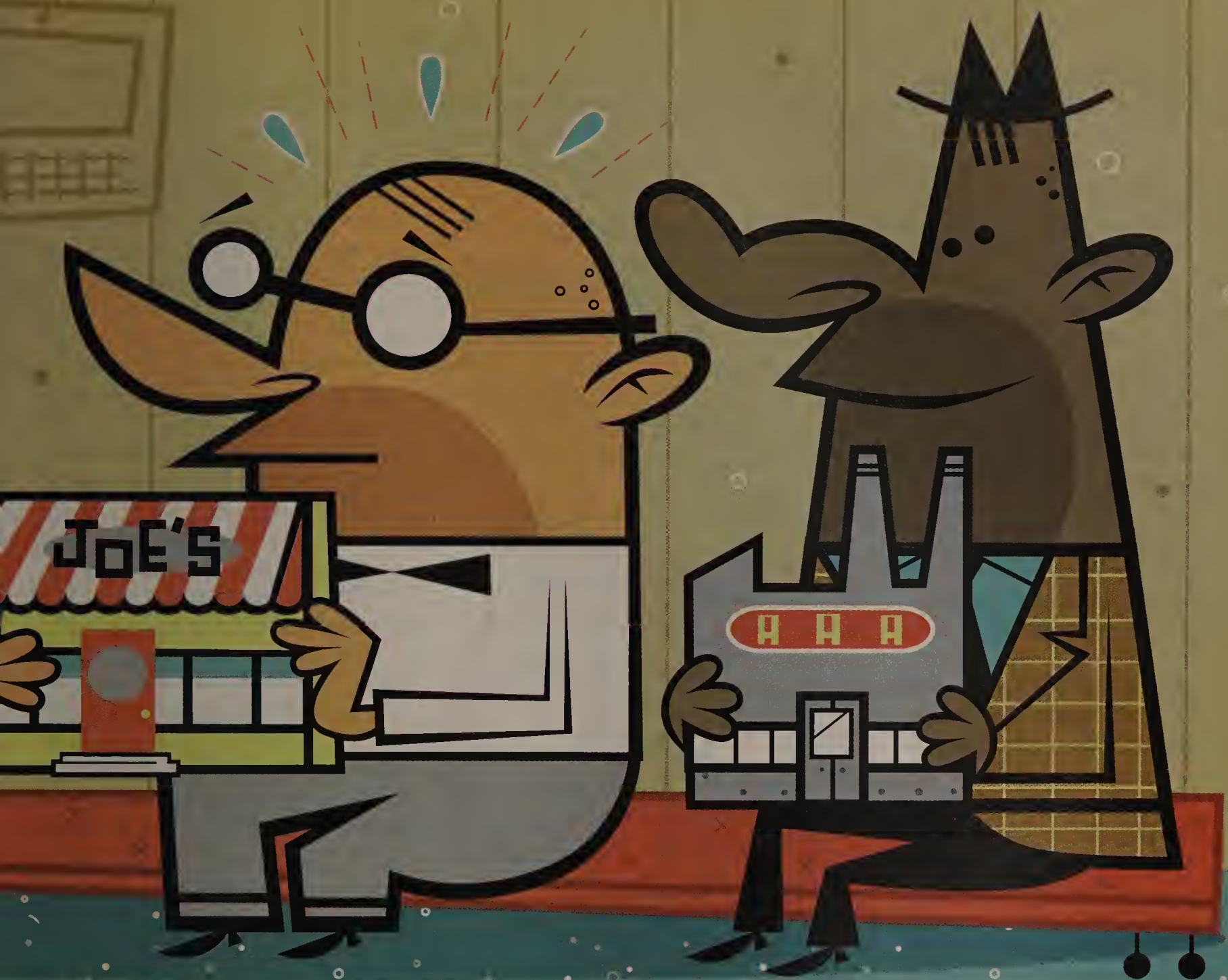
LOTUS



HOW HEALTHY IS

BY STEVE ADAMS

YOUR BUSINESS?



Check your company's vital signs with these common financial ratios.

Do you ever wake up in the middle of the night and wonder how your business *really* is doing? Are your operating expenses too high? Are you carrying way too much inventory? Are you over your head in debt? Are your markups what they should be? Are you paying early and collecting late?

Financial ratios give you good clues.

Everyone's familiar with a profit margin, which is a simple ratio: Net profit (after paying yourself) divided by what you

spent. Suppose your business took in \$1 million and spent \$900,000 last year, including taxes. Your profit is 10 percent of sales, but is that good enough to keep your business running?

Finding your profit margin is just the start of a thorough analysis of your company's health. Other ratios, such as debt divided by total assets, help you pinpoint problems or leap on opportunities.

Financial ratios can vary considerably across industries. Turning over inventory only once a year, for example, would

mean bankruptcy for most retail businesses, but it's about what you'd expect to see in a jewelry store.

Here's a model that shows what ratios mean for a small business, using an independent jewelry store called Peacock Jewelers as an example. To use this model for your business, you'll need your income statements and balance sheets for the last several years. You'll also want a report of financial ratios for your type of business, though you can use the model to analyze trends in your own business without one.

Keeping Three Scorecards

Financial ratios are a way of keeping score for your business, and to do so you need a scorecard—actually, three scorecards.

1 The first is a simplified income statement and balance sheet, shown in **FIGURE 1**. These financial statements always have the same basic elements, but they don't always have the same individual lines. Here, we include only the items we need to make the calculations in the other sections. The "Other Information" part at the bottom of the figure lists several other factors Jewelers of America (whose industry survey we're employing for this example) uses in calculating ratios. We'll use the labels in column B to assign range names, then we'll hide the column so it doesn't appear in the final result.

2 You'll also need same-size financial statements, as shown in **FIGURE 2**. These simply restate data from your income statement and balance sheet as ratios. In the income statement, the figures are shown as a percentage of sales (or gross revenue); in the balance sheet, the figures are shown as a percentage of total assets.

This approach offers two advantages. First, it makes it easier for you to gauge your business's financial performance over time. (Your cost of goods sold has increased over the last few years—but is it increasing in proportion to sales?) Second, it allows you to make more direct comparisons to the industry surveys, which also report these figures as ratios.

The figures in columns J through L are from the JA survey. They show the median, 25th percentile, and 75th percentile ratios for each row. You'll need a survey appropriate to your business to make a comparison. Don't worry if your survey is not in this median/low/high format—whatever comparison you can make will be useful.

3 Finally, you'll need a set of financial ratios derived from the financial statements, shown in **FIGURE 3**. For the most part, these calculations are simple division.

Building the Ratios Model

The model is built in a "diamond" pattern. That is, the second section is below and to the right of the first, and the third is below and to the right of the second. This type of arrangement allows you to add, delete, and hide columns, or change column widths in one section without affecting the others. If



An income statement and balance sheet, a same-size statement, and ratios tell your business's story.

you're working in 1-2-3 for Windows or DOS release 3.x or higher, you should put the three sections on separate sheets.

The model covers only three years. If you want to analyze more years, simply move sections 2 and 3 farther to the right to accommodate the ad-

ditional columns, and copy the formulas to the extra columns for those sections. We'll be using range names in the formulas, so rearranging the model a little shouldn't complicate things. We assume you already have your statements.

Income statement and balance sheet. The first section of the model (Figure 1) contains no formulas. If you like, you can calculate the cells in the indented rows from

the rows above. They're simple addition, subtraction, and @SUM calculations.

Begin by setting the width of column A to 30. Choose *Style•Column Width* (/Worksheet•Column•Set-Width in DOS releases), type **30**, and click *OK* or press **<Enter>**. Set the width of column B to 11. Enter the labels shown in columns A and B in Figure 1 and the dates in ranges C5..E5, C19..E19, and C39..E39.

Then assign the labels in column B as range names: Highlight B7..B43, choose *Range•Name*, click *Use Labels*, and click *OK*. In DOS, select /Range•Name•Labels•Right, highlight B7..B43, then press **<Enter>**.

Fill in the values in columns C through E from your own statements, or for our fictitious jewelry store. Next, highlight range C7..E15 and choose *Style•Number Format*, select *Comma* from the Format box, set Decimal places to **0**, and click *OK*. In DOS, select /Range•Format, select the comma, enter **0**, specify range C7..E15, and press **<Enter>**. Repeat these steps for ranges C21..E26, C29..E35, and C41..E43.

With the pointer in column B, choose *Style•Hide*, select *Column*, and click *OK*. In 1-2-3 for DOS, select /Worksheet•Column•Hide, and press **<Enter>**.

Same-size statements. The next section of the model, shown in Figure 2, comprises our same-size financial statements, along with industry comparisons. In the model it begins in cell F45, but it will be farther to the right if you entered more than three years' worth of data in the first section.

The values in this section are all percentages derived from the first section. In columns G, H, and I on the income statement, every value from the first section is divided by Net Sales. On the balance sheet, division is by Total Assets. The ratios in columns J, K, and L are from the JA survey. Substitute your own if you have the data; otherwise, leave those columns blank.

To build the section, set the width of column F to 30. Now enter the labels and dates shown in Figure 2, and assign the Percent 1 format to ranges G50..L58, G64..L69, and G72..L78.

In cell G50, enter the formula **+SALES/CS7**. Remember, all values in the income statement are divided by net sales for a given year. The absolute row reference lets us

complete this section in one step by copying cell G50 to range G50..I58. In Windows, select G50, choose *Edit•Copy*, select range G50..I58, and choose *Edit•Paste*. In DOS, place the pointer on cell G50, select /Copy, and press <Enter> to specify G50 as

the range to copy from. Specify G50..I58 as the range to copy to, and press <Enter>.

In range J50..L58 enter values from a survey appropriate to your business.

Values in the same-size balance sheet are divided by Total Assets. First, enter the

formula **+CASH/TOT_ASSETS** in cell G64, and copy it to ranges G64..I69 and G72..I78. To finish, enter values from your own industry survey in columns J through L.

Ratios. The ratios section of the model, shown in Figure 3, calculates a variety of

standard ratios, based on the values from your financial statements. We'll get to what they mean shortly. For now, set the width of column M to 30. Enter the labels and dates shown in Figure 3, then assign the Percent 1 format to ranges N85..S92, N98..S98, and N100..S100; the Fixed 1 format to ranges N96..S97, N99..S99, and N104..S109; and Comma 0 to range N113..S115.

Next, enter the formulas below, and copy them to columns O and P. Because we used range names, we can put the formulas anywhere as long as the items are laid out in *exactly* the same pattern.

CELL	FORMULA
N85	+NET/SALES
N86	+NPBT/SALES
N87	+OP_PROF/SALES
N88	+OP_PROF/TOT_ASSETS
N89	+NET/TOT_ASSETS
N90	+NPBT/TOT_ASSETS
N91	+NET/EQUITY
N92	+NPBT/EQUITY
N96	+C_ASSETS/C_LIAB
N97	(C_ASSETS-INVENTORY)/C_LIAB
N98	+TOT_LIAB/TOT_ASSETS
N99	+OP_PROF/INT_EXP
N100	+LT_LIAB/(LT_LIAB+EQUITY)
N104	+SALES/INVENTORY
N105	+COG/INVENTORY
N106	+SALES/AR
N107	365/N106
N108	+SALES/FIXED
N109	+SALES/TOT_ASSETS
N113	+SALES/SQFT
N114	+SALES/EMPLOYEES
N115	+PAYROLL/EMPLOYEES

Finally, in columns Q, R, and S enter values taken from an appropriate industry survey.

A	A	B	C	D	E
1					
2	Peacock Jewelers				
3					
4	Income Statement				
5			1992	1993	1994
6					
7	Net Sales	SALES	773,538	709,077	838,000
8	Cost of Goods Sold	COG	416,478	375,264	436,000
9	Gross Profit	GROSS	357,060	333,813	402,000
10	Operating Expenses	OP_EXP	395,200	390,133	380,000
11	Operating Profit	OP_PROF	(38,140)	(56,320)	22,000
12	Interest Expense	INT_EXP	25,000	25,000	25,000
13	Net Profit Before Taxes	NPBT	(63,140)	(81,320)	(3,000)
14	Taxes	TAX			
15	Net Income	NET	(63,140)	(81,320)	(3,000)
16					
17					
18	Balance Sheet				
19			1992	1993	1994
20	Assets				
21	Cash and Equivalents	CASH	25,000	20,000	50,000
22	Accounts Receivable	AR	33,333	20,000	20,000
23	Inventory	INVENTORY	479,600	741,200	545,000
24	Total Current Assets	C_ASSETS	537,933	781,200	615,000
25	Fixed Assets	FIXED	50,000	50,000	56,000
26	Total Assets	TOT_ASSETS	587,933	831,200	671,000
27					
28	Liabilities				
29	Accounts Payable	AP	84,810	84,810	91,333
30	Notes Payable	NOTES	45,667	45,667	45,667
31	Current Liabilities	C_LIAB	130,477	130,477	137,000
32	Long-Term Liabilities	LT_LIAB	304,000	304,000	304,000
33	Total Liabilities	TOT_LIAB	434,477	434,477	441,000
34	Net Worth/Equity	EQUITY	153,457	396,724	230,000
35	Total Liabilities/Net Worth	LIAB_NET	587,934	831,201	671,000
36					
37					
38	Other Information				
39			1992	1993	1994
40					
41	Square Feet	SQFT	2,900	2,900	2,900
42	Employees	EMPLOYEES	9	8	10
43	Payroll	PAYROLL	198,000	176,800	225,000

FIGURE 1: THE INCOME STATEMENT AND BALANCE SHEET are hard to interpret by themselves. Same-size statements and financial ratios put them into context.



Lotus Notes authorized training open it all the way up

Some programs were never meant to be just pattered around with. Take Lotus Notes®, for example. Harness its potential, and you and your company will be in for the ride of a lifetime.

That's why you should consider Lotus® authorized training. Because at Lotus, we've discovered that while customers are happy with Notes, many have yet to open it all the way up and

see what it can do. Simply because they need help doing it.

So we've established Lotus Authorized Education Centers (LAECs) in local markets worldwide to help you take advantage of the full power of Notes.

Every LAEC uses Notes as an integral part of running its own business, so instructors better understand the challenges

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Arizona

Infolmage/Workgroup University
Phoenix - 800-489-9511

ExecuTrain Phoenix
602-955-7787

California

WORDLINK, Inc., San Francisco
415-442-0137

Infolmage/Workgroup University
San Francisco - 800-489-9511

Productivity Point Int'l.
San Francisco - 415-243-0100

Corporate Software Inc.
San Jose - 800-274-4707

Infolmage/Workgroup University
Los Angeles - 800-489-9511

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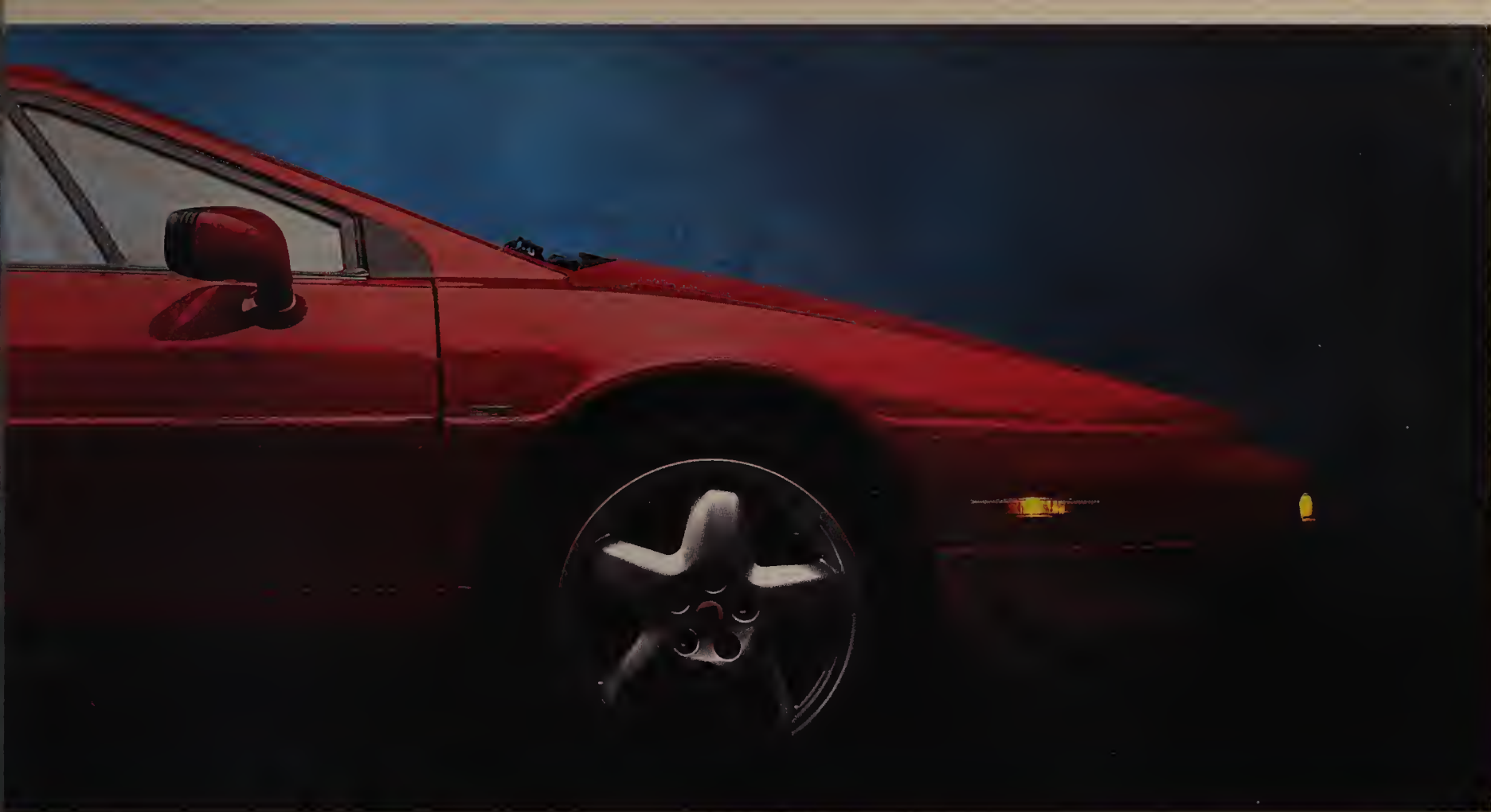
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Checking Same-Size Statements

Now let's look at what the numbers mean.

Start by turning back to Figure 1. It's not hard to see that Peacock Jewelers has problems. It's lost money the last three years—substantial amounts in 1992 and 1993. (Remember that these figures don't include the owner's salary, which has already been taken out.) At least the losses are shrinking—and the store turned an operating profit in 1994. But where is the problem?

Scanning the model, we find several. On the income statement, we can see that Net Sales has bounced back nicely since a dip in 1993. We can see a lot more by turning to the same-size income statement in Figure 2. Here we see that Cost of Goods Sold is a tad higher than the industry median, but declining. Peacock's markups are fairly typical but might offer some maneuvering room. That also means that Peacock's Gross Profit is low, since Gross Profit is simply Net Sales less Cost of Goods Sold.

Operating Expenses were a problem in 1992 and 1993—well above the 75th percentile figure for the industry. This means that the store was spending a disproportionate percentage of its sales on salaries, rent, utilities, and other day-to-day costs. The figure is down to near the median for 1994, but there may still be room for improvement.

Now we come to Interest Expense. The percentage of sales is low—3 percent in 1994—but it's considerably higher than typical for the industry. We begin to suspect that Peacock is carrying too much debt.

Let's find out by looking further on the same-size balance sheet.

Accounts Receivable is on the low side; Peacock is not selling too much on credit, nor is it having a serious problem with collections. But look at Inventory—more than 80 percent of total assets, near the top of the industry range. You can't sell from an empty wagon, but Peacock might turn a profit if it ran a little leaner.

Moving down to Liabilities section, we can see that the store's Current Liabilities aren't out of line with the industry norm. Long-Term Liabilities, however, are over the top. Aha! That's the main reason Peacock's Net Worth/Equity ratio is so low.

That confirms our impression that Pea-

cock carries too much debt. But getting out of debt is hard when you're not turning a net profit. Perhaps the financial ratios in Figure 3 will turn up some opportunities.

Starting With Financial Ratios

The values in Figure 3 reflect a number of common financial ratios. Depending on which source you use for industry figures, you may find more. It's also important to recognize that not all surveys use the same formulas to make their calculations. Dun & Bradstreet, for example, defines Inventory Turnover as Inventory/Net Sales, while

A	F	G	H	I	J	K	L
45	Same-Size Statements						
46							
47	Income Statement				Industry		
48		1992	1993	1994	Median	Low	High
49							
50	Net Sales	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
51	Cost of Goods Sold	53.8%	52.9%	52.0%	50.2%	43.4%	55.0%
52	Gross Profit	46.2%	47.1%	48.0%	49.9%	45.0%	56.6%
53	Operating Expenses	51.1%	55.0%	45.3%	44.3%	39.0%	49.5%
54	Operating Profit	-4.9%	-7.9%	2.6%	5.4%	0.4%	9.1%
55	Interest Expense	3.2%	3.5%	3.0%	1.4%	0.2%	2.2%
56	Net Profit Before Taxes	-8.2%	-11.5%	-0.4%	5.1%	0.4%	7.9%
57	Taxes	0.0%	0.0%	0.0%	NA	NA	NA
58	Net Income	-8.2%	-11.5%	-0.4%	NA	NA	NA
59							
60							
61	Balance Sheet				Industry		
62		1992	1993	1994	Median	Low	High
63	Assets						
64	Cash and Equivalents	4.3%	2.4%	7.5%	NA	NA	NA
65	Accounts Receivable	5.7%	2.4%	3.0%	11.9%	0.3%	14.6%
66	Inventory	81.6%	89.2%	81.2%	67.4%	54.2%	84.0%
67	Total Current Assets	91.5%	94.0%	91.7%	88.5%	84.8%	97.5%
68	Net Property	8.5%	6.0%	8.3%	9.3%	0.1%	11.2%
69	Total Assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
70							
71	Liabilities						
72	Accounts Payable	14.4%	10.2%	13.6%	NA	NA	NA
73	Notes Payable	7.8%	5.5%	6.8%	NA	NA	NA
74	Current Liabilities	22.2%	15.7%	20.4%	24.7%	8.6%	31.2%
75	Long-Term Liabilities	51.7%	36.6%	45.3%	22.0%	0.1%	40.1%
76	Total Liabilities	100.0%	52.3%	65.7%	NA	NA	NA
77	Net Worth/Equity	26.1%	47.7%	34.3%	53.3%	38.8%	74.3%
78	Liabilities and Net Worth	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

FIGURE 2: SAME-SIZE STATEMENTS express items on your income statement and balance sheet as percentages of sales and percentages of assets, making it easier to compare performance over time.

Robert Morris Associates defines it as Inventory/Cost of Goods Sold. (Peacock includes both methods.) So make sure you're comparing the same calculations.

Another factor in choosing a survey for comparison is the timing of the values. As is typical with the surveys, the model works with year-end figures.

Some models use annual averages for such items as inventory, calculated by taking the mean of inventory value at the ends of two years. That works if, for example, your business is rapidly expanding and your inventory on December 31 this year was twice the size of your inventory a year earlier. Your actual inventory turn-overs will be significantly higher than the year-end figure for this year suggests.

On the other hand, neither method accounts for seasonal fluctuations. A retail store—and the fictitious Peacock Jewelers is a good example—may do a high percentage of its business during the holidays, so inventory may be a lot lower on December 31 than on October 31.

Now let's take a look at Peacock's financial ratios, as shown in Figure 3. Remember to take some time to think about what the numbers mean. There aren't any exact answers—this isn't rocket science.

Profitability Ratios

You run a business to make money, right? Profit ratios tell you if you're succeeding.

Profit Margin = net profit after taxes/net sales: +NET/SALES.

Obviously, higher is better than lower. Although Peacock is getting close to breaking even, the store's figures are negative. Not good. We want to know why.

Profit Margin Before Taxes = net profit before taxes/net sales: +NPBT/SALES.

JA's and other surveys use this ratio because tax circumstances for small businesses vary crazily. Again, higher is better than

lower. Peacock's figure is the same as the Net Profit Margin, because the IRS has the good grace not to tax you for losing money.

Operating Profit = (net sales-cost of goods sold-operating expenses)/net sales: +OP_PROF/SALES.

We've seen that Peacock may have a problem with debt; this ratio shows whether it's making money before interest and taxes. At last, Peacock has a positive figure for 1994—2.6 percent. But it's still near the bottom. Interest is part of the problem.

Operating Profit/Total Assets = +OP_PROF/TOT_ASSETS.

How efficiently is a business using its resources? Peacock's number is low. The store has too much stuff relative to how much it's selling.

Return on Investment = net income/total assets: +NET/TOT_ASSETS.

Peacock is back in the red. That interest expense hurts.

ROI Before Taxes = net profit before taxes/total assets: +NPBT/TOT_ASSETS.

This ratio removes the effect of taxes from the previous ROI calculation. Nothing new here for Peacock, since it hasn't been paying any income tax.

Return on Equity = net income/net worth or equity: +NET/EQUITY.

ROE is the return on your stake in your business. If it's less than, say, the rate on Treasury bills, then sell the business, invest the money, and retire to Tahiti. (But don't forget, you've already taken your salary home before you calculate ROE.) Peacock has gone from dismal (−41.1 percent) to poor (−1.3 percent), so there's hope.

ROE Before Taxes = net profit before taxes/net worth or equity: +NPBT/EQUITY.

Again, Peacock's figure is the same as the after-tax figure because the store is losing

money. From the JA statistics, we can see that a typical store earns 8.9 percent and that the 75th percentile is 20.7 percent, so money can be made in this business. Peacock, for once, isn't at the bottom of the pile. If your ROE is way above the industry median, you may have too much of your own money invested in the business.

We can see that Peacock's performance is improving, even though the store is still losing money. But can it stay afloat long enough to turn the corner?

Liquidity Ratios

Next, we examine the creditors at the door.

We've noticed that Peacock's interest expenses are higher than the norm. Liquidity ratios, calculated from current and total assets and current and long-term liabilities, tell you about your asset and debt structure. Current assets are cash and assets that can readily be turned into cash. Total assets are everything the business owns. Current liabilities are debts that must be paid in the next 12 months, including the principal on long-term debt. (Interest payments due are excluded; they're expenses, not liabilities.)

Current assets and liabilities indicate whether you'll be able to pay your bills in the coming year. Long-term liability and total assets give a broader picture of your business's health. Obviously, you're in trouble if you owe more than you're worth. On the other hand, if you are debt-free, you may be missing opportunities that could be realized by borrowing.

Current Ratio = total current assets/current liabilities: +C_ASSETS/C_LIAB.

Current assets include cash and equivalents (such as marketable investments), accounts receivable, and inventory—items that you can convert to cash in the short term. Current liabilities are amounts you must pay (excluding interest), including accounts payable, short-term notes, and the current portion of long-term debt. The higher the ratio, the better. For once, Peacock is about in the middle. It doesn't have excessive short-term liabilities in proportion to current assets. That could be deceptive, however, if the store is sitting on a lode of inventory that isn't moving.



Quick Ratio = (current assets - inventory) / current liabilities: (C_ASSETS - INVENTORY) / C_LIAB.

Sometimes called the acid test ratio, the quick ratio removes inventory from the equation and thus is a sterner test of liquidity than is the current ratio. Peacock's ratio (0.5) is near the 25th percentile in the JA survey. Given that the store's current ratio is close to the median, the low quick ratio suggests that the business either is carrying too much inventory or needs to look at its product line to see whether it could stock merchandise that sells faster.

Debt/Total Assets = total liabilities / total assets: +TOT_LIAB / TOT_ASSETS.

How would you make out if you sold the business and paid off your debts? If this ratio is over 1, you're in trouble: You owe more than you own. But if it's low, you may be missing chances to increase earnings by borrowing money to expand. Net worth or equity is a liability (it belongs to the owner, not the business), but it's not included here. Peacock is way above the industry norm.

Times Interest Earned = operating profit / interest expense: +OP_PROF / INT_EXP.

This ratio measures a business's ability to cover interest costs out of operating profit before interest. If your company's operating profit is negative, as Peacock's is until 1994, interest is eating into capital. But even at 0.9 for the last year, the store is again on the bottom rung. We've identified two problems: high debt and high operating expenses.

Long-Term Debt/Total Capital = long-term debt / (long-term debt + equity): +LT_LIAB / (LT_LIAB + EQUITY).

Is the business overleveraged? Peacock's figures are high, another indication of high debt. But again, a low number may indicate an opportunity to fund expansion.

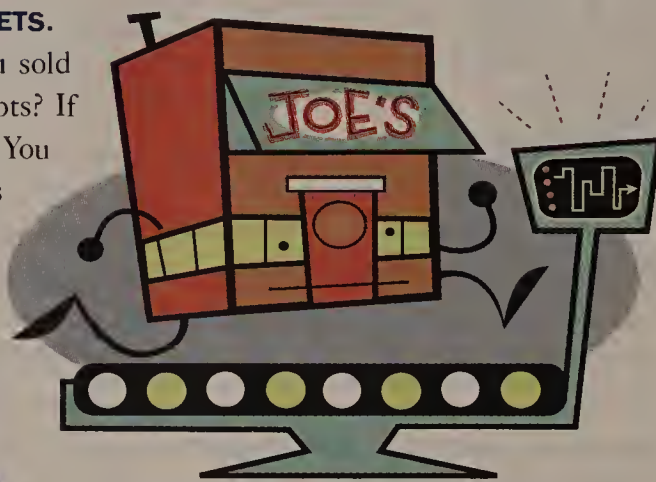
We're getting a clearer picture of Pea-

cock's troubles: high inventory, high operating expenses, and high debt. Can the store sell its way out of the problem?

Activity Ratios

Let's look at turnovers. Activity ratios measure the return a business gets on its investment. Is it carrying too much—or too little—inventory? Does it have a collection problem on credit sales? And finally, is it earning a reasonable return on its total assets? These ratios give some hints.

There are several ways to measure inventory turnover. Some measure it by the average for the year, others by year-end fig-



Look into productivity ratios if the profitability, liquidity, and activity ratios don't yield a solution.

ures. We use year-end figures and cost of goods. In your own calculations, make sure you're using comparable numbers.

Inventory Turnover (Sales) = net sales / inventory: +SALES / INVENTORY.

This is your sales volume in proportion to the merchandise you have in stock. Higher is better—keep that inventory moving out the door. Turnovers are low in the jewelry business. Peacock has bounced back in 1994 with 1.5 turnovers, compared with 1 in 1993.

Inventory Turnover (COG) = cost of goods sold / inventory: +COG / INVENTORY.

This is a measure of what you sold in proportion to what you paid for it. There are various ways of calculating inventory. JA uses first-in-first-out. Make sure you're consistent within your business and with

the survey figures you're using for comparison. See your accountant if you're unsure.

Low turnover may mean you're overstocked or need to examine your product line. A high figure may mean you could sell more if you had more to sell. Again, turnover is low in the jewelry business—about once a year, JA reports. Peacock is near the bottom, with 0.8 in 1994.

Receivables Turnover = net sales / accounts receivable: +SALES / AR.

How well are you collecting accounts? In a retail business, this isn't often a problem. But if you bill, say, 30 days net, it can be—especially if you're borrowing money to run your business. Peacock is doing fine, with nearly 42 turnovers a year, compared with an industry average of 8.4. The store doesn't make many credit sales.

Collection Period = 365 / receivables turnover (some models use a 360-day year): 365 / N106 in our model.

How long does it take you to collect bills? Peacock has no problem, but if your figure is high, stepping up collections could increase profits.

Fixed Asset Turnover = net sales / fixed assets: +SALES / FIXED.

This is net sales divided by anything on which you claim depreciation (plus land). High numbers are good, because you want to make the most you can on the least you can invest. Peacock is doing okay here.

Total Asset Turnover = net sales / total assets: +SALES / TOT_ASSETS.

How much are you making on what you've got? If your figure is low, you may need to increase productivity. If it's high, you may be paying too much out of pocket, as opposed to investing in ownership. Peacock's figures are at the bottom. We've seen that receivables and fixed assets aren't the problem. We suspect that the store is carrying too much inventory or needs to explore products that move faster.

We've seen that Peacock has high debt, high interest payments, and high inventory in proportion to sales, but it doesn't have a problem with receivables or too much invested in property other than inventory.

Productivity Ratios

But we still haven't found the answer. Productivity ratios may provide some ideas.

The productivity ratios shown in Figure 3 are based on data from the JA survey. These are less standardized than other business ratios, so you'll want to adapt your calculations to the statistics available for your industry. The ratios provided by JA tell jewelers whether they're using their space effectively, how well their employees perform, and whether their pay range is in line with the industry. (In the latter case, the owner's salary is included, so the problem may not be with the employees.)

Sales/Sq. Ft. = net

sales/square feet:

+SALES/SQFT.

Just what it suggests. Peacock's ratio is below the industry median (\$385) at \$289 in 1994.

Sales per Employee = net sales/employees (Including the owner and family members paid to work in the store): +SALES/EMPLOYEES.

This ratio tells whether your business is overstaffed, or whether hiring another salesperson might increase your sales. The jewelry store is way down below the 25th percentile here, meaning that there are too many employees or not enough sales.

Payroll per Employee = payroll/employees (again, including everybody): +PAYROLL/EMPLOYEES.

Here, we can see that Peacock doesn't pay much compared with the industry median. If there's a problem, then, it's more likely to

be too many employees, rather than pay scale. It might make a difference where you are located geographically.

What to Make of the Numbers

How to run a business is a matter of particular circumstances. Ratios can show you how to do better. We can see that Peacock's debt, interest expense, inventory, and payroll expenses are above the industry median. Its liquidity, activity, and productivity ratios are below the norm. The

ratios send Peacock the message to run leaner and improve its marketing.

When you run the figures for your own business, you may be pleasantly surprised by the results. If not, the ratios will show you what you need to fix.

Steve Adams is a freelance writer in Raleigh, North Carolina, and the author of several books, including Personal Finance with 1-2-3 (Brady Books, 1992). The model from this article is available via PC World Online on America Online and CompuServe.

A	M	N	O	P	Q	R	S
80	Ratios						
81						Industry	
82		1992	1993	1994	Median	Low	High
83	Profitability Ratios						
84							
85	Net Profit Margin	-8.2%	-11.5%	-0.4%	NA	NA	NA
86	Profit Margin Before Taxes	-8.2%	-11.5%	-0.4%	5.1%	0.4%	7.9%
87	Operating Profit	-4.9%	-7.9%	2.6%	5.5%	1.8%	10.2%
88	Operating Profit/Total Assets	-6.5%	-6.8%	3.3%	8.2%	2.2%	15.4%
89	Return on Investment	-10.7%	-9.8%	-0.4%	NA	NA	NA
90	ROI Before Taxes	-10.7%	-9.8%	-0.4%	7.2%	-0.7%	12.2%
91	Return on Equity	-41.1%	-20.5%	-1.3%	NA	NA	NA
92	ROE Before Taxes	-41.1%	-20.5%	-1.3%	8.9%	-3.0%	20.7%
93							
94	Liquidity Ratios						
95							
96	Current Ratio	4.1	6.0	4.5	4.3	2.7	8.5
97	Quick Ratio	0.4	0.3	0.5	0.8	0.4	1.9
98	Debt/Total Assets	73.9%	52.3%	65.7%	44.2%	26.5%	62.3%
99	Times Interest Earned	-1.5	-2.3	0.9	5.4	NA	NA
100	Long-Term Debt/Total Capital	66.5%	43.4%	56.9%	35.0%	17.0%	55.3%
101							
102	Activity Ratios						
103							
104	Inventory Turnover (Sales)	1.6	1.0	1.5	NA	NA	NA
105	Inventory Turnover (COG)	0.9	0.5	0.8	1	0.8	1.6
106	Receivables Turnover	23.2	35.5	41.9	8.4	NA	NA
107	Collection Period	15.7	10.3	8.7	43.4	NA	NA
108	Fixed Asset Turnover	15.5	14.2	15.0	10.8	NA	NA
109	Total Asset Turnover	1.3	0.9	1.2	1.5	1.2	1.9
110							
111	Productivity Ratios						
112							
113	Sales/Sq. Ft.	267	245	289	385	255	531
114	Sales per Employee	85,949	88,635	83,800	117,263	94,731	149,664
115	Payroll per Employee	22,000	22,100	22,500	25,520	21,129	32,153

FIGURE 3: FINANCIAL RATIOS help you examine the relationship between your income statement and balance sheet and gauge your performance against that of competitors.

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Put Your DATA on the 1-2-3

MAP

BY RICHARD CRANFORD



Release 5.0's mapping tool helps you focus sales efforts, analyze customer needs, and pick the best sites for stores and service centers.

1-2-3 has always been a math whiz—and with release 5.0's new mapping features, it's finally learned geography as well.

Whenever you're dealing with 1-2-3 data that is geographically distributed, creating a map can convey information much more

strikingly than ordinary worksheet numbers ever could. You can show where a product is successful and where it's not by mapping sales figures, or target your efforts by creating a map that shows which regions have the greatest populations in a particular age group. If you've conducted a consumer poll, a map makes it easy to interpret results by region. Public health experts can track the incidence and spread of diseases more easily on a map.

Mapping is a great addition to 1-2-3, and Lotus reports that 10 percent of users have purchased additional maps. Lotus should, and probably will, improve its ease of use, especially for such tasks as assigning more appropriate data groupings and adding la-

bels. For now, though, the effort needed to produce an attractive map isn't unreasonable. The steps involved in generating a map are similar to those you take to create a chart, and 1-2-3 does much of the initial work for you. However, producing a polished map requires lots of fiddling.

1-2-3's mapping feature works through the magic of Windows' OLE (Object Linking and Embedding). When you use the mapping commands in the Tools menu, 1-2-3 passes data from a worksheet range to a separate program, the Map Viewer. This program, in turn, puts a map object in your worksheet and establishes a two-way link; if you change the worksheet data, the change is reflected in the map.

Because of all this passing around of data in the background, creating and modifying maps can take a maddeningly long time on less-muscular computers. A 25-MHz 386 with 8MB of memory, which performs adequately for most Windows tasks, shows an hourglass and makes disk-access noises for many seconds while performing a map operation. My 60-MHz Pentium, which has

16MB of RAM, makes the process much quieter and more tolerable (although not instantaneous).

Step 1: Table the Data

The first step toward creating a map is to set up a two-column table. The left column of this table contains the names of geopolitical regions—states, provinces, and countries, for example—and the right column contains the data for each region.

The names in the left column must be spelled out in full or abbreviated in a form that can be accepted by the map you plan to use. To create a map showing values by state, for example, you can use state names (Alabama, Arizona, Arkansas) or their two-letter postal abbreviations (AL, AZ, AR). For a map of Japan, you can use the names

MAPDATA subdirectory, which contains worksheets with demographic, income, and business data for all the countries noted above and for the world as a whole. The file USA_A.WK4, for example, contains populations by state for 1990, 1993, and 1998 (projected) and breaks these down by sex and age group. It also provides the percentage changes in population between 1990 and 1993.

This file has four worksheets. Sheet A contains state names in column A, two-letter abbreviations in column B, and the population numbers beginning in column C. Sheets B and C contain data for Alaska and Hawaii. Sheet D explains the cryptic field headings used in row 1 of the other sheets.

FIGURE 1 shows a portion of the file in perspective mode (with sheets B and C hidden). Worksheet D shows that the term POP90 in cell A4 stands for 1990 total population, MALEPOP90 stands for 1990 total male population, and so forth. The other map-data sheets use a similar format.

To use the data supplied by Lotus, you need to put the column of numbers you want to use next to the list of region names and get rid of some of the regions (unless you want to map a whole country or the entire world).

In our example, we'll create a map showing populations of 50-to-64-

	A	B
1	AREANAME	P50T06493
2	Illinois	1563289
3	Indiana	775791
4	Iowa	382985
5	Kansas	323594
6	Michigan	1269813
7	Minnesota	564553
8	Missouri	722262
9	Nebraska	206959
10	North Dakota	79515
11	Ohio	1533691
12	Oklahoma	445278
13	South Dakota	90222
14	Wisconsin	660660

FIGURE 2: THE MAP'S DATA must be entered in this two-column format.

year-olds in America's midsection. We'll need a list of states and some of the data in column AA of USA_A.WK4. There are a few ways you can go about this. You can copy range A1..AA50 to the Clipboard, paste it into a new worksheet, delete columns B through Z, and delete all the rows for states that aren't in the Midwest. Or you can save the USA_A worksheet under a new name

and delete these columns and rows.

Because the tables in these worksheets are organized as databases, you may find that the best way to extract the data you want to map is to use 1-2-3's database tools. See the sidebar "Extracting Data From Lotus's Map Files" for an explanation.

If you're eager to start mapping, just enter the data in FIGURE 2. Feel free to omit the labels in row 1; you won't need them to produce the map.

Step 2: Draw the Map

Once you have the data from range A2..B14 of Figure 2 in your worksheet, select that range, then choose *Tools • Map • New Map* from the menu bar. In a few moments, the mouse pointer changes to crosshairs with a spinning globe attached.

Click where you want the upper-left corner of the map to appear, and 1-2-3 produces the map shown in FIGURE 3. Note that

	A	B	C
1	United States Basic Demographic Data by State		
2	AREANAME	Areaname	
3	STABBR	Federal Information Processing Standard (FIPS) state abbreviation	
4	POP90	1990 Total population	
5	MALEPOP90	1990 Total male population	
6	FEMPOP90	1990 Total female population	
7	POP93	1993 Total population	
8	MALEPOP93	1993 Total male population	

	A	B	C	D	E	F	G
1	AREANAME	STABBR	POP90	MALEPOP90	FEMPOP90	POP93	MALEPOP93
2	Alabama	AL	4040587	1936162	2104425	4169004	2000778
3	Arizona	AZ	3665228	1810691	1854537	3888730	1919842
4	Arkansas	AR	2350725	1133076	1217649	2410655	1162743
5	California	CA	29760021	14897627	14862394	31380053	15695741
6	Colorado	CO	3294394	1631295	1663099	3521490	1743192
7	Connecticut	CT	3287116	1592873	1694243	3276649	1588330
8	Delaware	DE	666168	322968	343200	699216	339078

FIGURE 1: WORKSHEETS WITH MAPPABLE DATA, like the lower sheet shown here, are included with release 5.0.

of that country's prefectures (Kyoto, Osaka) or their codes (26, 27).

1-2-3 release 5.0 comes with maps for the United States (except Alaska and Hawaii, which have their own maps); the states of Australia; the provinces of Canada; the prefectures of Japan; the estados of Mexico; the counties of the Republic of China (Taiwan); the regions of the European Economic Community; and the countries of the world.

If your company sells its products in a wide territory, or gathers marketing or demographic statistics, you may already have data that's suitable for producing maps in 1-2-3. If you have your own data, enter it in this two-column format, or import the data from disk files and rearrange it to create a suitable table.

If you don't have any data of your own, you may find what you need in 1-2-3's

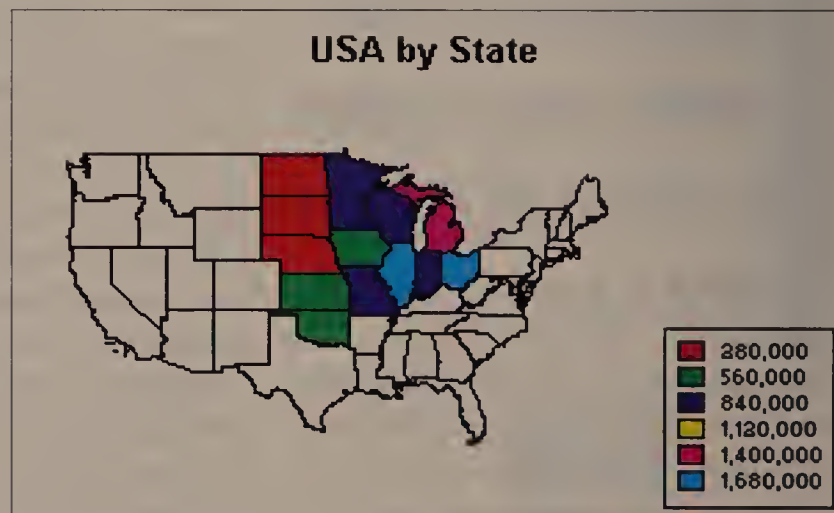


FIGURE 3: 1-2-3 ASSIGNS SIX BIN VALUES (or groupings) by default, but they're usually not the most appropriate. Fortunately, you can change them to your liking.

	A	B	C
16	Bins		
17	100,000	< 100,000	
18	500,000	100,000 - 500,000	
19	1,000,000	500,000 - 1 million	
20	1,600,000	1 million - 1.6 million	

FIGURE 4: THE BIN VALUES IN COLUMN A are easier to understand when you add the legends in column B.

the map appears in 1-2-3's default size. Unlike charts and other drawn objects, you can't size a map as you create it by dragging the mouse pointer. Instead, you resize (or move) the map after it's created.

Creating a basic map, as you can see, is easy. But this map needs some work. For one thing, the default title, *USA by State*, doesn't indicate what data we're mapping. For another, the map shows 48 states, not just those for which we have data.

The big problem, though, is the way the data is grouped—that is, with the bin values. Notice how North and South Dakota and Nebraska are all the same color—although Nebraska's 50-to-64 population is more than 2½ times North Dakota's. Should these states be in the same bin?

If you're not familiar with the concept of bins, consider the table of data in Figure 2. Although there are 13 values, we can regard each one as falling into one of a few size groups, as discussed in Step 3. Your maps can divide data into as many as six groups, or bins. 1-2-3 assigns six bins by default, but as you can see, it doesn't necessarily choose the most appropriate.

Let's fix these three problems. We'll change the map's title and zoom in on the Midwest, then tackle the bin-range issue.

With the map still selected, choose *Tools•Map•Ranges & Title*. In the resulting dialog box, replace the text in the Title box with **Population, Ages 50 to 64**; click *OK*.

To focus on the Midwestern states, double-click the map to launch the Map Viewer application. There are a couple of ways to get a portion of a map to fill a window. Try this: Select *View•Zoom In*. This enlarges the map by 100 percent. (Another option is to hold down the <Ctrl> key and drag the mouse to form a rectangle around the area of interest.)

The tops of the northernmost states are cut off. To shift the image a bit, move the

mouse pointer to the map's center, near the middle of Iowa. (If you don't know which one Iowa is, watch the status bar at the bottom of the screen to see which state the pointer is over.) Once you've positioned the pointer, click the right mouse button to display a QuickMenu, then click *Recenter*. This should make all the tinted states visible. Select *File•Exit & Return to Lotus 1-2-3* to close the Map Viewer and update the map in the worksheet.

Step 3: Adjust the Bins

Now let's tackle the job of adjusting those bin values. You can use as many as six bins, and you can define them any way you want, but a sensible set of bins for our ex-

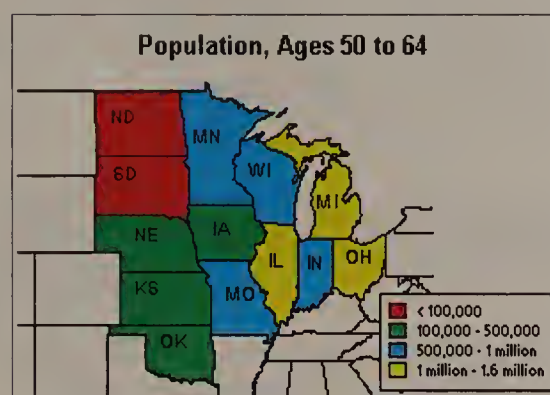


FIGURE 5: AFTER A FEW ADJUSTMENTS to the bin values, the legend, the title, and the area of focus, your map will look like this.

ample is 0 to 100,000, 100,000 to 500,000, 500,000 to 1 million, and 1 million to 1.6 million—four bins in all.

You can enter bin numbers into the Colors & Legend dialog box manually, but it's easier to enter them in a worksheet range, then link the map to that range.

Click cell A16, enter **Bins**, then, in range A17..A20, enter the values **100,000**, **500,000**, **1,000,000**, and **1,600,000**—the upper limit of each bin range. Click the map and select *Tools•Map•Colors & Legend*. Then click *Upper Limit* rather than *Exact Match* if necessary. Open the *Bin Values* list box and click *From Range*. Click the arrow button next to the leftmost of the Range boxes, temporarily hiding the dialog box. Drag the

mouse over range A17..A20. When the dialog box returns, click *OK*.

The map now has just four colors, and the states are grouped more sensibly. The legend could be more descriptive, though, since it simply lists colors and numbers with no indication of what they mean. Someone seeing the map for the first time might think the two red states are in a 100,000-to-500,000 group. By default, 1-2-3 uses the bin values as bin labels, but you can change the bin labels.

Click cell B17 in the worksheet, type an apostrophe, and enter **<100,000**. Then enter the labels **100,000 - 500,000**, **500,000 - 1 million**, and **1 million - 1.6 million** in range B18..B20. This section of your worksheet should now look like **FIGURE 4**.

Click the map, choose *Tools•Map•Colors & Legend*, select *From Range* in the *Legend Labels* drop-down list, click the arrow button next to the range box, drag the mouse over range B17..B20, and click *OK* when the dialog box returns. Your map should now resemble **FIGURE 5**, except for the state labels—our next step.

Step 4: Add Text to the Map Itself

OK, let's add two-letter state abbreviations to the center of each state to make our map easier to read. But be warned: The mapping feature is not terribly clever about adding text to a map (as opposed to a legend) in this way.

Unfortunately, you must manually feed location information into a map even for predefined regions such as states. And you must create a three-column table. The first column contains the labels for the map.

The second and third columns contain the latitudes and longitudes where you want the labels to appear.

If you don't happen to know the latitudes and longitudes at the centers of the Midwestern states, fear not. You can get them from the map. First, enter **Labels** in cell D16, and enter the state abbreviations shown in **FIGURE 6** in range A17..A29. Then select range

	D	E	F
16	Labels		
17	ND	47	-102.755
18	SD	45	-102.615
19	NE	42	-100.889
20	KS	39	-100.868
21	OK	36	-98.8407
22	MN	46	-96.0661
23	IA	42	-94.7166
24	MO	38	-93.4585
25	WI	45	-91.5712
26	IL	40.19144	-90.1033
27	MI	43	-86.1405
28	IN	40.09125	-87.0492
29	OH	40	-83.6726

FIGURE 6: TO SUPERIMPOSE TEXT ON A MAP, create a three-column table with labels, latitudes, and longitudes.

D17..D29, select *Style • Font & Attributes*, click 8 in the list of point sizes, and click *OK*. (The point size you assign to the labels in the worksheet controls the size of the labels in the map.)

Double-click the map to open the map viewer. Place the mouse pointer a bit left of the center of North Dakota (the most northwestern of the tinted states), click with the right mouse button, and select *Copy Coordinates* from the QuickMenu. Hold down the <Alt> key while pressing <Tab> to switch to 1-2-3 without closing the map viewer. Right-click cell E17 (next to ND) and select *Paste* from the QuickMenu. This adds the coordinates for the middle of North Dakota to the worksheet.

Press <Alt>-<Tab> again to switch back to the map viewer. (If you're right-handed, you may want to keep your left thumb and middle finger parked over the <Alt> and

<Tab> keys. That way, you can use your left hand to switch back and forth between the map and the worksheet, and use your right hand to copy and paste the coordinates with the mouse.)

Right-click just to the left of South Dakota's center and choose *Copy Coordinates*, switch back to 1-2-3, right-click cell E18, and choose *Paste*. Repeat this process until you've transferred coordinates from all 13 states to the worksheet. Remember to check the status bar as you click on states in the Map Viewer, to ensure that you're in the correct state when you select



FIGURE 7: ADD FLAGS to mark cities or points of interest in the same way you add text.

each coordinate. The listing of states in Figure 6 lets you work north to south and west to east. When you are finished, your worksheet should look like the one in Figure 6, although your exact numbers will vary depending on where you click on each state.

Click the map, then select *Tools • Map • Ranges & Title*. Click *Coordinates* in the *Assign range for list*, click the arrow button next to the Range box, drag the mouse over the

table of states, longitudes, and latitudes (D17.. F29), and click *OK*. This will superimpose the state abbreviations on the map, roughly where they appear in Figure 5.

One could well ask why this process is necessary. If 1-2-3 knows where the states are to color them, why doesn't it know where they are to label them? It's a procedure that Lotus could improve.

You can also add text to a map to pinpoint cities or flag areas of interest. One of the symbols in the Wingdings font, which comes with Windows 3.1, is a flag; you get it by typing an uppercase O. Using this trick with the text-adding process you just went through, you can pinpoint any spot on the map with a flag, as in **FIGURE 7**.

On Your Own

Now that you've seen how simple it is to create and customize a map, try designing some maps of your own using the other data worksheets supplied with 1-2-3 or your own data.

If you'd like to make maps of other areas of the world, or maps of the United States divided into counties or other smaller units, contact Strategic Mapping Inc., Lotus's mapping partner (800/764-3228). This firm can give you information on ordering additional maps, as well as worksheet files of mappable data.

Richard Cranford is a senior associate editor for PC World Lotus Edition and editor of The 1-2-3 for Windows Report.

EXTRACTING DATA FROM LOTUS'S MAP FILES

Each of the map-data worksheet files provided with release 5.0 lists the data in a range with the range name Database, making it possible to pull out a subset of the region names and the accompanying values from the appropriate column. Here's how to extract the data shown in Figure 2, the 50-to-64-year-old population of the Midwest:

First, open the file USA_A.WK4 in 1-2-3's MAPDATA subdirectory. Then, select *File • New* to create a new, plain worksheet file. With the cell pointer in cell A1 of this new file, select *Tools • Database • New Query* to open 1-2-3's New Query Assistant. Press the <F3> key to open the Database Name dialog box. Click the arrow next to the In File list, and click USA_A.WK4. The name DATABASE now appears in the Database Name list box, so click *OK*. You've now selected the table of map data in USA_A as the database range.

Click the *Choose Fields* button. All 42 of the fields are initially selected, so click *Clear All*, then click *Add* to display a list of the fields. Click AREANAME, then scroll down the list until you find P50T06493

(shorthand for "Population aged 50 to 64 for 1993"). Hold the <Ctrl> key and click P50T06493, then click *OK*. You should now see AREANAME and P50T06493 in the list of selected fields. Click *OK*.

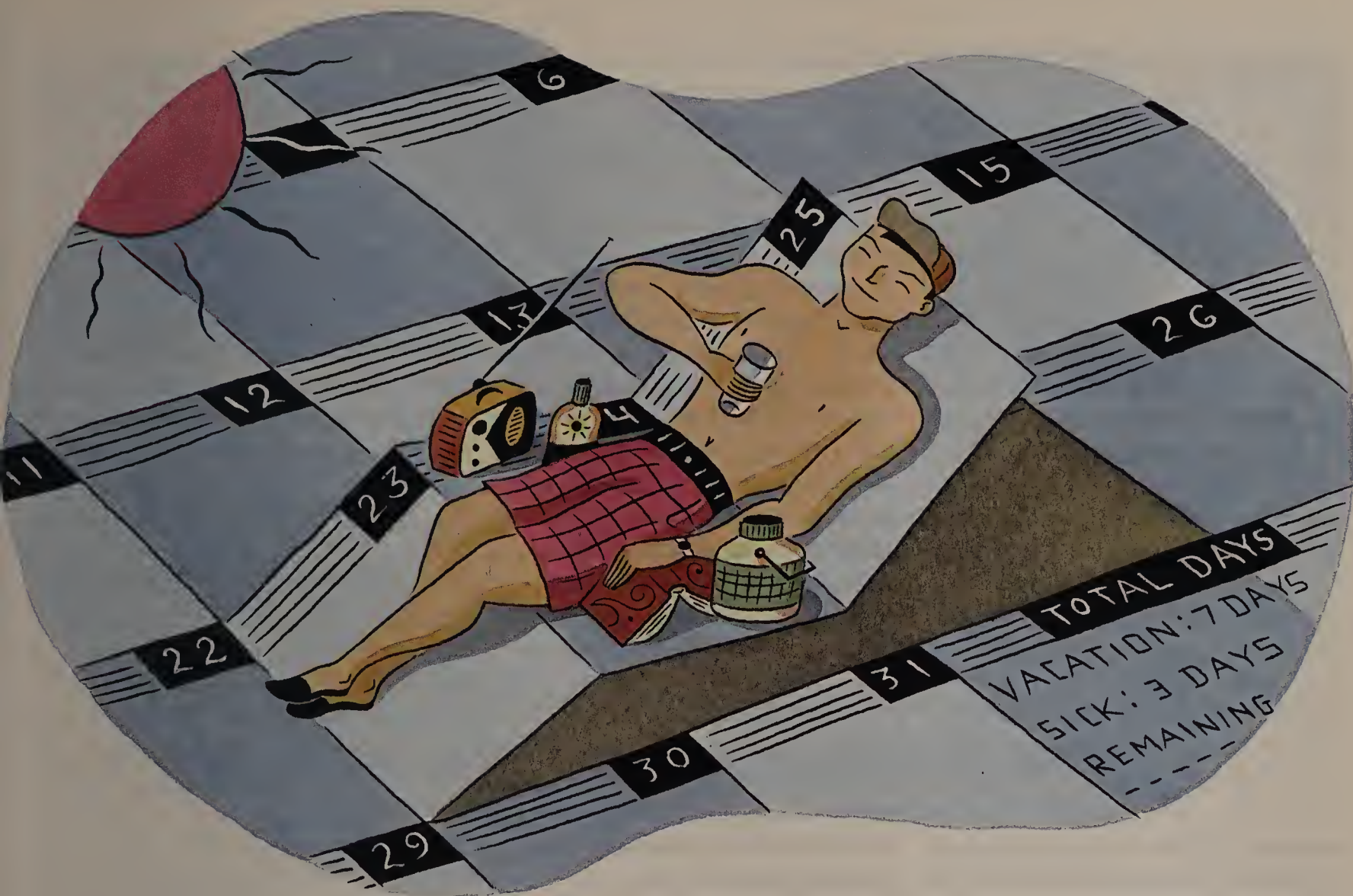
Now click *Set Criteria*. Open the Value list and select *Illinois*; this sets the initial criterion to 'AREANAME=Illinois'. Click the *Or* button; the Criteria box now contains 'AREANAME=Illinois or AREANAME=Illinois'. Click the *Value* box and select *Indiana*. Now the Criteria box contains 'AREANAME=Illinois or AREANAME=Indiana'. Continue in this manner, selecting the following state names:

Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, Oklahoma, South Dakota, and Wisconsin.

Click *OK* to return to the New Query Assistant dialog box. The box labeled 'Select location for new query table' should contain the address A:A1 prefaced by the path and name of the current worksheet. Click *OK* to create the listing shown in Figure 2.

Finally, select range A2..B14. You're now ready to follow our steps for turning these figures into an easy-to-understand map.





LET 1-2-3 TRACK

BY CATHERINE KENNY

TIME OFF

Tracking vacation and sick leave is probably one of the least glamorous yet most necessary tasks facing managers today, but it's not always that easy to keep an accurate recording of time off. We offer a simple 1-2-3 model for releases 2.3 and higher that helps make this job as painless as possible.

Once you've entered your company's time-off policies, you simply enter the dates you or your employees are out of the office. A summary screen instantly gives you an up-to-the-minute listing of time off for vacation, sick days, and personal days, as well as additional days off for jury duty, bereavement or family leave, or an unpaid leave of absence. The model can also account for half-days.

RECORD EMPLOYEE VACATION AND SICK LEAVE WITH THIS SIMPLE WORKSHEET.

	A	B	C
1	Track Time Off		
2			
3			
4	Date	Name	Code
5	01/05/95	Maggie	HV
6	01/05/95	Patrick	S
7	01/06/95	Maggie	V
8	01/09/95	Maggie	V
9	03/02/95	Courtney	P
10	04/13/95	Julie	S
11	04/24/95	Samantha	JD
12	04/28/95	Patrick	S

FIGURE 1: RECORD EACH EMPLOYEE'S time off in this section of the worksheet.

Creating the Worksheet

To build the worksheet, begin by entering the labels in range A1..C4 of **FIGURE 1**. In row 5 and the rows below, enter the date, employee name, and time-off code whenever an employee is out of the office. (For now, enter our sample records.) If you're using DOS release 3.x or higher or Windows release 4.x or 5.0, enter the dates in column A exactly as they appear. If you're working in DOS release 2.x, you must use the @DATE function to enter the dates. In all DOS releases, use the *Range•Format•Date•4* command to assign a date format.

Once you've entered the data, choose *Range•Name* (*/Range•Name•Create* in the DOS releases) and assign the name **timeoff** to range A4..C12. Remember that as you add records to this section of the worksheet, you must expand the Timeoff range to include them.

The next step is to create the table shown in **FIGURE 2**. This table lists the time-off codes and each employee name.

Enter the names of your employees, one name per column, beginning in cell V8. Then enter the time-off codes as shown, beginning in cell U9.

This model uses the following codes: *V* = vacation, *S* = sick day, *P* = personal day, *L* = leave of absence, *C* = compensation time, *JD* = jury duty, *B* = bereavement leave, *HV* = half a day of vacation, and *HS* = half a sick day. If your company offers

additional time off, enter the appropriate codes here. For example, enter *FH* for floating holiday in cell U18. Note that the codes you enter in the database table in Figure 1 must also be listed in this table.

To generate the time off taken for each employee, we entered an @DCOUNT formula, then issued the What-if command (Data•Table in 1-2-3 for DOS). Enter the labels shown in range U1..V1, and enter @DCOUNT(timeoff,2,U1..V2) in cell U8.

In 1-2-3 for Windows, choose *Range•Analyze•What-if Table*, select 2 in the Number of Variables edit box, and indicate range U8..Z17 as the table range, cell U2 as Input cell 1, V2 as Input cell 2, and click OK. In the DOS releases, choose */Data•Table•2*, and indicate the same range and input cells as above.

To add the borders to the table, highlight range U8..Z17 and choose *Style•Lines & Color*. Select *All* in the Borders section, and click OK. In DOS, choose *:Format•Lines•All* and specify the same range.

The third step in building the worksheet is to create the time-off policy table in **FIGURE 3**. Note that our sample vacation policy is graduated—that is, the number of vacation days is determined by length of service. The values in range Q2..Q6 are lengths of service (in days), and the values in range R2..R6 are the corresponding vacation amounts. In our sample, once you've been with the company for six months (182.5 days) you receive 3 vacation days. After 10 years (3650 days) you get 20 vacation days.

	T	U	U	W	X	Y	Z
1		Code	Name				
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							

FIGURE 2: THE CODE SUMMARY TABLE calculates the number of days each employee was out of the office, by type of leave.

To create the table, enter the labels shown in column P, then enter the values that reflect your company's policies in columns Q and R. In the Windows releases, choose *Range•Name* and assign the name **vacation** to range Q2..R6. In 1-2-3 for DOS, use the */Range•Name•Create* command. Then assign the labels in P8..P9 as names for the adjacent cells in column Q.

The final step is to create the summary table shown in **FIGURE 4**. To do so, enter the labels (substituting the names of your employees) in ranges H1..N4 and H6..I20.

CELL	FORMULA
J7	@IF(@NOW-start<182,5,0,@VLOOKUP(@NOW-start,\$vacation,1))
J8	+V9+(V16*0.5)
J9	+carry+J7-J8
Copy range J7..J9 to range K7..N7.	
J10	@IF(@DATE(@YEAR(@NOW),1,1)>start,\$sick,(@NOW-start)*\$sick/365)
J11	+V10+(V17*0.5)
J12	+J10-J11
Copy range J10..J12 to range K10..N10.	
J13	@IF(@DATE(@YEAR(@NOW),1,1)>start,\$personal,(@NOW-start)*\$personal/365)
J14	+V11
J15	+J13-J14
Copy range J13..J15 to range K13..N13.	
J17	+V12
Copy cell J17 to range K17..N17. Copy range J17..N17 to range J18..J20.	

Enter the label that appears in row 1 in cell H1. Be sure to enter the employee names in row 3 in the same order as they appear in Figure 2. Enter each employee's start date in row 4. If you're working in release 2.x, you must use the @DATE function to enter the dates. In all DOS releases, assign a date format with the *Range•Format* command. In row 6, enter any vacation days that an employee carried over from the previous year. Use the *Range•Name* command (*/Range•Name•Create* in 1-2-3 for DOS) to assign the name **start** to cell J4 and the name **carry** to cell J6.

Enter the formulas from the box above.

To center the labels in range J3..N3, highlight that range and choose *Style•*

	P	Q	R
1	Company Policies		
2	Vacation	182.5	3
3		365	5
4		730	10
5		1825	15
6		3650	20
7			
8	Sick	6	
9	Personal	2	

FIGURE 3: ENTER YOUR COMPANY TIME-OFF POLICIES in this table. The worksheet uses these values to calculate accrued vacation, sick days, and personal days.

Alignment. In the Horizontal section, select *Center*, and click *OK*. If you're using 1-2-3 for DOS instead, highlight range J3..N3 and choose */Range•Label•Center*.

To add the three lines shown in Figure 4 to your worksheet, highlight range I9..N9, hold down **<Ctrl>**, and highlight ranges I12..N12 and I15..N15. Choose *Style•*

Lines & Color, select *Bottom* in the Border section, and click *OK*. In 1-2-3 for DOS, choose *:Format•Lines•Bottom* and indicate the same ranges.

Use the *Style•Column Width* command (*/Worksheet•Column•Set-Width* in 1-2-3 for DOS) to set the width of column H to 15. To center the label in cell H1 across columns H through N, highlight range H1..N1 and choose *Style•Alignment*. In the Horizontal section, select *Center* and *Across Columns*, and click *OK*. In 1-2-3 for DOS, highlight range H1..N1 and choose *:Text•Align•Center*. Next, use the *Style•Number Format* command (*/Range•Format* in the DOS releases) to assign the Fixed 1 format to range J6..N20.

Finally, use the *File•Save* command to save the worksheet.

Using the Worksheet

To track time off, enter the date, employee name, and time-off code in the input section of the worksheet, as shown in Figure 1. For example, to add a new record to our sample database, you would enter the employee data in row 13. Remember, after you enter a new record, you'll have to use the *Range•Name (/Range•Name•Create* in 1-2-3 for DOS) command so the range

name *Timeoff* includes the new records in the database.

To update the summary information table in Figure 4, first make sure automatic recalculation is enabled. To do so, choose *Tools•User Setup*, click *Recalculation*, select *Automatic* in the Recalculation section, and click *OK* twice. In 1-2-3 for DOS, choose */Worksheet•Global•Recalc•Automatic*. Then, to update the summary table, press **<F8>** (the Table key).

Don't be alarmed if the data shown in the summary section of our sample worksheet doesn't match yours exactly. The formulas that return the Accrued values are

You must reset the range named *Vacation* to accommodate any change in vacation policy. In this case reassign the name *Vacation* from range Q2..R6 to cell Q2. Then enter the following formula in cell J7, and copy it to range K7..N7:

```
@IF(@DATE(@YEAR(@NOW),1,1)>start,
(@NOW-@DATE(@YEAR(@NOW),1,1))*0.0274,
(@NOW-start)*0.0274)
```

If your company offers 15 vacation days instead of 10, enter **15** in cell Q2, and substitute **0.041** (15/365) for each 0.0274 in the formula in range J7..N7.

For some companies, vacation days accrue at the rate of one day per month until the maximum number of vacation days is met. If that is the case in your company, enter the total number of vacation days per

AFTER YOU'VE ENTERED THE TIME OFF FOR EACH EMPLOYEE, PRESS THE <F8> KEY TO PRODUCE AN UP-TO-THE-MINUTE REPORT.

calculated using the current date (via the *@NOW* function). This function ensures that the information in the table is updated on a daily basis.

Customizing the Worksheet

If your company does not use a graduated vacation policy, but instead offers a fixed number of vacation days per calendar year, enter that value in cell Q2. For example, if all your employees get 10 vacation days per calendar year, enter **10** in cell Q2. Note:

year in the cell named *Vacation*—for example, **10**—and enter the following formula in J7: *@MIN(@MONTH(@NOW)-1,\$vacation)*. Copy this formula from cell J7 to range K7..N7.

Finally, replace the values in range Q8..Q9 with your own company policies for sick and personal days.

Catherine Kenny is an associate editor for PC World Lotus Edition. The model from this article is available via PC World Online on America Online and on CompuServe.

	H	I	J	K	L	M	N
1	Time Off Summary						
2							
3			Courtney	Julie	Maggie	Patrick	Samantha
4	Start Date		07/01/86	03/12/90	08/09/88	08/25/91	12/27/93
5							
6	Vacation	Carryover	5.5	3.0			
7		Accrued	15	10	15	10	3
8		Used	0.0	0.0	2.5	0.0	0.0
9		Available	20.5	13.0	12.5	10.0	3.0
10	Sick	Accrued	6.0	6.0	6.0	6.0	6.0
11		Used	0.0	1.0	0.0	2.0	0.0
12		Available	6.0	5.0	6.0	4.0	6.0
13	Personal	Accrued	2.0	2.0	2.0	2.0	2.0
14		Used	1.0	0.0	0.0	0.0	0.0
15		Available	1.0	2.0	2.0	2.0	2.0
16							
17	Leave	Used	0.0	0.0	0.0	0.0	0.0
18	Comp Time	Used	0.0	0.0	0.0	0.0	0.0
19	Jury Duty	Used	0.0	0.0	0.0	0.0	1.0
20	Bereavement	Used	0.0	0.0	0.0	0.0	0.0

FIGURE 4: THE SUMMARY shows each employee's accrued, used, and available time off.

Protecting Range Names



As we saw last month, range names are invaluable for organizing and manipulating your worksheet data, but they're all too easily corrupted by an accidental deletion, an inadvertent insertion, or a misguided move. And a bad range name that's included in a formula or macro, or that spans several sheets, can wreak havoc in your worksheets. This month we'll discuss some of these dangers and explore some techniques to ensure that your named ranges always work the way you expect.

If you built and saved the worksheet we used in last month's column, retrieve it now, assign the name **first_qtr** to

range A3..E6, and resave the file. If you haven't created the model yet, follow the instructions below.

Begin by entering the labels shown in **FIGURE 1**. Enter the values in range B4..E6, and assign the Currency 0 format to ranges B4..E6 and B9..B12. Widen the columns as needed.

Assign the name **abacus** to range B4..B6, **slide_rule** to range C4..C6, **calculator** to range D4..D6, **computer** to range E4..E6, and **first_qtr** to range A3..E6.

To do this in releases 4.x and 5.0 for Windows, select **Range•Name**, type **abacus** in the Name text box, specify range **B4..B6** in the Range box, and click the **Add** button. Assign the other range names in the same manner. Click **OK** instead of **Add** after you've assigned the last range name. In the DOS releases, select **/Range•Name•Create**, type in the name **abacus**, and use the mouse or the arrow keys to specify range B4..B6. Repeat these steps to assign the other range names.

Next, enter the following formulas:

CELL	FORMULA
B9	@SUM(abacus)
B10	@AVG(abacus)
B11	@MAX(abacus)
B12	@MIN(abacus)

Finally, copy range B9..B12 to range C9..E9 and save the worksheet.

Watch the Outside Corners

Although a named range carries a descriptive moniker, it is defined by two key cells called the range's *anchors*: the cell in the upper left corner and the cell in the lower right corner.

One of the most common ways to corrupt a named range is to move data onto an anchor cell. Let's see what happens when you

do this. Using the **Edit•Cut** and **Edit•Paste** commands in the Windows releases, or **/Move** in the DOS releases, move cell A4 onto cell B4 (one of the anchor cells of the range **Abacus**).

Notice that all the formulas that refer to **Abacus** return **ERR**, because the range name is now undefined. (If you had deleted the range name altogether, the reference would revert to the range address B4..B6.)

To repair the damaged formula in the Windows releases and in release 2.x for DOS, first reassign the name to the corrupted range, then edit the formulas so they refer to that range name. In releases 3.x and 4.0 for DOS, just reassign the name; 1-2-3 will automatically update the formulas. (Before repairing the formula in our example, restore the original contents of cells A4 and B4.)

You can also use the **Undo** feature to fix damaged formulas, but only if you have **Undo** enabled and you realize what you've done before you make any further changes to the worksheet.

In this example, you can restore the worksheet to its original state by simply loading it again without saving any changes to the damaged version.

Deleting a row or column that contains an anchor cell also destroys a named range. Before you delete a column or row, check the locations of named ranges. In the Windows releases, click the **Navigator** button, then select each name in the list to find its location. In the DOS releases, select **Range•Name•Table** to display a list of range names and their locations.

Anchors Away

Accidentally moving one of the anchor cells and thereby altering the dimensions of the named range doesn't invalidate the name as it does in the above examples, but it creates problems nonetheless. And it's easy to do. Suppose you realize that the **abacus** and **slide rule** sales figures for March are

	A	B	C	D	E
1	Mathematics-R-Us				
2					
3		Abacus	Slide Rule	Calculator	Computer
4	Jan	\$12	\$25	\$250	\$10,000
5	Feb	\$8	\$15	\$300	\$19,000
6	Mar	\$4	\$10	\$450	\$22,000
7					
8					
9	Total Sales	\$24	\$50	\$1,000	\$51,000
10	Average Sales	\$8	\$17	\$333	\$17,000
11	Maximum Sales	\$12	\$25	\$450	\$22,000
12	Minimum Sales	\$4	\$10	\$250	\$10,000

FIGURE 1: CREATE THIS WORKSHEET to learn how to avoid corrupting named ranges, and how to repair damage once it's been done.

transposed. You begin to correct this by moving the contents of cell B6 to cell C6. Without meaning to, you've expanded the named range Abacus to include range C4..C6.

In the Windows releases, click the *Navigator* button just under the menu bar and select *Abacus* from the drop-down list. In the DOS versions, select */Range•Name•Create* and

You can insert or delete columns or rows between the anchor cells without damaging a named range.

select *Abacus* from the menu. In both cases 1-2-3 highlights range B4..C6.

The formulas in range B9..B12 that referenced the abacus sales data now include the sales data for slide rules as well. We've also destroyed the range *Slide_rule* by moving data onto one of its anchor cells, forcing the formulas in range C9..C12 to evaluate to ERR.

To remedy this situation, retrieve the original version of the worksheet.

Manipulating 3-D Ranges

Nearly all the rules that apply to named ranges in 2-D worksheets apply in 3-D as well. The anchor cells in a three-dimensional named range reside in the upper-left corner of the first sheet and the lower-right corner of the last sheet. As in single-sheet named ranges, you will corrupt a multisheet named range if you move the contents of one cell onto an anchor cell. Moving a corner cell of a multisheet named range alters its dimensions, and inserting and deleting sheets in between the first and last sheets causes the named range to expand or contract.

However, there's one key difference between single-sheet and multisheet named ranges: In a multisheet file, deleting a column, row, or sheet that contains an anchor cell doesn't corrupt the range name. Instead, the range is automatically redefined. Say you've defined the range *Sales*. If you delete

sheet F, *Sales* becomes A:A1..E:D10. If you delete column D in sheet E, *Sales* becomes A:A1..E:C10.

Protecting Your Good Range Names

1-2-3 releases 4.x and 5.0 for Windows offer two safeguards against corrupting or redefining named ranges: the *Delete Selection* check box in the *Delete* dialog box, and the *Insert Selection* check box in the *Insert* dialog box. These options tell 1-2-3 to limit the area in which it inserts or deletes columns or rows.

In **FIGURE 2**, range D3..E9 has been assigned the name *Test_data*. Suppose you want to delete row 3 in columns A and B but you don't want to corrupt *Test_data* by deleting cells D3 and E3. Highlight range A3..B3 and select *Edit•Delete*. In the *Delete* dialog box, select the *Delete Selection* check box and click *OK*. 1-2-3 deletes the data in cells A3..B3 (and moves any data below row 3 in columns A and B up one row) without disturbing the data to the right.

Planning for Growth

Of course, protecting your named ranges doesn't mean you can't expand and contract those ranges as your worksheet changes. Named ranges wouldn't be very useful if they were inelastic.

You can insert or delete columns or rows between the anchor cells without any damage to the named range. When you do this, the range definition expands or contracts to match the changing dimensions of the data.

For example, insert a row between Feb and Mar in **Figure 1** by placing the cell pointer on any cell in row 6. In 1-2-3 for Windows, select *Edit•Insert*, select the *Row* radio button, and click *OK*. In 1-2-3 for DOS, select */Work-*

sheet•Insert•Row and press <Enter>. The range addresses for *Abacus*, *Slide_rule*, *Calculator*, *Computer*, and *First_qtr* automatically expand by one row, and the range names adjust to include row 7.

If you know you'll be inserting rows or columns to add data to your model, include an extra blank column or row when defining the range so it will be easier to add information later. Let's change the dimensions of *Abacus* to include row 7.

In the Windows releases, select *Range•Name*, select *Abacus* in the *Existing Named Ranges* box, specify range B4..B7, and click *OK*.

In the DOS releases, select */Range•Name•Create*, select *Abacus*, press the down arrow key once to expand the range by one row, and press <Enter>.

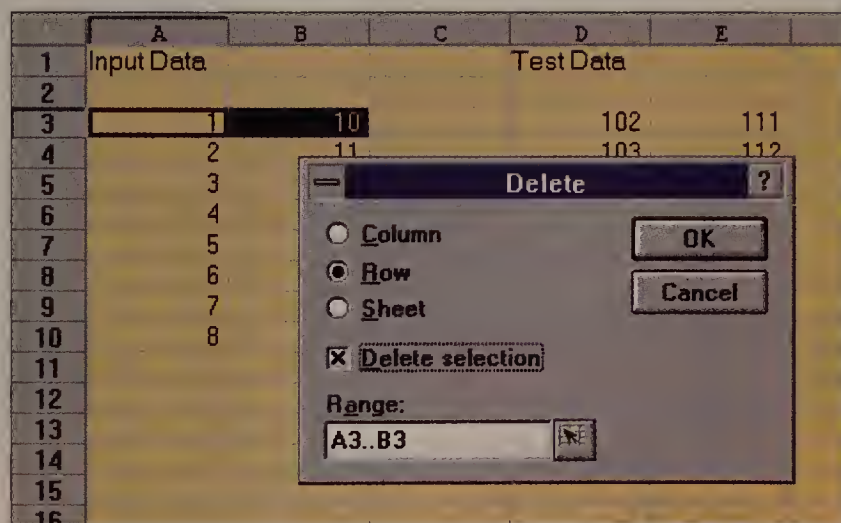


FIGURE 2: THE DELETE SELECTION OPTION in the 1-2-3 for Windows Delete dialog box limits your deletion to the highlighted area.

Now, suppose you wanted to enter data for April. In the Windows releases, position the pointer in row 7 and select *Edit•Insert*, make sure the *Row* button is selected, and click *OK*. In the DOS releases, select */Worksheet•Insert•Row* and press <Enter>.

Now enter the label **Apr** in cell A7 and the value **20** in cell B7. Notice how the results of the formulas in range B9..B12 increase to include the new amount in cell B7.

By Cynthia G. Fitzgerald

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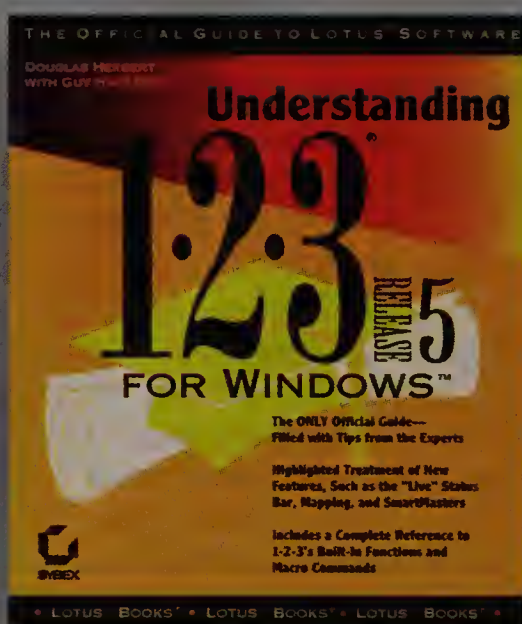
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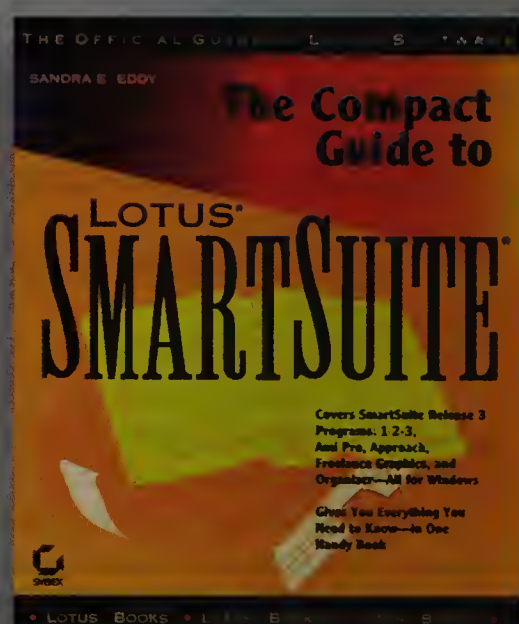
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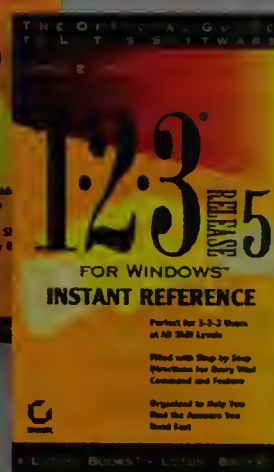
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Seven Ways to Fight Worksheet Mistakes

Whether you're modeling crucial business problems or tracking your personal finances, there's no room for mistakes. Fortunately, 1-2-3 catches some errors on its own—formula syntax errors and undefined range names, for example. But it can't recognize faulty logic or prevent you from overwriting data.

Last May, in "Create Safeguards to Assure Accuracy," we identified ten ways to eliminate common mistakes from your worksheets. This month, we offer seven more error-proofing techniques, including a few advanced tricks for keeping worksheets trouble-free.

1 Pointing is okay. When you type a formula, it's easy to use the wrong cell address, and often you won't catch the mistake until much later. To prevent this, enter cell references in your formulas by using the mouse or the cell pointer to point to the actual cells and ranges.

If you're creating a new formula, begin by typing a plus sign (+), minus sign (-), open parenthesis ((), at sign (@), pound sign (#), dollar sign (\$), or decimal point. In the Windows releases, you can also type an equal sign (=). If you're editing an existing formula, start by pressing +, -, slash (/), asterisk (*), or caret (^), and then pressing the up or down cursor key. (If you press the right or left cursor key, 1-2-3 thinks you want to move within the formula, not to another cell or range.)

You can then point to a cell by clicking it or using the cursor keys to move the pointer to it. To point to a range, drag the mouse across the range. You can also use the cursor keys to move the pointer to the first cell in the range; then press the period key and use the cursor keys to finish highlighting the range. In either case, the pointing ac-

tion ends when you enter the formula or type an operator (such as a parenthesis or a plus sign) to continue the formula. Use this pointing technique as many times as needed to create all cell and range references within a formula.

1-2-3 for Windows also lets you place an existing range name in a formula by pointing: Click the Navigator button in the edit line, and select a range name from the resulting list. 1-2-3 places the range name in the formula; it then allows you to continue with the formula or to enter it in the worksheet.

2 Break up long formulas. Spreadsheet enthusiasts may enjoy the challenge of creating a complex formula that includes several nested @functions—especially one that uses nested @IF statements to test for several different conditions—but such formulas are a common source of errors, because it can be difficult to test all the possible outcomes.

If your worksheet returns incorrect answers, look for lengthy nested formulas. When you find one, you can either examine each possible outcome and its impact on the rest of the worksheet, or break it into smaller chunks

Hiding 1-2-3 columns or sheets is a handy way to prevent accidental changes—not a sign of paranoia.

that you can test individually. The latter option is preferable, because formulas that contain several layers of nesting can be nearly impossible to debug. In addition, shorter formulas are easier for others to decipher.

3 Hide things. Hiding 1-2-3 columns or sheets is not a sign of paranoia—it's a handy way to prevent some accidental changes. Once you've entered constants or constructed formulas that you don't intend to change, there's no need to

leave them visible. Also, hiding unneeded columns can help tighten up a large worksheet, putting more of your active data entry cells within immediate reach.

In the Windows releases, select *Style•Hide*, and in the Hide dialog box (shown in **FIGURE 1**), select the *Column* or *Sheet* button. In releases 3.x and 4.0 for DOS, hide columns by selecting */Worksheet•Column•Hide* and sheets by choosing */Worksheet•Hide•Enable*. Once you've hidden a column or sheet, the cell pointer skips right over the

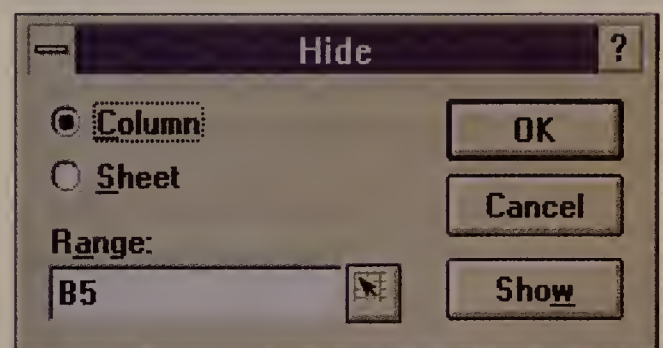


FIGURE 1: PROTECT COLUMNS AND SHEETS from accidental changes by hiding them. You can hide worksheet areas in both Windows and DOS releases.

area in question, so you and other users won't even miss it. (In releases 4.x and 5.0 for Windows, you can make hidden sheets especially hard to detect by changing the worksheet tabs from the default alphabetical sequence.)

4 Check your defaults. The hidden-column trick has an Achilles' heel in release 4.x for Windows: Unless you seal or protect the worksheet (a technique described in last May's column), you may accidentally overwrite information in the hidden columns—or anywhere else, for that matter—by dragging and dropping data on top of other data.

Release 5.0 for Windows posts a warning dialog box during a drag-and-drop operation, asking you to approve the task before it overwrites data. If your copy of release 5.0 is configured to work without this warning, consider changing it back: Choose *Tools•User Setup*, then select the *Confirm drag-*

and-drop check box. You'll see the warning dialog box whenever you attempt to drag and drop data over existing entries. Although this is an extra step, the added safety is worth the inconvenience.

Take note of some other useful settings in the User Setup dialog box while you're there. The *Beep on error* and *Undo* check boxes should both be selected. And make sure that the 'Save files every' check box is turned off. If you introduce mistakes into a file, this autosave feature may overwrite the error-free version before you realize what has happened.

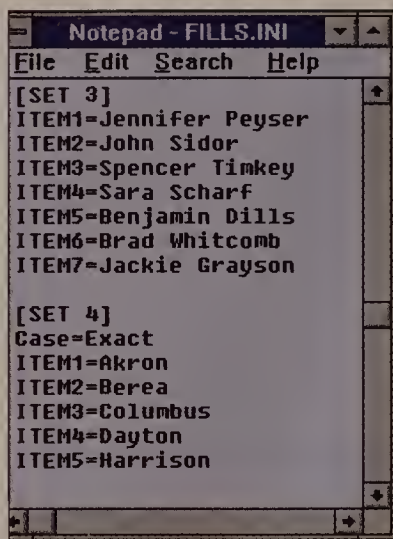


FIGURE 2: FILL BY EXAMPLE in the Windows releases works with standard series or series that you create.

1-2-3 still prompts you before closing a file that you've made revisions to, so the autosave feature is a bit superfluous—unless your computer has a tendency to crash in the middle of 1-2-3 sessions.

5 Customize your fills.

If you enter the same series of items in several worksheets, cut down on typographical errors by taking advantage of the Fill

by Example feature in releases 4.x and 5.0 for Windows: Enter the first item in a series, and 1-2-3 fills in the rest. 1-2-3 automatically recognizes standard series such as days of the week, months,

and numbers, but you can get it to recognize your own custom series as well.

To create a custom series, switch to a text editor, such as the Windows Notepad (in the Accessories group), and open the FILLS.INI file (in the 1-2-3 for Windows program directory). Go to the bottom of the file, press <Enter> to add a blank line, and type in your series as shown in **FIGURE 2**. Make sure you end each line by pressing <Enter>. Resave the FILLS.INI file.

In the worksheet, type the first item in the series, select the range to fill, and select *Range • Fill by Example*.

In release 5.0, you can use drag-and-fill to complete the series. Just type the first item, move the mouse pointer to the bottom of the cell until you see four black triangles, and then drag the mouse over the range you want to fill.

Note that 1-2-3 treats the series listed in the FILLS.INI file as labels rather

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than values. While it's possible to use @VALUE to convert the labels into values, that's a convoluted process. To enter a custom series of numbers, it's easier to copy it from an existing worksheet onto the Windows Clipboard, and then paste it where you want it.

6 Make forms easy to fill out. 1-2-3's extensive Wysiwyg capabilities let you recreate nearly any form in a worksheet. But the fancier the form, the more likely users are to miss crucial entries or to enter data in the wrong places.

One alternative is to put data entry cells in a different part of the worksheet (or in another sheet), accompanied by labels that prompt the user for input, as in **FIGURE 3**. In the part of the sheet that comprises the printed form, use simple formulas, such as +A:B3, to refer to the inputs. In Figure 3, the form on sheet B is updated as you

enter values in range B3..B8 of sheet A. After you finish filling in the data entry range, examine the completed form in sheet B before printing.

7 Use Version Manager to spot changes. If you don't want to protect or hide a range that contains important information, you can quickly tell whether the data has been changed by using Version Manager. Begin by naming the range that you want to check, and create a version for this range—for example, Final. Then use the @VERSIONCURRENT function to check whether the range is just the way you left it. For example, @VERSIONCURRENT (Constants), where Constants is the range name, returns 'Final' if the

cells in the range have not changed since you created the version. If they have changed, this formula returns

FIGURE 3: AVOID NAVIGATING A COMPLEX FORM by doing data entry in another sheet. As data is entered in sheet A (bottom), cell referencing formulas in sheet B (top) update the form automatically.

'ERR', alerting you to the potential for trouble within the worksheet.

—By Kelly R. Conatser

Kelly R. Conatser is a frequent contributor to PC World Lotus Edition. ■

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Show File Name in Footer



Include File Name in Footer

Q In my workgroup, we include a worksheet's path and file name in its footer. But after placing the name in the footer, we sometimes inadvertently misspell the file name when saving the worksheet, making the name in the footer incorrect. Is there a macro that can accomplish both tasks at once so that we can avoid any inconsistency?

Linda Maddox, Costa Mesa, California

A You don't need a macro. In releases 4.x and 5.0 for Windows, you can tell 1-2-3 to print the current file name in the footer automatically. Select *File • Page Setup* and click one of the three footer boxes, depending on how you want the footer to appear—left justified,

centered, or right justified. Then click the *File name* SmartIcon—the second icon from the right in the Insert section of the dialog box shown below. A caret appears in the footer box.

If you're working in 1-2-3 for DOS, you can create a formula that uses the @CELL function to return the file name. Then, in the footer, reference the cell that contains this formula.

For example, enter the formula @CELL("filename",A2) in cell A1 of your worksheet. (You can enter this formula in any blank cell. In this example, use cell A2 as the second argument to avoid a circular reference—that is, an error that results when a formula refers to the cell it's located in.) The formula returns the complete path and file name of the current worksheet.

Now let's link this formula cell to the footer. Select */Print • Printer • Options • Footer* and enter \A1. If you're using Wysiwyg, select *:Print • Layout • Titles • Footer*, then enter \A1.

Remember not to include the cell containing the @CELL formula in your print range. Also, make sure you press <F9> (the calculation key) to update the formula before you print the file.

How Many Digits?

Q Is there a formula that returns the number of digits to the left of the decimal point of a value entered in my worksheet?

Jade Dornfeld, Venice, California

	A	B	C
1	Value	Digits to the left	
2	0.1	0	
3	1.23	1	
4	12.34	2	
5	123.45	3	
6	1234.56	4	
7	12345.67	5	
8	123456.79	6	
9	1234567.89	7	
10	12345678.90	8	
11	123456789.90	9	
12	1234567890.00	10	

The @IF portion of the formula tests to see if the value in cell A2 is less than 1. If it is, the formula returns 0. If the value in cell A2 is greater than 1, the @STRING function converts the value to a label with no decimal places. Then the @LENGTH function returns the number of characters in the label.

Wrapping Text in 1-2-3 for Windows

Q In the April 1994 Q&A column, Rory Parness asked how to get 1-2-3 to wrap text ["Use a Text Block"]. Your solution, which uses text blocks, does work, but it's not ideal. Aligning the floating text blocks is difficult, and any text you've already entered must be moved into the text block.

Although not a 1-2-3 for Windows command, the Classic */Range • Justify* command does exactly what Parness asked. Can you describe how this command works?

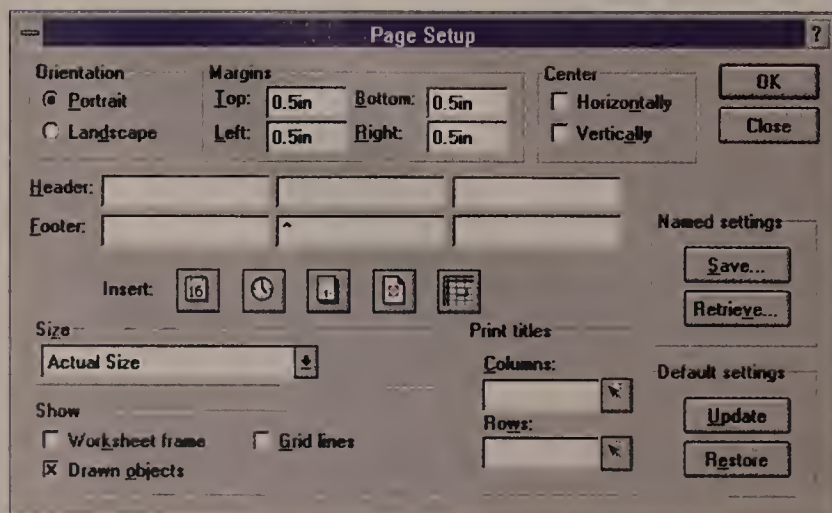
David M. Pollock, Dallas

A You're right. Getting text blocks to line up with the other data in your worksheet is a challenge, because the text blocks aren't actually in the worksheet's cells. Rather, they "hover" over the worksheet.

The */Range • Justify* command, available in all releases of 1-2-3, offers an easier method. To start, enter several labels in a single cell. Make sure your entry is too long for the column's width, then select */Range • Justify*.

1-2-3 prompts you for the Justify range. The width and depth of the range you specify determines the

A Yes, you can use an @LENGTH formula that includes @IF and @STRING terms. To see how it works, first enter the values shown above in column A. Then enter the formula @IF(A2<1,0,@LENGTH(@STRING(A2,0))) in cell B2, and copy that cell to range B3..B12.



length of the justified labels and how data below will be affected. Specify a single-row range if all the cells below the labels are blank or if you don't mind having any data directly below the justified range move down. Select a multiple-row range if you want to keep the data below from being moved. If you don't specify a range that's wide and deep enough to hold all the justified labels, the error message 'Justify range is full or line too long' appears. After you select the range, press <Enter>. 1-2-3 left-justifies the text in that range.

In the worksheet shown below, we entered all of our text in cell A1. Then we selected /Range•Justify and specified range A1..D5.

	A	B	C	D
1	First quarter	sales of 1995 have exceeded all		
2	expectations. You have all done an			
3	exceptional job! Bonuses will be distributed in			
4	an informal meeting tomorrow morning.			

Numbers That Repeat

Q How can I find the six numbers that appear most often in a given range? For example, I want to find the six most frequent numbers in a range 15 columns wide by 650 rows deep. I use release 2.4 for DOS.
Rusi B. Patell,
North Bergen, New Jersey

A The solution to this problem entails several Data•Query commands, as well as Data•Distribution and Data•Fill. The Data•Distribution command is the one that computes the frequency of all values in the range.
First, a few ground rules: Your range can't contain more than 8191 different values; we'll use a smaller range of values and only integers in this example so we don't have to account for deci-

mals in the fill range's step value.
Enter the labels that appear in row 1 and the values that appear in range D2..F8 of the bottom figure.
Assign the name **list** to range D2..F8. Select /Data•Fill and specify range A2..B43 as the range to fill. Enter the formula @MIN(list) as the start value, press <Enter> to accept 1 as the step value, and enter the formula @MAX(list) as the stop value. This step creates a list of integers that begins with the minimum value and ends with the maximum value in List.

Select /Data•Distribution. Specify range D2..F8 as the values range, and specify range A2..B43 as the bin range. Press <Enter>, and 1-2-3 fills column B with numbers that indicate the frequency of each value in column A. Some of the frequencies in column B are 0, which indicates that the corresponding values in column A are not in the List range.

Let's extract the frequencies not equal to 0, along with their corresponding values, to another range. Copy A1..B1 to ranges D10..E10 (the criteria range) and D13..E13 (the output range). Enter the criterion '<>0' in cell E11. This criterion tests to see which records are not equal to 0. Select /Data•Query•Input, and specify range A1..B43. Next select Criteria, and specify range D10..E11. Select Output, and specify range D13..E13. Finally, select Extract, then Quit. The output range contains only the values and the number of times each appears in List.
To sort the list, select /Data•Sort•Data-Range. Specify range D14..E21 as the range to sort. Select Primary-Key and specify cell E14. Accept the de-

	A	B	C	D	E	F
1	Value	Frequency		Data Set 1	Data Set 2	Data Set 3
2				45	56	34
3				54	34	40
4				54	45	34
5				34	56	68
6				75	65	54
7				75	54	34
8				34	65	45

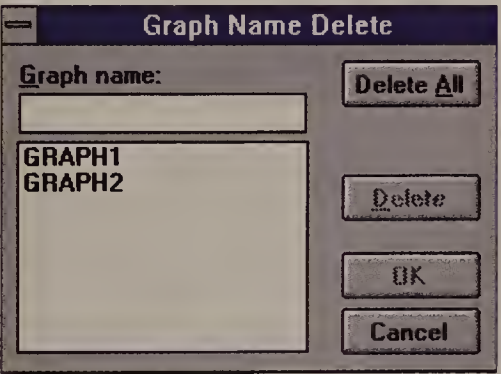
fault sort order (D for descending) and select Go. The first six rows of range D14..E21 now contain the six most frequent values in the List range.

Deleting Outdated Graphs

Q At the beginning of every year, I clear the data from last year's budget worksheet so that I can use it as a template for the current year's budget. I would like 1-2-3 to clear the graphs from the worksheet at the same time, but for some reason it won't. Can you help? I'm still working in 1-2-3 release 1.1 for Windows.
Debbie Olmstead, Roscoe, Illinois

A In release 1.1 for Windows, you delete graphs in a separate operation, by selecting Graph•Name•Delete. You'll see a dialog box with a list of the graph names associated with the current worksheet, as in the figure below. To erase all the graphs, click the Delete All button and click OK.

Deleting graphs is easier in releases 4.x and 5.0 for Windows. Just click on



a blank area inside the graph frame to select the graph, then press <Delete>. The graph and its associated name are deleted from the worksheet.
In the DOS releases of 1-2-3, select /Graph•Name•Reset to delete all the named graphs in the current worksheet. To erase a single graph in the current worksheet, just place the cell pointer on a cell that contains the graph, then select the Wysiwyg command :Graph•Remove.

Just Average

Q I have a worksheet with a long column of numbers that grows by one cell each day. I'm trying to write a formula that will calculate the average of the last ten cells each time I add a new entry. Can you help?
Gary Duhaime, Provo, Utah

A Try entering the following formula:
`@AVG(@@("A"&@STRING(@COUNT(A1..A8192)-9,0)&"..A"&@STRING(@COUNT(A1..A8192),0)))`.

The formula assumes that column A contains the list of numbers you want to average, that the list of numbers begins in cell A1, and that the list is contiguous. You can enter the formula in any column but A.

Here's how the formula works. The @STRING and @COUNT terms find the row numbers of the first and last values in the range you want to average. Then each number is concatenated with the letter A to create the range address. The @@ term returns the contents of that range, which the @AVG term then averages.

If your values are in a different column, replace each A in the formula with the letter of the column in which they are located.

All or Nothing at All

Q How do I make an @VLOOKUP formula return NA or 0 instead of ERR whenever it can't find an exact match? My worksheet [shown at right] depicts a small sample of what I'm trying to do. Range A4..B9 contains truck numbers and their associated radio numbers. I want to log the trucks currently available in

column D and have their radio numbers automatically appear in column E. *L. Scheffler, LaBelle, Florida*

A As you discovered, looking up values with the @VLOOKUP function can be tricky. The values in the first column of the lookup range must be in descending order, but even then you can get unexpected results. For exam-

ple, if the value you're searching for is smaller than the first value in the first column of the lookup range, then the @VLOOKUP formula returns ERR. If

	A	B	C	D	E
1	Inventory			Log	
2					
3	Truck No.	Radio No.		Truck No.	Radio No.
4	8421	27			
5	8422	84			
6	8423	80			
7	8425	91			
8	8427	65			
9	8429	21			

the value you're searching for isn't in the first column, @VLOOKUP finds the value closest to but not greater than the value you're searching for.

Looking up labels is more straightforward. When the lookup range consists entirely of labels, @VLOOKUP returns ERR if the label you're searching for doesn't have an exact match in the first column of the lookup range.

Thus, the easiest solution to your problem is to first convert the truck numbers in column A from values to labels. Then create an @IF formula that tests for the occurrence of 'ERR' and replaces it with 'NA'.

Convert the truck numbers to labels by entering the formula @STRING(A4,0) in cell C4 and copying it to range C5..C9. Next, copy the results of these formulas to column A.

GOOD IDEAS



Summing Less Than Everything

Suppose you want to sum only part of a contiguous range of cells, using 1-2-3's Sum SmartIcon. To understand the situation, consider the top worksheet shown below.

Say you want to sum up ranges C2..E2, C3..E3, and so on, to arrive at a quarterly total. You also want to sum up the expense totals by totaling only rows 3 through 6, using formulas located in row 7. Instead of letting 1-2-3 decide which

rows to sum, you specify the range—and include the cells that will contain the totals in this range specification.

To get the quarterly expense totals, select range C3..F7 and click the Sum SmartIcon. If you want a sum of income from January through March, select range C2..F2, then click the Sum SmartIcon. The results are shown in the bottom worksheet.

Shane Devenshire, Walnut Creek, California

	A	B	C	D	E	F
1		Dec	Jan	Feb	Mar	Quarter Total
2	Income	9000	10000	12000	13555	
3	Communication	200	400	100	200	
4	Travel	509	654	321	667	
5	Salary	3900	3700	3500	3800	
6	Benefits	600	600	600	600	
7	Expense Total					

	A	B	C	D	E	F
1		Dec	Jan	Feb	Mar	Quarter Total
2	Income	9000	10000	12000	13555	35555
3	Communication	200	400	100	200	700
4	Travel	509	654	321	667	1642
5	Salary	3900	3700	3500	3800	11000
6	Benefits	600	600	600	600	1800
7	Expense Total		5354	4521	5267	15142



Shane Devenshire is a partner in Mar & Sha Corporation, a consulting firm in database and application design. Devenshire has been using 1-2-3 since release 1A and hopes that his 1A disks and manual will soon become collector's items.

In the Windows releases, highlight range C4..C9, select *Edit•Cut*, move the pointer to cell A4, and select *Edit•Paste Special*. In the dialog box, select *Formulas as values*, and click *OK*.

In the DOS releases, select */Range•Value*, specify C4..C9 as the range to copy from, and specify cell A4 as the range to copy to. Then erase C4..C9.

Now enter some truck numbers as labels in range D4..D7, as shown in the figure below. Then enter the following formula in cell E4 and copy it to range E5..E7: `@IF(@ISERR(@VLOOKUP(D4,A$4..B$9,1)),"NA",@VLOOKUP(D4,A$4..B$9,1))`.

	A	B	C	D	E
1	Inventory			Log	
2					
3	Truck No.	Radio No.		Truck No.	Radio No.
4	8421	27		8422	84
5	8422	84		990	NA
6	8423	80		8400	NA
7	8425	91		8427	65
8	8427	65			
9	8429	21			

Changing Fonts in Headers and Footers

I recently upgraded to 1-2-3 release 4.01 for Windows, and I'm trying to figure out how to translate a 1-2-3 for DOS technique to the new environment. I've been using different-size fonts and adding various attributes, such as bold and italic, to header and footer information using special Wysiwyg control codes.

For example, pressing `<Ctrl>-A` and then typing B and the header text assigns the bold attribute to a header. How do I do that in Windows?

Harold Turchin, Coconut Creek, Florida

In 1-2-3 for Windows, press `<Alt>-<F1>` and type **ba** to begin an attribute. For example, to create a bold header, select *File•Page Setup*, select one of the Header boxes, press `<Alt>-<F1>`, type **ba**, and type **b**. Then type the text you want to appear as a header, and click *OK*.

	A	B	C	D	E
1					
2			+/-	+/-	
3		Plan	Forecast	Re-Forecast	
4	April	4409	-1000	5409	<wrong
5	May	5849	-800	6649	<wrong
6	June	4359	1000	3359	
7	July	6672	250	6422	
8	August	8236	-807	9043	<wrong
9	September	7630	-1100	8730	<wrong
10	October	7699	600	7099	
11	November	3667	-600	4267	<wrong
12	December	5644	460	5184	

Printing Long Formulas

In the August 1994 Q&A column, you described to Chris Willems how to print worksheet formulas instead of their results ["Print Worksheet Formulas"]. Is there a way to get 1-2-3 to print long formulas on more than one line if they don't fit?

James M. Hopkins, Sioux City, Iowa

The third method described in the August item does just that. Even though the Cell-Formulas option is a Classic 1-2-3 command, it works in all releases of 1-2-3. Try this out on one

of your worksheets. Select the */Print•Printer•Range* command and specify the range of cell formulas that you wish to print. Now select *Options•Other•Cell-Formulas*. Choose *Quit*, then *Align•Go* to align the paper and print the cell formulas. Select *Page* to advance the paper out of the printer. You'll see that 1-2-3 printed the formulas, wrapping extra formula characters to subsequent lines.

Dealing With Positive and Negative Numbers

I'm having a hard time figuring out how to make a column of formulas work.

Each month I create a forecast like the one shown in the worksheet below.

Columns B and C contain plan and forecast values. Column D contains formulas that are supposed to calculate

the difference between the plan and forecast values. In cell D4 I entered the formula `+B4-C4`, then copied it down the column.

This formula works whenever the forecast is a positive number. But if the forecast is a negative number, I must manually change the formula so the negative number isn't added to the plan number. When the next month arrives and the forecast number is positive, I have to edit the formula again. There must be a better way.

Lori C. Basilone, Chicopee, Massachusetts


Yes, there is. You can add an `@IF` function to the formulas in column D to test whether the forecast values in column C are negative.

Enter `@IF(C4<0,B4+C4,B4-C4)` into cell D4 and copy the formula down column D. Whenever the forecast value is less than zero, the formula adds the negative forecast value to the positive plan value. Adding a negative is the same as

	A	B	C	D
1				
2			+/-	+/-
3		Plan	Forecast	Re-Forecast
4	April	4409	-1000	3409
5	May	5849	-800	5049
6	June	4359	1000	3359
7	July	6672	250	6422
8	August	8236	-807	7429
9	September	7630	-1100	6530
10	October	7699	600	7099
11	November	3667	-600	3067
12	December	5644	460	5184

subtracting. If the forecast value is positive, the formula subtracts the forecast value from the plan value.

The worksheet shown above contains the correct reforecast values.

 Do you have a question about Lotus products, or a favorite technique for using them? Send your letter, including your address and daytime telephone number, to Q&A/Good Ideas, PC World Lotus Edition, 77 Franklin St. #300, Boston, MA 02110, or fax us at 617/426-0235. We will send you \$60 if we publish your letter. Sorry, we cannot acknowledge unpublished materials.

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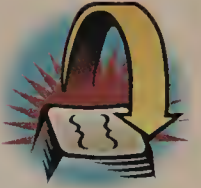
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Prompt Users Through Your Macros

Why bother with user input commands? The spreadsheet is by nature a large input screen (as well as a repository for data), so why not just let the user enter data directly into the worksheet, then run your macro on that data? Here's why: Input commands shield the user from a large, intimidating worksheet, and they direct input to the right cells, thereby reducing the chances for error.

1-2-3 provides several commands for getting information from the user—for example, {GET-} and {CHOOSE-} in the Windows releases, and {GET}, {GETLABEL}, and {GETNUMBER} in all releases—but each displays a different kind of prompt or elicits a different kind of answer. Before you add any of these commands to a macro, decide what kind of response you want from the user, and how you should ask for it. For example, {GETLABEL} is not the best choice when there is a finite number of valid responses to a question, such as yes/no, male/female, or true/false.

Simple Prompts

{GETLABEL} is appropriate when the response can be any text string. {GETLABEL "prompt";location} displays in a dialog box (in the Windows versions) or in the 1-2-3 control panel (in the DOS versions) the text you supply for the prompt argument, and it suspends the macro while the user enters a response. When the user clicks OK or presses <Enter>, the entered text is placed as a left-aligned label in the cell specified in *location*.

{GETNUMBER} works the same way, except that it expects the input to be a value (or an expression that can be converted to a value). If you enter 300

in response to {GETNUMBER}, 1-2-3 stores the value 300; if you enter the formula 9+5, 1-2-3 stores 14; if you enter @ROUND(B18,2), 1-2-3 stores the *result* of rounding cell B18 to two places. But if you enter a label or an expression that 1-2-3 can't convert to a value—300x or @ROUND(B18)—it returns ERR in the target cell.

{GETLABEL} and {GETNUMBER} require minimal setup; just assign a name to the cell that's to receive

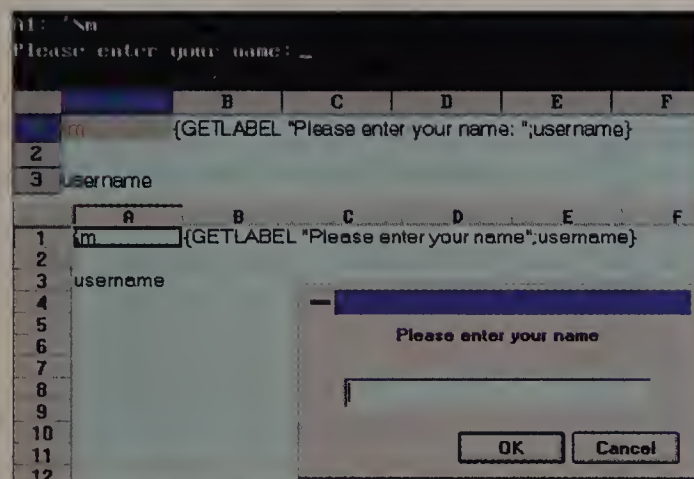


FIGURE 1: {GETLABEL} ACCEPTS A STRING in response to its prompt, which is displayed in the control panel in 1-2-3 for DOS and in a dialog box in 1-2-3 for Windows.

the input label or number. Sometimes you don't even have to do that; you can use @CELLPOINTER("address") as the prompt argument to direct a user's input to the current cell. The upper part of **FIGURE 1** shows the {GETLABEL} command used in a DOS release of 1-2-3, which displays the prompt in the control panel. The lower part of the figure shows the command used in a Windows release, which displays the prompt in a dialog box.

If a user clicks Cancel (in Windows) or presses <Esc> (in DOS) in response to the {GETLABEL} prompt, 1-2-3 stores an apostrophe label prefix in the target cell, as it does if the user clicks OK or presses <Enter> without typing any text. To test whether the user failed to enter a response, follow the {GETLABEL} command with a line beginning with {IF *location*=""}

If the user fails to type any text in response to a {GETNUMBER} prompt, 1-2-3 stores ERR in *location*. You can then test for no response with the command {IF @ISERR(*location*)}.

Later we'll see how the Windows alternatives {GET-LABEL} and {GETNUMBER} handle nonresponses.

Press Any Key to Continue

If you want a one-letter response from a user—such as Y (yes) or N (no)—use the {GET} command. {GET} doesn't wait for the user to press <Enter> after responding. It suspends a macro until the user presses any key, stores that key in the cell specified in the location argument, and moves on to the next instruction in the cell immediately below the {GET} command.

{GET} does not accept a prompt argument, but there are ways to create a prompt. A popular approach in the DOS versions is to make the macro "type" a label without entering it, so that the text appears in the control panel but is not entered into the worksheet, then pause the macro with a {GET} command and clear the con-

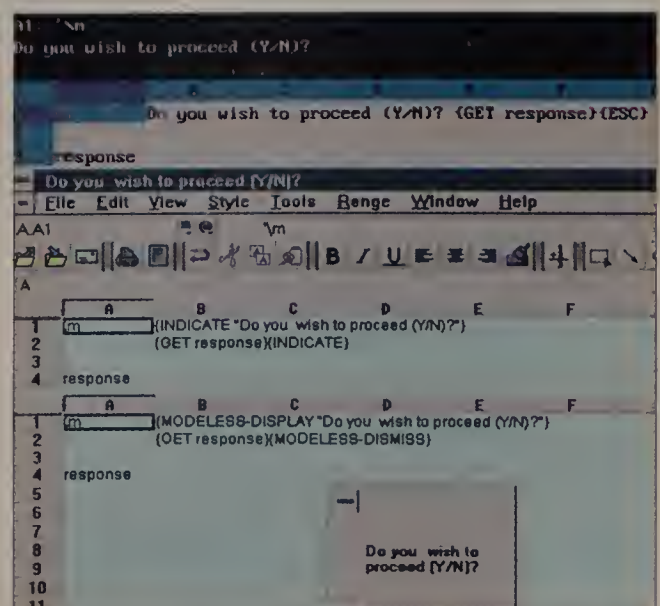


FIGURE 2: {GET} CAN DISPLAY A PROMPT in the control panel in 1-2-3/DOS (top) and 1-2-3/W 4.x (middle), and in a dialog box in release 5.0 (bottom).

trol panel with {ESC}. We used this approach in the top section of **FIGURE 2**, on the previous page.

This trick also works in the Windows releases, but it looks messy because of in-cell editing. The "prompt" appears both in the control panel and wherever the pointer is. In release 4.x for Windows, try using {INDICATE "prompt"} before a {GET} command to display a prompt in the title bar, and {INDICATE} with no arguments after the {GET} command to reset the title bar (as in the middle section of Figure 2). This isn't an ideal solution, because unlike 1-2-3 for DOS users, release 4.x users aren't accustomed to looking for messages at the top of the screen.

In release 5.0 you can precede the {GET} command with the {MODELESS-DISPLAY} command, which displays a prompt in a dialog box in front of the worksheet as it waits for the user to press a key. To clear the di-

How the macro responds to a non-response at a {GET-LABEL} or {GET-NUMBER} prompt depends on which {IF} statements you use after the command. For example, you might assume that a user who clicks Cancel wants to end the macro, in which case you'd follow it with {IF target=""}{QUIT}.

{GET-LABEL} and {GET-NUMBER} support a few additional optional

argument supported by {GET-LABEL} and {GET-NUMBER}; the earlier releases will simply ignore what they can't process. For example, the instruction {GETLABEL "Please enter your country: ";countryname;"USA";"User Profile";60;130} works in all releases. Release 5.0 responds to all arguments, displaying the prompt in a dialog box in the top left corner of the frame with the default response 'USA' in the edit box and 'User Profile' in the title bar. Release 4.x displays the same dialog box but in the center of the screen. The DOS releases ignore everything but

If you're creating a macro for all releases, use {GETLABEL} and {GETNUMBER}, but be aware of their many limitations.

arguments. In **FIGURE 3**, we included a default response to the 'Please enter your country' prompt—'USA'. The user can click OK to accept the default or enter a different response. We also supplied text for the dialog box's title bar—'User Profile'. If you want a title but no default, enter two semicolons between the location argument and the title-bar text argument.

In release 5.0, you can specify precisely where you want the dialog boxes for {GET-LABEL} and {GET-NUMBER} to appear on the screen. After the optional title-bar argument, enter a number to control the horizontal

the prompt and location arguments, and they display the prompt you supply in the 1-2-3 control panel.

Windows-Only Commands

The Windows releases offer two more {GET-} commands that let your macros ask explicitly for two particular types of input: ranges and formulas. As with {GET-LABEL} and {GET-NUMBER}, you need only supply a prompt and a target cell. You can, if you like, provide a default response, title-bar text, and screen coordinates for positioning the {GET-RANGE} dialog box.

In addition to a prompt and an edit box, the {GET-RANGE} dialog box includes an arrow button, which the user clicks to specify the range. For instance, if the user clicks the arrow button, drags the mouse over B2..D8, and clicks OK, 1-2-3 stores the characters 'B2..D8' in the target cell. The user can also type a range address or a range name in the edit box and click OK, and 1-2-3 stores the typed text in the target cell. Nothing in {GET-RANGE} prevents the user from entering an invalid name or address, so it's a good idea to include an @ISRANGE function to test the target cell—for example, {IF =NOT=@ISRANGE(@@{formatrange})}{BRANCH rangeprompt}.

Unlike {GET-NUMBER}, which converts a formula to its result, {GET-FORMULA} puts the formula a user



FIGURE 3: {GET-LABEL} AND {GET-NUMBER} in the Windows releases let you specify a default response and a dialog box title.

alog box, follow the {GET} command with {MODELESS-DISMISS}, as in the bottom section of Figure 2.

Get More Options in Windows

The commands {GET-LABEL} and {GET-NUMBER} in the Windows releases function the same as their unhyphenated cousins, but they can tell the difference between no response and a bad response. If the user responds by clicking Cancel or pressing <Esc>, the macro empties the target cell. (With {GETLABEL} and {GETNUMBER} bad responses and nonresponses both result in an ERR.)

position of the dialog box's left side, then enter another number to control the vertical position of its top. In most cases, the command {GET-LABEL "Please enter your country";countryname;"User Profile";60;130} puts the {GET-LABEL} dialog box in the top left corner of the worksheet.

If you're creating a macro that must work in DOS and Windows, you can use {GETLABEL} and {GETNUMBER}, but be aware of the limitations of these lower-level commands. If you use {GETLABEL} and {GETNUMBER} for compatibility with earlier releases, you can include any optional ar-

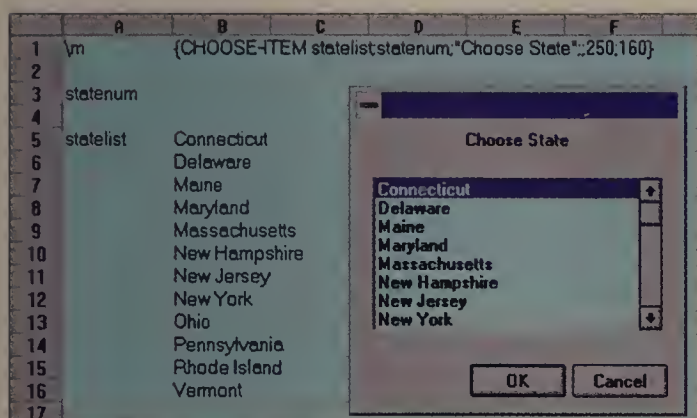


FIGURE 4: {CHOOSE-ITEM} LIMITS A USER'S RESPONSE to just one item in a dialog box list.

enters verbatim in the target cell. For example, if the response is @ROUND (B18,2), 1-2-3 stores that formula. In the two years since Lotus introduced release 4.0 for Windows, I've never thought of a good use for {GET-FORMULA}. If you know of one, drop me a note or send an E-mail (Internet: richard_cranford@pcworld.com; AOL: rcranford; and CompuServe: 72723,40).

Fancier Commands

To limit the user to a response from a specific list, use the {CHOOSE-} commands in the Windows releases.

{CHOOSE-ITEM} displays a dialog box containing a list box, from which the user selects one item. To use this command, you must enter a list of items in a contiguous column in the worksheet and declare a target cell for the user's selection. (You may also provide an optional prompt or title.) You can assign a range name to the entire list of items and include that name in the {CHOOSE-ITEM} command, or you can include just the address or name of the first cell of the list, as in **FIGURE 4**. {CHOOSE-ITEM} displays the first cell and all entries directly below it until it encounters an empty cell. Although we assigned the name Statelist to cell B5 only, all the entries in range B5..B16 appear in the list box. {CHOOSE-ITEM} stores an offset number in the target cell; if you select the first item, it stores 0; if you choose the second item, it stores 1; and so on.

{CHOOSE-ONE} also limits a user to exactly one choice, but it presents

the choices as radio buttons instead of as items in a list. Selecting a radio button deselects the one chosen before.

{CHOOSE-ONE} requires a definition table and at least four arguments: the upper left cell of the table, an output cell, a prompt, title-bar text, and (in 5.0) screen coordinates.

In the upper part of **FIGURE 5**, the top row of the definition table contains the buttons' labels; you can include up to eight. The row below it is often left blank, but you can use this row to preselect a button other than the first; the first label in the top row with a 1 below it (South, in this case) will be selected when the dialog box first appears. You can also dim the radio buttons by putting @NA in the second row's cells. The third row is where you put macro commands that are to be executed when the user clicks one of the buttons. These commands are treated as subroutines: After a set of commands is executed, the macro continues with the command immediately after {CHOOSE-ONE}.

When you want to let the user choose any, all, or none of a set of options, use {CHOOSE-MANY} to display a dialog box with up to eight check boxes. {CHOOSE-MANY} takes the same arguments as {CHOOSE-ONE} and uses a similar table, but the command itself—not the programmer—puts data in the third row.

The {CHOOSE-MANY} command shown in the lower part of Figure 5 refers to a definition table in which South and Midwest are preselected and West is dimmed. You can see the result in the dialog box. If the user selects East, deselects South, leaves Midwest selected, and then clicks OK, the

command puts 1 in cell B7, 0 in cell C7, 1 in cell D7, and 0 in cell E7.

The output cell specified in the {CHOOSE-ONE} and {CHOOSE-MANY} commands records whether the user closed the dialog box by clicking OK or pressing <Enter>, as opposed to clicking Cancel or pressing <Esc>. Clicking OK stores a 1, clicking Cancel stores a 0. If you close a {CHOOSE-ONE} dialog box by clicking Cancel, none of the macro code beginning in the third row of the definition table is executed, and the macro proceeds to the command following {CHOOSE-ONE}. If you click Cancel

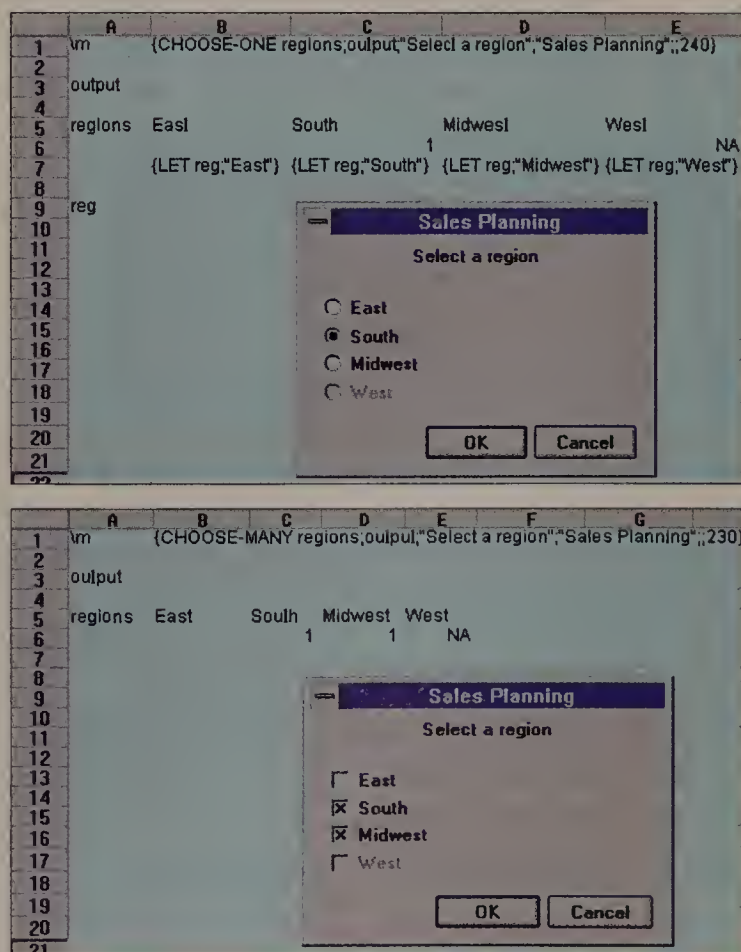


FIGURE 5: {CHOOSE-ONE} DISPLAYS a dialog box with radio buttons. {CHOOSE-MANY} presents choices as check boxes.

in a {CHOOSE-MANY} dialog box, the macro leaves the third row of the definition table unchanged.

By Richard Cranford

Richard Cranford is a senior associate editor for PC World Lotus Edition and editor of 'The 1-2-3 for Windows Report. The models from this article are available via PC World Online on America Online and CompuServe.



Create Organization Charts in Freelance

For many companies, organization charts are a necessary evil. Departmental reporting structures may be etched in every employee's head, but getting them down on paper and keeping them up-to-date can be a real headache, especially if you don't have the right software.

Consider for a moment all the steps required to create an organization chart using a graphics package. First you might draw the boxes and try to fit in the names and titles, then you might draw the connecting lines one by one. When a new person is hired or some-

features of this chart type useful in many other areas—time lines, genealogies, and decision trees, for example. With these multiple uses in mind, let's see how to get the most out of Freelance organization charts.

Entry-Level Charting

To get started, create a new Freelance presentation or open an existing one. Next, switch to the Organization Chart page layout and click the chart object placement box (or click the *Organization Chart* tool displayed in the Toolbox on the left side of the presentation window).

At this point, Freelance displays the Organization Chart Gallery dialog box, as shown in **FIGURE 1**. This dialog box lets you select the basic style and design options for your chart. For now, just click *OK* to accept Freelance's default settings.

Next you'll see the Organization Chart Entry List dialog box (**FIGURE 2**), where you enter the data for your chart. To move from line to line, press <Enter>. To break a long entry into two lines, press <Ctrl>-<Enter>. Press <Tab> to enter a subordinate's name and title; press <Shift>-<Tab> to enter a superior's name and title.

Before we start entering names, let's collapse the entry list so that we are only prompted to enter names and titles. Choose *View • Names and Titles*. Then enter the data in Figure 2. Note

that you can enter up to 12 levels of information per chart.

When you're finished, click *Preview* to see how the chart will appear.

At this point you might want to experiment with the different Gallery options. Click *Change* to return to the Entry List dialog box, and choose *Gallery* from the menu. Select another style from the Gallery dialog box, and click *Preview*. When you're satisfied with the chart style, click *OK* to return to the Entry List dialog box, then click *OK* again to accept the chart and return to the chart presentation page. No matter which chart style you choose, Freelance automatically sizes your chart to fit within the chart placement block.

Design and Style

Your selection of a chart style is ultimately a matter of personal preference, but there are a few design principles you should consider. If you want your chart to have a more formal and structured look, choose one of the squared-off styles—particularly the 3-D, drop-shadow style on the top right of the Gallery dialog box. For a more casual chart, choose one of the rounded styles.

Another design consideration is the format for the lowest level of data in the chart; it not only determines the way your chart looks, but also plays a part in how the chart is interpreted. Freelance provides four different format options for the lowest level of the chart. The 'Row of boxes' format continues the existing style—including box shape and shading—to the lowest level. This is a good all-purpose selection for a balanced-looking chart.

The 'List' format displays the lower entries as unboxed vertical lists underneath the superior entries. The 'Boxed list' format displays the entries in the

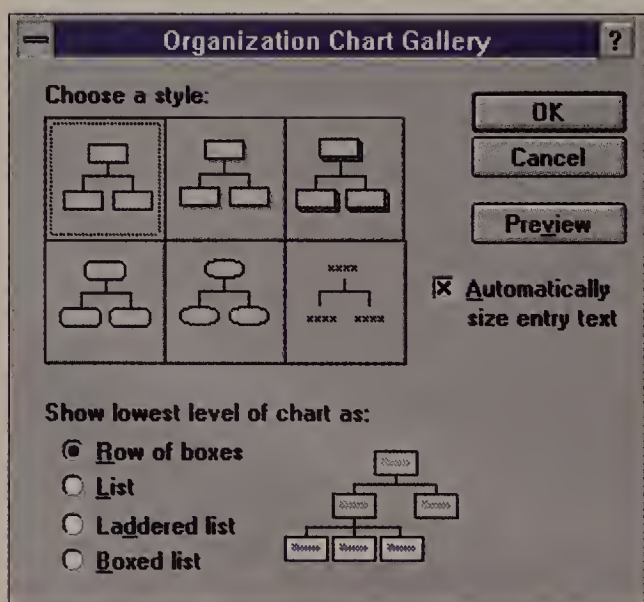


FIGURE 1: FREELANCE PROVIDES SIX BASIC STYLE OPTIONS for organization charts. You can call this dialog box at any point to change a chart's design.

one changes jobs, you have to manually move everything around to adjust for the change. To alter one thing—the font, for instance—you must make that change to every element in the chart. Feel a migraine coming on?

Fortunately, Freelance Graphics provides organization-charting tools that relieve the pain. All you do is type in your data, and voilà, Freelance draws a perfect chart. If you change a relationship or try a different design, Freelance redraws the chart to your specifications.

Even if you don't need to draw organization charts, you'll find the design

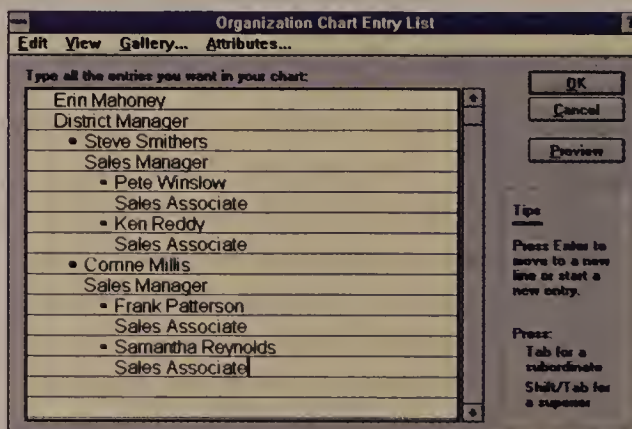


FIGURE 2: ENTER EMPLOYEES' NAMES AND TITLES in the Organization Chart Entry List dialog box.

same manner, but in simple boxes. These formats can be used to illustrate a process or time line horizontally, as in **FIGURE 3**. In this example, the first level of the chart contains the umbrella process or title. The major process steps are placed in the second level, and all of the steps that fall under each major process are grouped within the third level. If you're creating a time line, you could enter the important dates or critical steps for the time period as well.

The 'Laddered list' format shows the same vertical lists but with lines attaching the entries to their superiors. The laddered list is frequently used to represent nonexempt employees (such as clerical staff) in an organization.

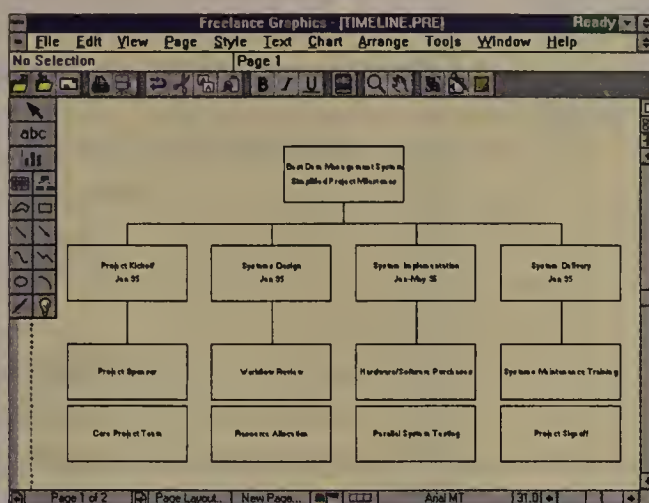


FIGURE 3: CREATE A TIME LINE by using the List format to display the lowest level of a chart.

Fine-Tuning the Design

As elsewhere within Freelance, you can fine-tune many of the design details in charts, such as text attributes, colors, and line widths, to suit your own sense of style.

Each organization chart is composed of four elements: text, boxes, connect-

ing lines, and the frame. Freelance allows you to change text and box elements either globally or individually, but you must change connecting lines and the frame globally. For example, you could change the color of just one text box in the chart, but any changes you make to a connecting line will affect all connecting lines in the chart.

To make changes to the chart as a whole, click on any element of the chart and choose **Chart • Attributes** to display the Organization Chart Attributes dialog box. To change the attributes of one element in the chart, double-click the element to select it and open the dialog box. If you're working in the Organization Chart Entry List dialog box, choose **Attributes**.

The first step in the Organization Chart Attributes dialog box is to specify the element you want to change. When you select Text or Box, the sec-

SUITE MYSTERIES

Ami Pro's Crossed-Up Cross-References

Q In January's *Suite Success* column, you published a tip for creating cross-references in Ami Pro. I followed your instructions but ran into difficulties. The first few pages of my document do not contain page numbers. Page numbering begins on page 3 of the actual document but appears as page 1 in the footer. The cross-reference I create counts those first few unnumbered pages in the document. What can I do?

Janice Monroe, Irving, Texas

A Ami Pro is confusing the physical page number of a bookmarked item with the logical page number. You can create a formula that adds or subtracts a value from the PageRef power field so it displays the correct number.

To do so, choose **Edit • Power Fields • Insert**, and enter the following formula in the Insert box:

PageRef bookmark - *numpages*

where *bookmark* is the name of the bookmark you want to cross-reference,

and *numpages* is the number of pages between the first page in the document and the page on which physical numbering begins (in your case, *numpages* is 2). Be sure to type a space on either side of the mathematical sign in the formula. Click **OK**. The correct page number (page 5 - 2 = 3) appears where you inserted the power field.

Start With a Clean Slate

Q I use Freelance primarily to create diagrams, and I don't use the SmartMasters all that often. Is it possible to start Freelance with a blank page instead?

Sandra Jacobs, Sacramento, California

A Sure. Choose **Tools • User Setup**, select **Skip the standard dialogs and bring up a blank page**, and click **OK**. Note that when you choose this option

Freelance does not display any start-up dialog box (or the Welcome screen) where you opt to create a new presentation or open an existing one.

If you'd rather not skip the dialog boxes, follow these steps to open to a blank page: Start Freelance and select **Create a new presentation**. In the Choose a Look for your Presentation dialog box, select the *Blank.Mas* SmartMaster or *SmartMaster with blank background*, then click **OK**.

In the Choose Page Layout dialog box, select **[None]** and click **OK**.

Send your questions to PC World Lotus Edition, *Suite Success*, 77 Franklin Street, Boston, MA 02110; to Cathykenny on America Online; or to 72723,2071 on CompuServe. We pay \$60 for each question that we publish.

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ond step in the dialog box asks you for the extent of the change. To globally change the text font or the box color, select *All boxes in chart*. To change the text attributes of only the currently selected block, select *Current box*. The

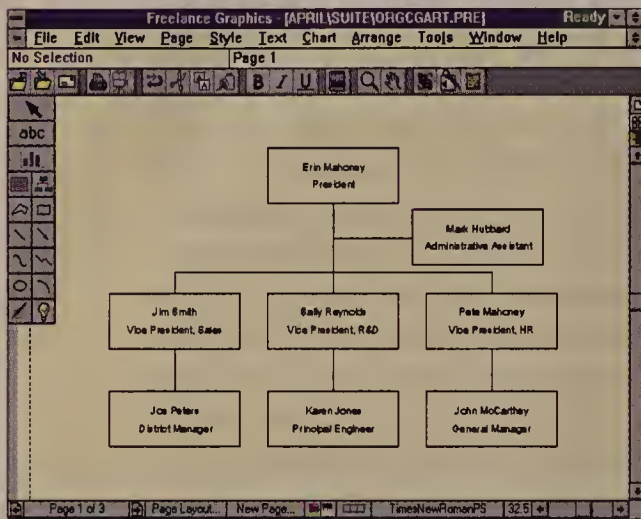


FIGURE 4: A STAFF POSITION IS BEST DEPICTED as an offshoot from the group's highest member.

'Current box & subordinates' option allows you to change an entire reporting group at once, while the 'Current box and peers' option applies the changes to all entries in a selected level.

The 'Text line' drop-down list lets you choose which line of text to change—all lines at once, or just the name, title, or comment.

The options at the bottom of the Attributes dialog box depend on the element you selected. Make the necessary adjustments to the attribute settings and click *OK* or click *Preview*.

Reporting More Complex Organizations

With the basics mastered, let's explore some of the more advanced features of organization charts.

Staff position. Some individuals in your organization—for example, an administrative assistant for a group—may not fit precisely within the structure of the organization chart. In most cases, it's best to show such a staff position as an offshoot of the line from the highest-ranking individual in the group, since the assistant is often the best first contact for the group. Besides, including the position makes the chart more complete.

To add a staff position, click on any element within the chart to select it, and choose *Chart • Edit* or click the *Organization Chart* tool in the Toolbox. Then choose *Edit • Staff* from the menu in the Entry List dialog box. In the resulting dialog box, enter the employee's name and title, add a comment if desired, and click *OK*. Click *OK* again to add the position to the chart and return to the presentation page. **FIGURE 4** illustrates how a staff position is displayed in the chart.

Note that you can include only one staff person in the organization chart. If the president (top level) and the vice presidents (second level) each have assistants, for example, only the president's assistant is allowed on this chart. A common workaround is to create additional charts for each vice president.

Skipping levels. You may also find that you need to skip levels in an organization chart without disrupting the rest of the reporting structure. For example, suppose that a district sales manager has three direct reports—two regional managers and one sales analyst—and that each regional manager supervises several sales analysts. By default, Freelance draws the three direct reports to the district manager on the same tier (second level). But a more accurate chart would show all the sales analysts—including the one who reports directly to the district manager—on the third tier, as illustrated in **FIGURE 5**.

Unfortunately, Freelance doesn't allow you to skip levels in this way. So here's another workaround: Create a dummy intermediate position with a blank name. Then, in the Organization Chart Gallery dialog box, change the chart style to the one without box outlines (the lower right choice in Figure 1), so that Freelance won't draw an empty box for the dummy manager position in the chart.

However, this still leaves a minor gap in the line where the dummy manager should be. But you can fill that in later by using the *Line* tool located in the Toolbox. Note that if you later make changes to the chart, you may have to move the added filler.

Dotted-line relationships. The solid lines in an organization chart illustrate the traditional chains of command. But many vital working relationships form outside these confines. To make your chart more complete, document these relationships with dotted lines.

The only way to incorporate the dotted-line reporting relationship is to draw it in separately once the organization chart is complete. Use the *Line* tool in the Toolbox to draw the line, then use the *Style • Attributes* command to change the line to a dotted style. Note that you may have to move these dotted lines if you make any changes.

Nontraditional charts. Some companies are moving away from top-down structures toward network, inverse-pyramid, and other reporting structures. Unfortunately, these structures cannot be illustrated by Freelance's organization-chart tool. You might want to explore dedicated organization-chart software for such alternative reporting structures.

By Helen Chen

Helen Chen is a senior sales analyst for Genentech in San Francisco.

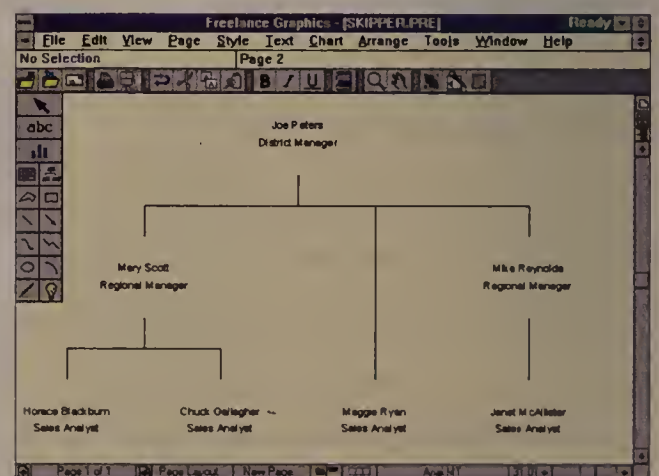


FIGURE 5: SKIP LEVELS in a chart by creating a blank placeholder, selecting the unboxed style, then filling in the resulting gap with the Line tool.

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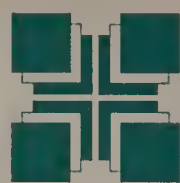


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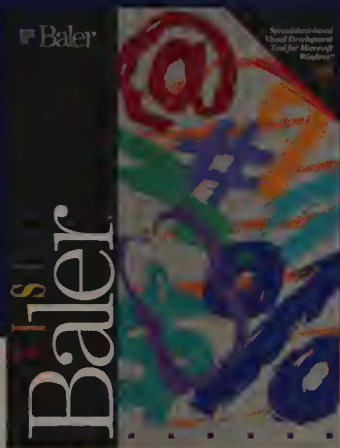
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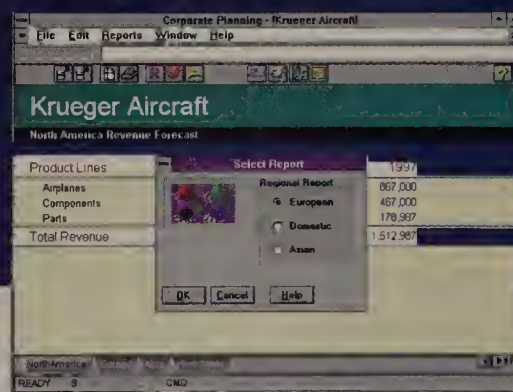
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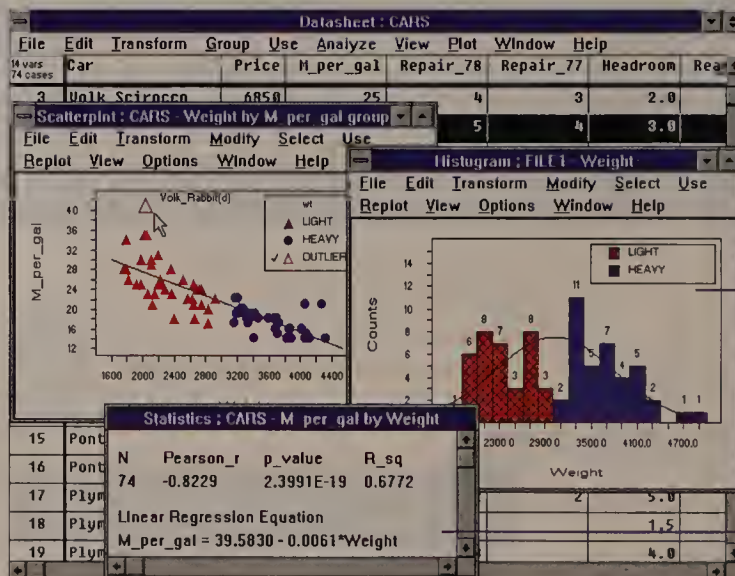
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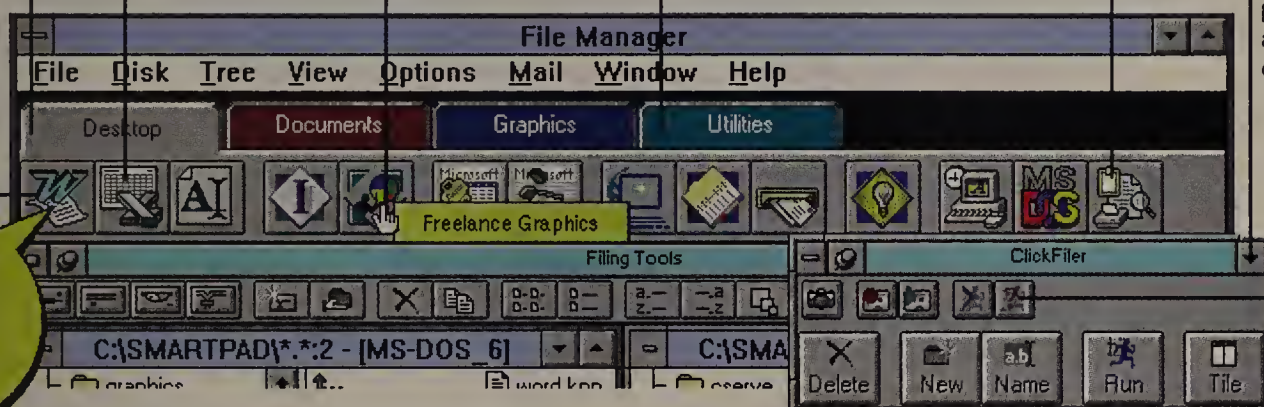
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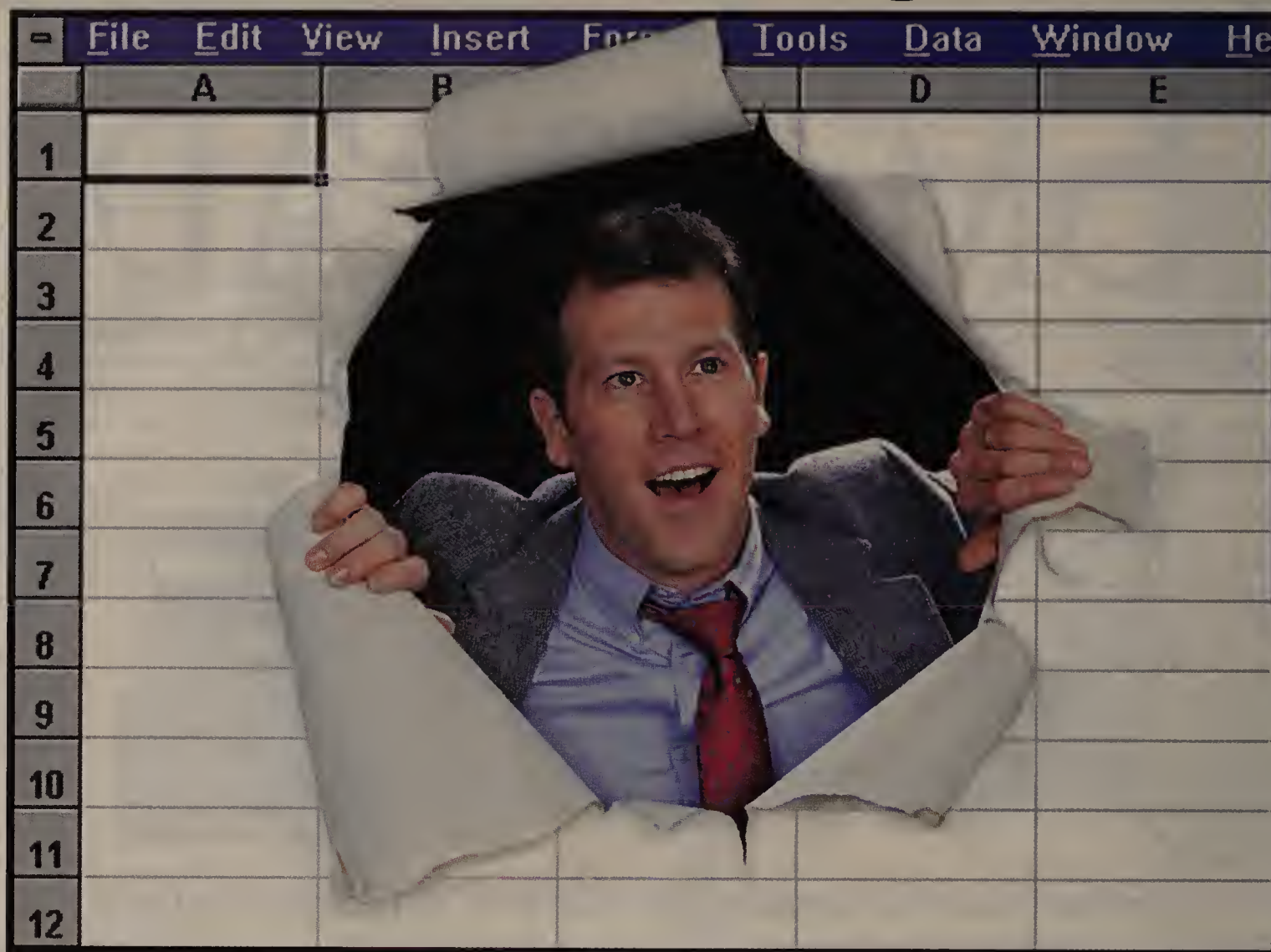
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Model 2010 20 inch Color Monitor

*18.8" viewable image size;
digital on-screen controls include RGB,
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30 memory settings (18 user storable);
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(AR-ASC); .28mm dot pitch; dynamic
focusing; up to 1280x1024 @ 77 Hz,
flicker-free; auto-scan to 1600x1280 NI;
MPR II compliant; VGA and BNC inputs.*

Model 1727 17 inch Color Monitor

*FST, 16.1" viewable image size;
digital on-screen controls include zoom,
tilt and auto diagnostic; 34 memory
settings (27 user storable); non-glare,
anti-static coating; .28mm dot pitch;
dynamic focusing; up to 1024x768 @
76 Hz, flicker-free; auto-scan to
1280x1024 NI; MPR II compliant.*

Model 1527 15 inch Color Monitor

*FST, 14" viewable image size;
digital on-screen controls include RGB,
color temperature, zoom and tilt;
40 memory settings (32 user storable);
non-glare, anti-static coating;
.28mm dot pitch; up to 1024x768 @
76 Hz, flicker-free; auto-scan to
1280x1024 NI; MPR II compliant.*



PHOTOGRAPHY BY GIAMPIERO BENVENUTI, ILLUSTRATION BY JIM LUTKE



**Why buy a 17-inch monitor? For starters, you get
two-thirds more Windows work space.**

We test 30 of the latest models to find the best values.

SCREENS

The small monitors that come with most computers are like cramped office cubicles. There's never enough room to lay everything out in front of you. If you want to work with a bunch of documents at once, you need to constantly stack, shuffle, and move things around.

Buying a 17-inch monitor is like moving into an office with nearly twice the space. Those extra square inches of screen let you run Windows comfortably at a resolution of 1024 by 768—giving you nearly two-thirds more Windows work space than you get with 15-inch monitors, which for practical purposes top out at a resolution of 800 by 600.

In this review, we take a close look at 30 of the latest 17-inch monitors with street prices ranging from \$599 to just over \$1400. That's quite a range—and quite a price, compared to the \$300 to \$700 you can expect to pay for a 15-inch model. But if you need to view sev-

eral documents simultaneously, work with monster spreadsheets, or lay out pages, the extra dollars for a 17-incher will be well spent.

Big-Screen Beauty Contest

The key to choosing a great 17-inch monitor is finding one with great image quality. Unfortunately, it's hard to tell the good from the bad unless you see them side by side, and such qualitative judgments are often a matter of taste. For those reasons, in addition to conducting laboratory tests, *PC World* assembled a panel of judges to compare and rate the 1024 by 768 image quality of the monitors reviewed here. Judges looked at three types of images: text in a Windows word processor, a spreadsheet, and a scanned color photo. We also performed objective contrast, brightness, misconvergence, and geometric distortion tests. Nearly all the monitors produced acceptable test scores. (See "Most

Monitors Make the Grade" for more details.)

When we tallied up the numbers, however, we found only a loose correlation between the subjective and objective results, proving that good numbers don't necessarily mean a good picture. By contrast, the opinions of the panelists—who weren't allowed to disclose their ratings to each other—were relatively consistent. For example, nearly everyone loved the IBM 17P and the Mag MXP17F, the two monitors with highest marks for image quality. And the monitors that fared worst—the Orchestra Tuba and the Mitsubishi Diamond Scan 17FS—got low ratings from the whole panel.

We also discovered that the type of picture tube (also known as the CRT, or cathode-ray tube) was the only specification that consistently reflected what people liked best. Overall, our judges strongly preferred monitors with Sony Trinitron CRTs, giving all but one

By Eric Knorr

such monitor very high marks for sharpness and color rendition. In our judges' eyes, the Mag MXP17F—the only monitor with a Toshiba CRT—produced an image as clear and sharp as that of the best Trinitron.

Remember, though, that you are the ultimate judge of a monitor's display quality. If you have to squint to tell the difference between a \$950 monitor we rated excellent and a \$750 monitor we rated good, you may not want to pay the extra \$200. You'll also find significant variation in image quality among monitors of the same make and model. This is because of inconsistent factory adjustments and quality control. We strongly advise you to visit a dealer and have a close look for yourself before deciding what to buy. (See "Tips for Buying and Tweaking Monitors.")

Screen Size and Dot Pitch

The monitors in this review call themselves 17-inchers, but in fact their average screen size is just 15.8 inches. Monitor vendors defend this exaggeration by proclaiming that screen size denotes the diagonal measurement of the tube itself, not the viewable screen. If you have trouble swallowing that one, you're not alone: In California, the state attorney general's office has been investigating several monitor manufacturers for allegedly deceptive screen size claims in advertisements.

A monitor's dot pitch is a key factor in determining sharpness, especially at high resolution. To create a video image, monitors fire electron beams at tiny red, green, and blue phosphor dots arrayed on the inner surface of the CRT screen; the dot pitch is the distance between the centers of two neighboring phosphor dots of the same color. The monitors in this review had dot pitches ranging from .28mm to .26mm, and overall, the monitors that offered smaller dot pitches made a better impression on our judges. Trinitron CRTs have red, green, and blue vertical stripes instead of an array of dots; the stripe pitch listed in the table is the distance horizontally between the centers of two stripes of the same color.

The Ergonomic Edge

Computing is hell on the eyes. If you're going to stare at a screen for hours on end, you not only need a monitor that looks good, but one that operates at a high refresh rate—that is,

one that renders an entire 1024 by 768 image at least 70 times per second (abbreviated as 70 Hz). Below 70 Hz, most people perceive a slight flicker that strains the eyes, especially when viewing white document backgrounds.

In fact, 70 Hz is barely adequate. On larger screens, flicker is more perceptible, which is one reason the industry recently established a 75-Hz refresh standard. In Europe, a new 85-Hz standard has been proposed, and eight monitors in this review already accommodate

possible, ask a dealer to set up a demo, and see how the monitor fares for yourself.

While some monitors run at 1280 by 1024 and even 1600 by 128, few users will need these resolutions—Windows text shrinks too much for easy readability. But users of computer-aided design and desktop publishing programs may need the added detail; they should get a monitor with a refresh rate of 70 Hz to 75 Hz at their desired resolution.

Never settle for working at an interlaced

Best Buys



We evaluated the monitors in this review based on image quality, price, features, and support policies. Of the 30 units we looked at, three won Best Buys: The Nokia Multigraph 447X, the Mag MXP17F, and the CTX 1785GM.

The Nokia Multigraph 447X is the overall winner. With a street price of slightly more than \$1000, it's not the cheapest 17-incher you can buy. But its Trinitron tube delivers images on a par with

the best, and its on-screen controls offer more options than any other monitor tested.

The Mag MXP17F earns second place. Our judges loved its image quality, and its \$950 price tag is a little easier on the wallet. The front-panel controls are a little hard to use, but if you hook this monitor to your PC with a serial cable, you can adjust your image with a mouse instead.

The CTX 1785GM is the low-cost Best Buy. At \$750, this monitor cannot



it. You might not see the difference between 75 Hz and 85 Hz, but the image feels more stable and paper-like, and you may get fewer headaches.

Some monitors claim to offer refresh rates of 100 Hz or even 120 Hz at 1024 by 768. To achieve these rates, you'll need both a graphics card that reliably produces that many screens and a monitor with a high *video bandwidth* (a number that indicates how many pixels a monitor can render per second). Unfortunately, the video bandwidth can be a difficult spec to obtain: Some vendors fudge the number, while others simply refuse to disclose it. If you want the highest refresh rate

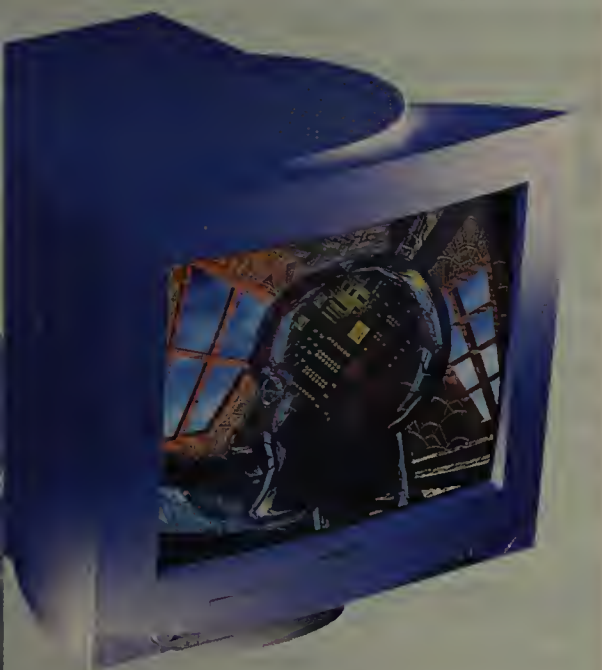
resolution. When a monitor interlaces, it takes two passes to complete an image. The flicker from interlacing is so bad it makes 60 Hz look great by comparison. All the resolution specifications listed in this article are for noninterlaced operation.

Adjusting Your Image

Every monitor gives you a few basic image controls—at the very least, contrast and brightness along with horizontal and vertical

size and position. Even if your monitor automatically fills the image to the border of the screen, you still need to tweak the image with basic sizing and positioning controls. Besides size and position, the most common image geometry controls are pincushion and barrel, which respectively cinch and expand the image horizontally until it aligns with the frame. Almost as common are trapezoid and keystone, which adjust the width of an image from top to bottom, respectively. Perhaps

match the image quality of the other two, although the differences emerge only under close scrutiny. You don't get on-screen menus, but you'll find CTX's button controls sensibly laid out and easy to use. The CTX delivers a class act for a fair price.



From left to right: Nokia Multigraph 447X, CTX 1785GM, and Mag MXP17F.

most important of all is image tilt, which rotates the entire image so that all four edges align with the frame. Another feature, called *degaussing*, zaps away random color swirls produced by the earth's magnetic field. All the monitors reviewed degauss when you turn them on, but a few of them lack a manual degaussing control.

Color control settings, found on all but four monitors, can make a real difference in how pleasing your monitor's image looks. Color temperature controls let you adjust the hue of white to your taste. Most monitors also include individual controls to adjust the amounts of red, green, and blue visible on

screen. The Iiyama, Mag, Mitsubishi, Nanao, and both NECs also offer color-matching software to help you imitate hard-copy hues produced on a color printer—a useful feature for graphic artists and desktop publishers.

The most hyped feature in monitorland is the on-screen menu, which pops up when you punch a button on the front panel of some monitors. Instead of a lot of buttons or knobs to fiddle with, you get just a couple of buttons that move the cursor, plus an on-screen list of controls and visual feedback as you make adjustments. Usually, a menu scheme works better than a dozen or so buttons, but not always. For example, the Best Buy CTX 1785GM's buttons are much easier to use than the Qume QM1791's on-screen menus.

All the monitors reviewed will save adjustments automatically, so when you turn your monitor back on, the settings are as you left them. In addition, you can save and recall additional settings (up to 42 depending on the monitor) for specific applications—or to suit the preferences of different people who share the same PC.

Plugging and Playing

You can use all the monitors in this article with any standard VGA or super-VGA graphics card. However, some also offer BNC connectors, which let you hook your monitor to a high-end graphics card using separate coaxial cables for red, green, and blue signals. Using a BNC connection produces a crisper image that keeps fine lines distinct—particularly useful in CAD applications.

The Nanao FlexScan T2-17 and both NECs also offer Plug and Play compatibility. You've heard this term in connection with Windows 95, but when it comes to monitors, PnP has nothing to do with software. Instead, PnP enables a monitor to send its specifications to the graphics card, which then automatically adjusts the monitor to its optimum refresh rate for the resolution you've set. To enable this feature, you'll need a PnP video card, which should be available by the time you read this.

Beyond Plug and Play is ACCESS.bus, which enables you to use software to adjust image geometry and color. An ACCESS.bus connection uses a standard telephone cable that runs from your monitor to the system unit. At this writing only a few PCs and one of the monitors reviewed (the NEC Multi-

Sync XP17) have ACCESS.bus jacks. However, the Mag MXP17F and the Mitsubishi Diamond Scan 17FS have serial ports, allowing you to make a serial connection to your PC and enjoy the same control. Install the image control software (which comes with each monitor), and you can use a mouse to tweak your picture ad infinitum.

Power, Safety, and Service

Every monitor in this review complies with the environmentally conscious VESA DPMS standard, which stipulates that after a period of inactivity, a monitor must sink into a series of three power-saving sleep modes, each deeper than the last. Some monitors require a DPMS graphics card to do this, some can do it with software alone, and many do it either way. However, only about half the monitors reviewed let you set the length of time before a monitor dozes off.

Monitors give off electromagnetic energy, which some studies have linked to miscarriages, leukemia, and disorders of the nervous system. All but one of the monitors in this article comply with Sweden's MPR II guidelines, which set a maximum level for electromagnetic monitor emissions (the Smile offers this as an option); seven also comply with the much stricter TCO guidelines. Monitors also emit radio waves that may interfere with nearby TV and radio reception. An FCC Class B rating, which is found on all but the Hyundai HL-7682P and Tatung CM-17MKR, reduces this problem.

Remember that there's no better indication of a company's confidence in its product than the length and coverage of its warranty. Well over half the monitors in this review come with a three-year warranty, while just three—Apple, Link, and Qume—offer skimpy one-year coverage. IBM and Panasonic have the best policies, consisting of a three-year warranty and free on-site service.

Eric Knorr is a contributing editor for PC World and the editor and principal author of The PC Bible (Peachpit Press, Berkeley, California, 1995). Testing by Joseph Allotey, Dave Casini, and Susan Silvius; research and support by Anita Hamilton, Arden Hoffman, and Mike Salayko.

For more information about all products in this article, circle reader service no. 909.

ADI MicroScan 5EP

Estimated street price: \$769

Image quality: Fair

Viewable screen: 15.5 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1280 by 1024

Our ADI MicroScan 5EP review unit produced a barely acceptable image. The judges felt the color and sharpness were unexceptional, but the main problem was that the Windows desktop was cut off on both sides by about $\frac{1}{8}$ inch. This persisted no matter how much we reduced the horizontal size with the monitor's push-button controls—whose relatively large increments made sizing and positioning difficult. If you're looking for a monitor in the \$750 range, check out the CTX 1785GM instead. ADI, 800/228-0530, 408/944-0100 Reader service no. 775

Apple Multiple Scan 17

Estimated street price: \$1069

Image quality: Excellent

Viewable screen: 16.1 inches

Maximum refresh at 1024 by 768: 60 Hz

Maximum noninterlaced resolution: 1024 by 768

Thanks to its Trinitron tube, the Apple Multiple Scan 17 won an Excellent rating from our judges, even though four remarked that the white backgrounds seemed grayish. A Mac monitor by origin, the Multiple Scan 17 has nonintuitive controls, and it's the only unit that tops out at 1024 by 768. Worse, Apple recommends a refresh rate of no more than 60 Hz at this resolution, which wears on the eyes after awhile. Add a brief, one-year warranty, and we can't recommend this monitor. Apple Computer, 800/538-9696, 408/996-1010 Reader service no. 776



IF YOU CAN AFFORD to pay top dollar, the \$1299 Nanao FlexScan T2-17 is your best bet. It has high image quality and a full feature set.

CTX 1785GM

Estimated street price: \$750

Image quality: Good

Viewable screen: 16.1 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1600 by 1280



With crisp image quality, a truckload of features, and a low \$750 street price, the CTX 1785GM gives you more monitor for your money than any other unit reviewed. The first thing you notice is an elegant design: The only exposed control is the brightness knob, which sits next to a slick pop-out panel containing all the other controls—in a sensible layout that proves you don't need an on-screen menu to adjust things easily. The automatic fill-to-edges feature reduces futzing with geometry, and the controls for setting red, green, and blue values are instantly decipherable. The image tilt, trapezoid, keystone, and color controls add value to this display. For over \$100 less than the average price of the monitors we reviewed, CTX delivers a class act. CTX Int'l, 909/598-8094 Reader service no. 777

Daytek DT-1730

Estimated street price: \$599

Image quality: Fair

Viewable screen: 16.1 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1280 by 1024

At \$599, the DT-1730 is the lowest priced monitor reviewed, but its fair image quality is no prize. The controls are easy to figure out, but half require a screwdriver to adjust. And our review unit's geometric distortion was unacceptable. Still think the price is too good to pass up? Before you buy, visit a dealer and judge for yourself. Daytek, 800/329-8351, 214/241-1700 Reader service no. 778

Delta Socos 1765 VAF

Estimated street price: \$665

Image quality: Good

Viewable screen: 15.9 inches

Maximum refresh at 1024 by 768: 70 Hz

Maximum noninterlaced resolution: 1280 by 1024

Of the six monitors priced under \$700, the Delta Socos 1765 VAF's image quality impressed our judges the most. This unit also offers a nice selection of button-based controls, including color convergence and image tilt. What knocks this monitor out of the running is its relatively low 70-Hz refresh rate at 1024 by 768. Delta Products, 510/770-0660 Reader service no. 779

Hyundai HL-7682P

Estimated street price: \$730

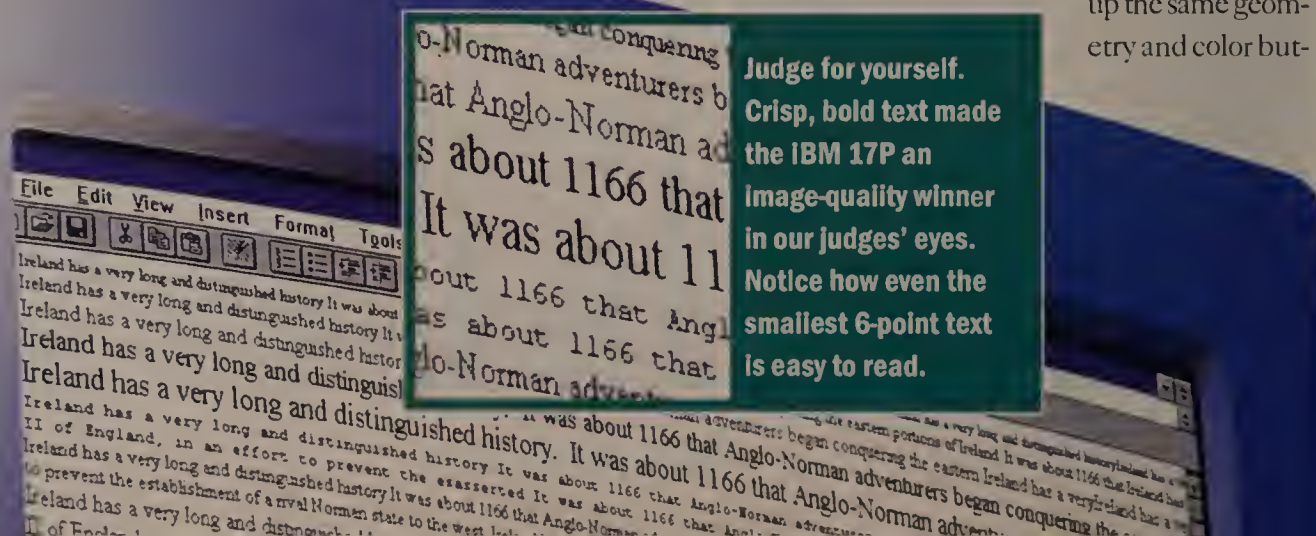
Image quality: Good

Viewable screen: 15.7 inches

Maximum refresh at 1024 by 768: 70 Hz

Maximum noninterlaced resolution: 1600 by 1280

The Hyundai HL-7682P earned the same solid image quality ratings as the similarly priced Best Buy CTX 1785GM. The controls are also alike: A stylish pop-out drawer serves up the same geometry and color but-



Judge for yourself. Crisp, bold text made the IBM 17P an image-quality winner in our judges' eyes. Notice how even the smallest 6-point text is easy to read.

tons in a similar arrangement, with a handy tilt control and two preset color temperatures. However, the warranty lasts a year less, the diagonal viewable screen size is nearly half an inch shorter, and worst, the refresh rate at 1024 by 768 tops out at 70 Hz rather than 75 Hz. You'll feel the difference after long hours of computing. Hyundai plans to replace this monitor with the DeluxScan 17 this spring. *Hyundai Electronics America, 800/568-0060, 408/232-8000* **Reader service no. 780**

IBM 17P

Estimated street price: \$1199

Image quality: Excellent

Viewable screen: 15.4 inches

Maximum refresh at 1024 by 768: 77 Hz

Maximum noninterlaced resolution: 1600 by 1280

The IBM 17P was the apple of our judges' eyes, tying for first place in image quality and earning such praise from our judges as "clean," "crisp," and "very sharp." A full set of digital controls is logically arrayed behind a flip-open door, and images automatically fill to the edge of the screen. This Trinitron monitor even complies with the TCO guidelines, the strictest spec for electromagnetic emissions. And the three-year warranty and free on-site service are great. The only problem is the price: Nokia, which makes the 17P for IBM, offers a very similar model for \$170 less. If you love the Trinitron look, you're better off with the Nokia Multigraph 447X, a Best Buy winner. *IBM, 800/426-2968*

IBM 17S/S

Estimated street price: \$1410

Image quality: Good

Viewable screen: 16.2 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1600 by 1280

Take your pick: The IBM 17S/S is either a wildly overpriced multimedia monitor or a teleconferencer's dream. One of two

monitors in this review to include speakers, the 17S/S also has a video camera mount, headphone and microphone jacks, a built-in unidirectional microphone, and volume control. Unfortunately, the 17S/S delivered slightly less than average image quality and the same selection of image controls as the IBM 17P (accessible by menu rather than by buttons). IBM's three-year warranty and free on-site service are a plus, but they are not enough to justify the 17S/S's exorbitant price. *IBM, 800/426-2968*

Iiyama VisionMaster 17

Estimated street price: \$790

Image quality: Fair

Viewable screen: 15.8 inches

Maximum refresh at 1024 by 768: 100 Hz

Maximum noninterlaced resolution: 1600 by 1280

The VisionMaster 17 comes with a complete set of controls you can easily tweak using three buttons and a neat little backlit LED display. The VisionMaster also includes a tilt control, three preset color temperatures, and individual red, green, and blue color adjustments. It also supports a high 100-Hz refresh rate at 1024 by 768 resolution. Unfortunately, this monitor's image quality was significantly below average. *Iiyama of North America, 800/394-4335, 215/957-6543* **Reader service no. 781**

Link LM-1791WWR

Estimated street price: \$850

Image quality: Fair

Viewable screen: 15.8 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1600 by 1280

With a high bandwidth, a high refresh at 1280 by 1024, and an on-screen image control menu, the Link

LM-1791WWR looks good on paper—but the images its Hitachi CRT produced were disappointing. This monitor was in the bottom fifth of our image quality rankings, with the dreaded words "fuzzy" and "washed out" appearing three times in our judges' notes. Moreover, it lacks image tilt and keystone controls, the on-screen menu is ugly and hard to use, and relatively large adjustment increments put perfect centering and sizing out of reach. The short one-year warranty is no prize, either. In short, we can't recommend this monitor. *Link Technologies, 800/448-5465, 510/651-8000* **Reader service no. 782**

Mag MXP17F

Estimated street price: \$950

Image quality: Excellent

Viewable screen: 16.1 inches

Maximum refresh at 1024 by 768: 85 Hz

Maximum noninterlaced resolution: 1600 by 1280



Our judges were so impressed with the Mag MXP17F's picture, the monitor tied with the IBM 17P for first place in image quality. Of the seven highest-rated units, the Mag alone lacks a Trinitron tube, using a new Toshiba CRT instead. The one fly in the ointment is this monitor's push-button controls: Although they cover most of the bases, the layout is nonintuitive, and the function button has a nasty habit of jiggering the horizontal size. Fortunately, the Mag is also one of three monitors that provide software control as an alternative, so you can use a mouse to play with color and geometry to your heart's content (once you install the image control software and hook a serial cable between your monitor and PC). Add a three-year warranty and

Our judges gave the Mitsubishi Diamond Scan 17FS a thumbs-down for its fuzzy, faded text. Compare it to the IBM 17P, and you'll see the difference.

MONITORS 17-INCH

an 85-Hz refresh rate at 1024 by 768, and the Mag MXP17F is well worth its \$950 price. *Mag InnoVision*, 800/827-3998, 714/751-2008 Reader service no. 783

Mitac L1782

Estimated street price: \$689

Image quality: Fair

Viewable screen: 15.9 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1600 by 1280

The Mitac L1782 is essentially the same monitor as the Link LM-1791WWR, with the same basic specs and an identical on-screen menu system. Likewise, this monitor received a thumbs-down on image quality from our judges. The only major difference between the Mitac and the Link is that the Mitac costs \$160 less on the street. However, the CTX 1785GM costs only \$60 more than this monitor, so there's no need to trade image quality for a low price. *Mitac*, 800/285-9874 Reader service no. 784

Mitsubishi Diamond Scan 17FS

Estimated street price: \$945

Image quality: Poor

Viewable screen: 15.6 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1280 by 1024

If image is everything, then the Mitsubishi Diamond Scan 17FS is in big trouble. Our judges felt that this monitor produced poor-quality images, and they volunteered such comments as "hazy," "misty," and "out of focus." A major CRT manufacturer, Mitsubishi may be concentrating its efforts on manufacturing its new licensed clone of the Trinitron CRT, the DiamondTron. (Unfortunately, no DiamondTron monitors were ready in time for this review.) Whatever the reason, our review unit was too fuzzy to be taken seriously. *Mitsubishi Electronics America*, 800/843-2515, 714/236-6352 Reader service no. 785

Nanao FlexScan T2-17

Estimated street price: \$1299

Image quality: Excellent

Viewable screen: 15.9 inches



BUILT-IN SPEAKERS needn't be unsightly. All you see of the speakers on the Philips 17B are the grilles on each side of the monitor.

Maximum refresh at 1024 by 768: 105 Hz

Maximum noninterlaced resolution: 1600 by 1200

The Nanao FlexScan T2-17 is the monitor to buy if price is no object. Its stunning Trinitron images ranked third in the eyes of our judges, and its one-touch control actually makes adjusting geometry and color fun. A single knob does it all. Select horizontal size, for example, and you rotate the knob clockwise to expand the image, counterclockwise to shrink it—while an on-screen readout tells you where you're at. A maximum refresh rate of 105 Hz at 1024 by 768, Plug and Play, adjustable power-down, full color control, TCO compliance—you name it, the Nanao FlexScan has it. But if you can live without TCO, PnP, and the knob, note that Nokia offers a comparable model—one of our Best Buys—for \$270 less. *Nanao USA*, 800/800-5202, 310/325-5202 Reader service no. 786

NEC MultiSync XE17

Estimated street price: \$1060

Image quality: Good

Viewable screen: 15.5 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1280 by 1024

NEC has a reputation for setting the standard in monitors, and the MultiSync XE17 delivers in one sense: Its on-screen menu system is without peer. Elegant, sensibly organized menus slide past as you select controls and make adjustments with a convenient cursor diamond built into the front panel. The XE17 also has accessible focus controls—great for sharpening up a monitor as it ages—plus TCO compliance, Plug and Play, and automatic fill-to-edges. However,

with a price in the \$1000 range, this monitor should deliver better image quality than it does. *NEC*, 800/632-4636, 708/860-9500 Reader service no. 787

NEC MultiSync XP17

Estimated street price: \$1295

Image quality: Excellent

Viewable screen: 15.5 inches

Maximum refresh at 1024 by 768: 120 Hz

Maximum noninterlaced resolution: 1280 by 1024

Nearly identical in appearance to the MultiSync XE17, but slightly more compact, the MultiSync XP17 duplicates all the XE17's features—the same terrific menus, accessible focus controls, and Plug and Play operation. However, the XP17's much higher bandwidth enables it to deliver a better image, and its unique ACCESS.bus connector—plus superb image control software—give you complete mouse control over color, geometry, and power-down times. (If your PC doesn't support ACCESS.bus—and most don't—you'll need to install an ACCESS.bus parallel port adapter to make the connection.) Impressive as all this is, we found the \$1295 price to be too steep. *NEC*, 800/632-4636, 708/860-9500 Reader service no. 788

Nokia Multigraph 447X

Estimated street price: \$1029

Image quality: Excellent

Viewable screen: 15.4 inches

Maximum refresh at 1024 by 768: 90 Hz

Maximum noninterlaced resolution: 1600 by 1280



The Nokia Multigraph 447X has it all: looks, tons of features, and an attractive price. True, \$1000 isn't exactly cheap, but in exchange you get image quality surpassed only by the Mag MXP17F and the IBM 17P (Nokia makes the latter for IBM). This monitor, which features a Trinitron picture tube, offers the same controls as the 17P plus a few more, all of which you adjust with four buttons and slick on-screen menus instead of the IBM's 29 buttons. For a superstable image, you can boost the refresh rate at 1024 by 768 all the way to 90 Hz. The Multigraph 447X is our high-end Best Buy of the roundup and the smartest choice if you have your heart set on a Trinitron. *Nokia Display Products*, 800/296-6542, 415/331-6622 Reader service no. 789



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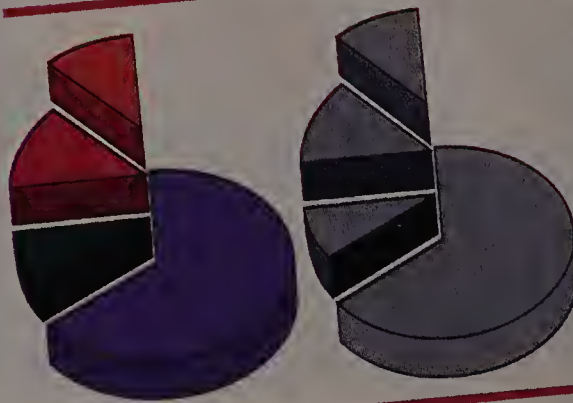
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Sales Manager
Subject: Persuasive power of color presentation

- Color increases ad readership 39%
- Color ad increases sales 42%
- Color documents provide 70% time savings, 39% decrease in errors
- Color improves attention, comprehension, recall and recognition



Color improves recall and recognition performance compared to black and white.

We've seen that, in general, presentation is powerful. Let's look now at the benefits of presentation visuals.

Color is all around us in our everyday lives. We probably don't think much about color and how it affects us. But, imagine a traffic light with all the lights the same color. How would you know when to stop? Color can produce a stronger response in the brain than black and white.

For example, adding color to a document can increase ad readership 39%. A newspaper color ad can increase sales 42% over a black and white ad. In decision type documents, color can reduce time and a 39% reduction in errors. Research shows that color improves attention, comprehension, recall and recognition.

% Greater Impact:	Color Visuals
Action	56
Retention	84
Agreement	
Comprehension	
Attention	15
Perceptions	

[1] CARR Report No. 110.3A "Does Color Increase Advertising Readership?", Cahners Publishing Co.
[2] "Update on split run tests on sales effectiveness of ROP color ads #20"; internal report of color versus black and white ads, 1988, Newspaper Association of America.

[3] From a study conducted by Xerox Public Information Group, "Recall and Recognition of Color and Children," Bulletin of the Xerox Corporation.

Color is color, unless it's

It's the business printer you've been waiting for. Office color that's so easy to use, reliable, and inexpensive, it's a practical office tool. It's the new Tektronix Phaser™340 color printer.

Speed? It's the world's fastest color printer at 4 color pages per minute. Cost? Full text pages on plain paper at 3¢ each. Color pages for 12¢ on your office paper. Simplicity? If you can load a stapler, you've mastered

Print vibrant, high-end color on office papers for less cost per page than low-end color. They'll snap to attention.

Connect faces and places with photorealistic quality. Welcome to the world of practical color!



brilliantly practical.

this machine. Reliability? Add 750 sheets of paper and let it run overnight. Now, that's robust. Cost? At \$4,995 there's nothing in its performance range that even comes close. Best of all, it's from Tektronix, a

Fortune 500 leader, that's been making world-class color printers for 13 years.
The Phaser 340 Color Printer.
So practical, it's brilliant.



Tektronix

Circle 124 on reader service card

For free output sample or nearest dealer, call 800-835-6100, Ext. 1036.

Optiquest 4000TC

Estimated street price: \$849

Image quality: Fair

Viewable screen: 15.6 inches

Maximum refresh at 1024 by 768: 80 Hz

Maximum noninterlaced resolution: 1280 by 1024

The Optiquest 4000TC proves that not all Trinitrons are created equal: This one was plagued by fuzziness noted by most of our judges. Like the ADI MicroScan 5EP, it also scanned improperly, leaving a thin vertical strip out of reach on both sides of the image. The Optiquest also lacks trapezoid, keystone, and image tilt controls, and though you get a three-year warranty, labor is covered only for the first year. *Optiquest, 800/843-6784, 909/468-3750* Reader service no. 790

Orchestra Tuba

Estimated street price: \$669

Image quality: Poor

Viewable screen: 15.9 inches

Maximum refresh at 1024 by 768: 72 Hz

Maximum noninterlaced resolution: 1600 by 1280

When we first tested this monitor, faint horizontal streaks across our color test image made us think we had a defective unit. So we tried another—only to find the same problem. This defect, plus dull colors, caused our judges to give this monitor a poor image quality rating. Orchestra promises to have corrected the problem by the time you read this. If so, then the bargain pricing and full complement of controls could make this basso profundo a contender. *Orchestra Multisystems, 800/237-9988* Reader service no. 791

Panasonic PanaSync/Pro C-1792P

Estimated street price: \$919

Image quality: Good

Viewable screen: 15.8 inches

Maximum refresh at 1024 by 768: 100 Hz

Maximum noninterlaced resolution: 1600 by 1280

Afew of our judges praised the Panasonic PanaSync/Pro C-1792P for its sharpness, but a slight dip in the top border of the image caused unacceptable geometric distortion. Otherwise, this monitor is well designed: The on-screen menus provide easy access to a full set of controls. If you find a unit without

the distortion problem, the Panasonic might be worth considering—were it not for the ViewSonic 17, which costs \$70 less and is virtually the same monitor. *Panasonic, 800/742-8086, 201/348-7000* Reader service no. 792

Philips 17B Model 1766DC

Estimated street price: \$799

Image quality: Good

Viewable screen: 16 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1280 by 1024

Someday, all monitors will come with built-in speakers. For now, the Philips 17B is one of the few such 17-inch models available—and it's a good deal. The price is a bit below average and the image quality a tad above, so you're basically getting the speakers, volume control, and headphone jack for free. The only drawback is the set of controls: There are plenty of them, but cryptic abbreviations

Tips for Buying and Tweaking Monitors

Even if you find a monitor that looks promising in this review, you still need to inspect the unit yourself to make sure you don't get a lemon. Here are a few things to check as you give a prospective buy the once-over—along with some tips for improving images on the fly.

Size. Some monitors have trouble getting the image to fill the frame, although monitors that exhibit this problem in the showroom are usually just poorly adjusted. Before you buy, play with the horizontal and vertical size and position controls to see if you can get the image precisely centered and flush with all four screen edges.

Geometry. When a monitor suffers from rough handling during shipping, geometry—the shape of the image—is the first thing to go. The more geometry controls a monitor has, the better chance you have of being able to fix a crooked image. Sometimes the entire image is tilted, which can only be corrected with an image tilt (or image rotation) control. If the sides bow outward or collapse inward, you need pincushion and barrel controls. Trapezoid and keystone controls can correct an image that's too fat or narrow at the top or bottom. However, no control can correct a small bend or ripple on one edge of an image, and controls for eliminating a dip or bow in an image's top or bottom edge are extremely rare.

Focus. Sharpness is subjective, but you can usually tell the crisp from the fuzzy when you compare several monitors side by side. Small, dark letters on a light background are a good test of sharpness. Look not only at the center of the screen but also at the corners, to make sure the focus is

uniform. Very few monitors have an adjustable focus control. However, a "focus" problem may in fact be a maxed-out brightness or contrast control: Turned up too high, either one may make a monitor appear fuzzy, so play with these basic controls before you jump to conclusions.

Glare. Most monitors use a screen coating to reduce glare from reflected light, which can be harder on the eyes than flicker. Side by side, it's pretty easy to see which monitors handle glare better than others. Note that the less curvature the screen has, the easier it is to eliminate glare when you tilt or swivel the monitor. Trinitron monitors have a completely flat screen, which reduces glare from overhead lighting.

Color. Don't like the colors you see on screen? Most 17-inch monitors let you adjust screen hues and even set individual red, green, and blue values. However, if you think one monitor's colors look washed out compared to another's, it may be because the brightness or contrast has been turned up too high. Often, turning down brightness just a tad will suddenly make colors appear rich again.

Note that if you're serious about scrutinizing a monitor before you buy, you might consider DisplayMate, an easy-to-use program that contains a series of test patterns you can use to calibrate as well as evaluate monitors. If you can't use DisplayMate at your dealer, you may want to ensure that you get a money-back guarantee on your monitor—if your tests don't check out, you can always send the monitor back. • *DisplayMate for Windows \$79; Sonera; 800/932-6323* Reader service no. 803

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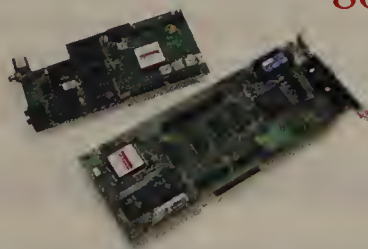
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MONITORS 17-INCH

viations on the little LED display and an odd menu structure make adjustments unnecessarily difficult. Nonetheless, if you want to hear Justus cackle wildly in *Blown Away*, this is the monitor for you. *Philips*, 800/835-3506, 310/217-1300 Reader service no. 793

Qume QM1791

Estimated street price: \$635

Image quality: Poor

Viewable screen: 15.9 inches

Maximum refresh at 1024 by 768: 70 Hz

Maximum noninterlaced resolution: 1600 by 1280

The Qume QM1791 is similar to the Link LM-1791WWR and the Mitac L1782, with awkward on-screen menus and an even less attractive image. Here's how to recognize this generic monitor: If you see these four buttons on the front panel—a diamond with a missing left corner, a minus sign, a plus sign, and a bent left arrow—then you should probably run the other way. *Qume*, 800/457-4447, 408/473-1500 Reader service no. 794

Samsung 17GLs

Estimated street price: \$799

Image quality: Good

Viewable screen: 15.6 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1280 by 1024

The 17GLs produces a sharp image, but its image quality suffers from slightly dull color rendition. As with the Nanao, you get on-screen controls and a handy knob for making adjustments. The relationship between

FEATURES COMPARISON The Choice Is Yours: 30 Big-Screen Monitors

Product name	GENERAL FEATURES			SCREEN FEATURES						
	Street price as of 12/1/94	Dimensions (width/depth/height in inches)	Weight (pounds)	Picture tube	Viewable screen (diagonal inches)	Automatic fill-to-edges ¹	Dot/stripe pitch (mm)	Maximum refresh at 800 x 600 (Hz)	Maximum refresh at 1024 x 768 (Hz)	Maximum refresh at 1280 x 1024 (Hz)
● = Yes ○ = No n/a = not applicable										
ADI MicroScan 5EP	\$769	16.5 x 19.5 x 15.75	40.4	Hitachi	15.5	○	dot .28	100	76	60
Apple Multiple Scan 17	\$1069	16.25 x 18.5 x 16.5	49.6	Sony Trinitron	16.1	○	stripe .25	75	60	n/a
CTX 1785GM	\$750	16.75 x 19.75 x 17.25	48.4	Matsushita	16.1	●	dot .26	75	75	75
Daytek DT-1730	\$599	16.75 x 16.6 x 19	43.8	Hitachi	16.1	●	dot .28	90	75	73
Delta Socos 1765 VAF	\$665	16.75 x 18.5 x 15.5	41.2	Hitachi	15.9	○	dot .26	72	70	60
Hyundai HL-7682P	\$730	16.25 x 19.5 x 16.25	48.4	Hitachi	15.7	○	dot .26	72	70	70
IBM 17P	\$1199	16.25 x 18.25 x 16.75	51.2	Sony Trinitron	15.4	●	stripe .25	76	77	77
IBM 17S/S	\$1410	16.5 x 19 x 17	45.6	Panasonic	16.2	○	dot .27	70	75	77
Iiyama VisionMaster 17	\$790	16.5 x 19 x 16.75	50.2	Hitachi	15.8	○	dot .26	100	100	80
Link LM-1791WWR	\$850	16.75 x 19.25 x 16.75	46	Hitachi	15.8	○	dot .26	76	76	76
Mag MXP17F	\$950	17.5 x 20 x 16.75	53.6	Toshiba	16.1	○	dot .26	120	85	76
Mitac L1782	\$689	16.6 x 19 x 17.25	45.42	Hitachi	15.9	○	dot .26	76	76	76
Mitsubishi Diamond Scan 17FS	\$945	16 x 17.5 x 15.5	39.4	Mitsubishi	15.6	○	dot .28	76	76	74
Nanao FlexScan T2-17	\$1299	15.6 x 18.75 x 16.25	56.2	Sony Trinitron	15.9	○	stripe .25	135	105	80
NEC MultiSync XE17	\$1060	16.5 x 19.5 x 17.25	50.4	NEC	15.5	●	dot .28	120	75	60
NEC MultiSync XP17	\$1295	16.5 x 19 x 16.75	54	NEC	15.5	●	dot .28	160	120	75
Nokia Multigraph 447X	\$1029	16.8 x 18.1 x 16.4	45.8	Sony Trinitron	15.4	○	stripe .25	110	90	75
Optquest 4000TC	\$849	16.25 x 20 x 16.5	54.6	Sony Trinitron	15.6	○	stripe .25	90	80	60
Orchestra Tuba	\$669	16.25 x 19.25 x 17	44.8	Hitachi	15.9	●	dot .26	72	72	75
Panasonic C-1792P	\$919	16.25 x 17 x 17.6	38.2	Matsushita	15.8	○	dot .27	128	100	77
Philips 17B Model 1766DC	\$799	16.5 x 19 x 16.25	42	NEC	16	○	dot .28	75	75	60
Qume QM1791	\$635	16.75 x 19.5 x 17.25	46.2	Hitachi	15.9	○	dot .26	72	70	72
Samsung 17GLs	\$799	16.6 x 17.75 x 17	46.8	Hitachi	15.6	●	dot .26	76	76	76
Samtron SC-728SXL	\$775	16.6 x 18 x 17	48.2	Hitachi	15.6	○	dot .28	75	75	60
Smile CA1718	\$675	16.5 x 17.5 x 16	41.2	Hitachi	16	○	dot .26	80	76	60
Sony Multiscan 17se	\$1049 (list)	16 x 18.75 x 16.25	50.2	Sony Trinitron	15.9	●	stripe .25	100	100	76
Sony Multiscan 17sf	\$999 (list)	16 x 17.75 x 16.75	43.4	Sony Trinitron	15.7	●	stripe .25	80	76	60
Tatung CM-17MKR	\$800	16 x 18 x 17.25	50.8	Hitachi	15.9	●	dot .26	75	75	76
Taxan ErgoVision 880 LR	\$749	16.25 x 16.5 x 16.25	49.4	Hitachi	15.5	●	dot .28	100	80	60
ViewSonic 17	\$850	16.25 x 17 x 16.5	40.4	Matsushita	15.8	●	dot .27	128	101	77

Best Buys in red

¹ At 1024 by 768 at 70 Hz.

² Two years CRT.

³ Three years parts, two years labor.

⁴ Serial port for field service only.

⁵ Optional.

⁶ Free.

⁷ One year labor.

“Color” and “Hue” is unclear, though, and it takes a while to realize that the “Sel” button toggles between the two rows of settings on the front panel. This monitor is only slightly above average. *Samsung, 800/726-7864, 201/691-6200* Reader service no. 795

Samtron SC-728SXL

Estimated street price: \$775

Image quality: Fair

Viewable screen: 15.6 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1280 by 1024

At first glance, the Samtron SC-728SXL appears to be a slightly less expensive version of the Samsung 17GLs. It has a similar shell, uses a knob for adjustments, and provides a nearly identical on-screen control readout—plus, it’s easier to figure out how to select the Samtron’s controls. All this sounds promising, until you see that the Samtron’s image quality ratings fell in the bottom third, making the Samsung a smarter

buy. *Samtron Displays, 800/726-8766, 310/537-7000* Reader service no. 796

Smile CA1718

Estimated street price: \$675

Image quality: Good

Viewable screen: 16 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1280 by 1024

If you refuse to pay more than \$700 for a monitor, then the Smile CA1718 is worth

USER CONTROLS AND SETTINGS									MISCELLANEOUS FEATURES				SERVICE/SUPPORT	
Maximum noninterlaced resolution	Maximum horizontal scan rate (kHz)	Bandwidth (MHz)	On-screen controls	Trapezoid/keystone	Focus/convergence	Image tilt/manual degauss	Color temperature/RGB controls/color correction software	Number of savable user video modes	BNC-5/serial port	Plug and Play/ACCESS.bus	MPR 2/TCO	VESA DPMS/Adjustable power-down	Warranty (years)	One year on-site service under \$100
1280 x 1024	64	85	○	●/○	○/○	●/●	○/●/○	8	○/○	○/○	●/○	●/●	2	○
1024 x 768	64	80	○	○/○	○/●	●/○	●/●/○	3	○/○	○/○	●/○	●/●	1	○
1600 x 1280	85	135	○	●/●	○/○	●/●	●/●/○	15	●/○	○/○	●/○	●/●	3 ²	○
1280 x 1024	67	100	○	●/●	○/○	○/●	○/○/○	12	●/○	○/○	●/○	●/●	3 ³	○
1280 x 1024	65	100	○	●/●	○/●	●/●	○/●/○	21	○/○	○/○	●/○	●/○	2	○
1600 x 1280	82	75	○	●/●	○/●	●/●	●/●/○	21	●/● ⁴	○/○	●/○ ⁵	●/○	2	○
1600 x 1280	82	148	○	●/●	○/●	●/●	●/●/○	17	●/○	○/○	●/●	●/●	3	● ⁶
1600 x 1280	82	135	●	●/●	○/●	●/●	●/●/○	8	○/○	○/○	●/○	●/●	3	● ⁶
1600 x 1280	86	135	○	●/●	○/○	●/●	●/●/●	27	●/○	○/○	●/○	●/○	3	○
1600 x 1280	82	135	●	●/○	○/○	○/●	○/●/○	6	○/○	○/○	●/●	●/○	1	○
1600 x 1280	82	130	○	●/●	○/○	●/●	●/○/○ ⁵	8	●/●	○/○	●/○ ⁵	●/●	3	●
1600 x 1280	82	130	●	●/●	○/○	○/●	●/●/○	4	○/○	○/○	●/○	●/○	3	●
1280 x 1024	78	100	○	●/●	○/○	○/●	●/●/○ ⁵	10	○/●	○/○	●/○	●/●	3	○
1600 x 1200	85	130	○	●/●	○/○	○/●	●/●/●	10	●/○	●/○	●/●	●/●	3	○
1280 x 1024	65	85	●	●/●	●/○	●/●	●/●/●	28	○/○	●/○	●/●	●/●	3	○
1280 x 1024	75	140	●	●/●	●/○	●/●	●/●/●	42	●/○	●/●	●/●	●/●	3	○
1600 x 1280	82	160	●	●/●	○/●	●/●	●/●/○	23	●/○	○/○	●/○ ⁵	●/●	3	○
1280 x 1024	64	86	○	○/○	○/○	○/●	○/●/○	7	○/○	○/○	●/○	●/●	3 ⁷	○
1600 x 1280	82	135	●	●/●	○/●	●/●	●/●/○	1	●/○	○/○	●/●	●/○	2	○
1600 x 1280	82	135	●	●/●	○/○	●/●	●/●/○	13	●/○	○/○	●/○	●/○	3	● ⁶
1280 x 1024	66	110	●	●/●	○/○	●/●	●/●/○	11	○/○	○/○	●/●	●/●	2	○
1600 x 1280	82	135	●	●/●	○/○	○/●	○/●/○	6	○/○	○/○	●/○	●/○	1	○
1280 x 1024	82	135	●	●/●	○/○	○/●	●/●/○	11	●/○	○/○	●/○	●/○	3	○
1280 x 1024	65	106	○	●/●	○/○	○/●	○/○/○	11	○/○	○/○	●/○	●/○	3	●
1280 x 1024	65	110	○	●/●	○/○	●/●	○/○/○	3	○/○	○/○	○ ⁵ /○	●/●	2	○
1600 x 1200	82	100	○	○/○	○/●	●/○	●/○ ⁸ /○	11	●/○	○/○	●/○	●/○	3 ²	○
1280 x 1024	64	⁹	○	○/○	○/●	●/○	●/○/○	10	○/○	○/○	●/○	●/○	3 ²	○
1600 x 1280	82	130	○	○/○	○/○	○/●	○/○/○	25	●/○	○/○	●/○	●/○	2	○
1280 x 1024	64	135	●	●/●	○/○	●/●	●/●/○	15	○/○	○/○	●/○	●/○	2	○
1280 x 1024	82	135	●	●/●	○/○	●/●	●/●/○	8	●/○	○/○	●/○	●/●	3 ⁷	○

⁸ Adjustable hue/saturation/intensity.

⁹ Information not available.



considering. Unlike other monitors in this price range, you get a nice, high refresh rate of 76 Hz at 1024 by 768, and good image quality. Our objective tests revealed a noticeably low contrast ratio, but our judges didn't seem to mind. You have to live without color settings and endure downright ugly controls, though. In the under-\$700 category, you can't do better for the price, but why be penny-wise? A mere \$75 more nets you the Best Buy CTX 1785GM. *Smile Int'l*, 800/253-2872, 714/546-0336 **Reader service no. 797**

Sony Multiscan 17se

List price: \$1049

Image quality: Excellent

Viewable screen: 15.9 inches

Maximum refresh at 1024 by 768: 100 Hz

Maximum noninterlaced resolution: 1600 by 1200

The Sony Multiscan 17se's image quality impressed our judges, earning this Trinitron monitor high marks for both clarity and color rendition. In addition, the top refresh rate of 100 Hz at 1024 by 768 is among the highest offered. But with trapezoid and keystone missing, you'd either have to live with a misaligned unit or send it back. And the controls are cryptic—to change color temperature, for example, you have to press the control and selection buttons simultaneously. If you want a Sony, the Multiscan 17sf is a better buy. *Sony Electronics*, 800/352-7669, 408/432-0190 **Reader service no. 798**

Sony Multiscan 17sf

List price: \$999

Image quality: Excellent

Viewable screen: 15.7 inches

Maximum refresh at 1024 by 768: 76 Hz

Maximum noninterlaced resolution: 1280 by 1024

Due to its lower bandwidth, the Multiscan 17sf seemed slightly less sharp than the

Multi-
scan 17se,
but our judges

barely noticed the difference. The 17sf's button-based control layout is much easier to learn and use. Aside from the superhigh refresh rate, about all you really lose by opting for the 17sf instead of the 17se is $\frac{1}{2}$ inch of viewable screen and a BNC connector. If excellent image quality is high on your wish list, this monitor should be your third choice after the Nokia Multi-graph 447X and the Mag MXP17F. *Sony Electronics*, 800/352-7669, 408/432-0190 **Reader service no. 799**

Tatung CM-17MKR

Estimated street price: \$800

Image quality: Fair

Viewable screen: 15.9 inches

Maximum refresh at 1024 by 768: 75 Hz

Maximum noninterlaced resolution: 1600 by 1280

The Tatung CM-17MKR has little to distinguish it. Its image quality is just fair, and it doesn't have any trapezoid, keystone, tilt, or color controls. The high bandwidth and 1600 by 1280 maximum resolution are impressive, but otherwise the Tatung CM-17MKR doesn't measure up. *Tatung*, 800/829-2850, 213/979-7055 **Reader service no. 800**

Taxan ErgoVision 880 LR

Estimated street price: \$749

Image quality: Fair

Viewable screen: 15.5 inches

Maximum refresh at 1024 by 768: 80 Hz

Maximum noninterlaced resolution: 1280 by 1024

The inexpensive Taxan ErgoVision 880 LR gives you a full set of controls for an attractive price. But our judges didn't like its looks, offering such adjectives as "blurry" and "fuzzy" to describe its image. This unit's poor showing on our contrast test may be part of the problem. Fortunately, you have a great alternative: the Best Buy CTX 1785GM, which costs the same. *Taxan distributors: Avnet Computer* 800/426-7999, *Hallmark Computer* 800/884-5675, *Hamilton Hallmark* 800/332-8638 **Reader service no. 801**

ViewSonic 17

Estimated street price: \$850

Image quality: Excellent

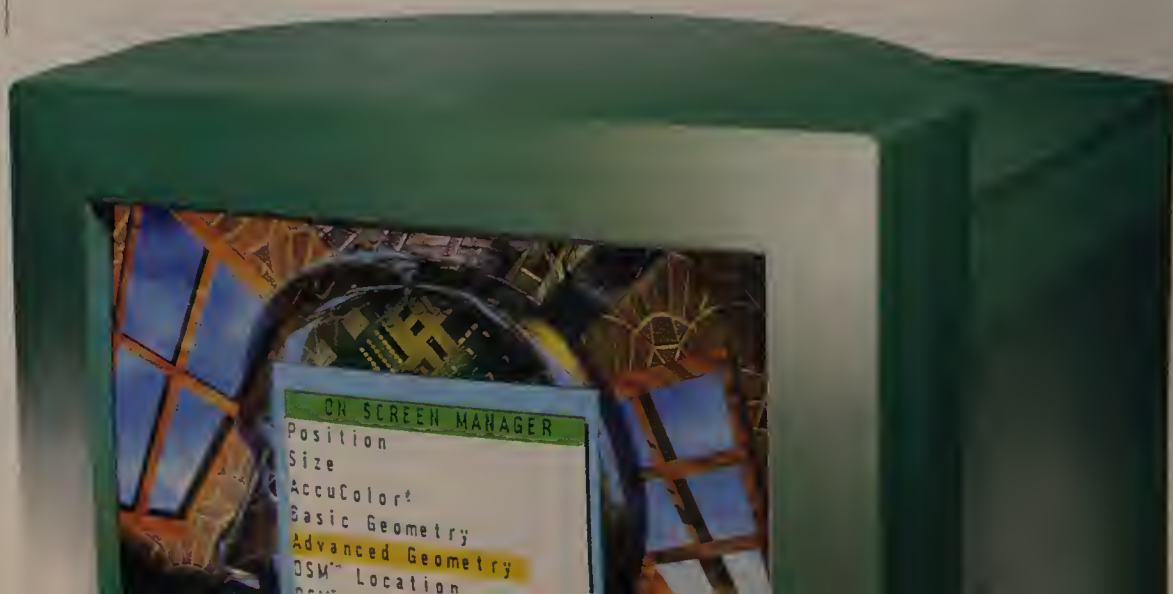
Viewable screen: 15.8 inches

Maximum refresh at 1024 by 768: 101 Hz

Maximum noninterlaced resolution: 1280 by 1024

Maximum resolution aside, the ViewSonic 17 has about the same specifications and controls as the Panasonic Pana-Sync/Pro C-1792P and sells for \$70 less. Even better, our judges rated ViewSonic's image quality on a par with that of the much more expensive NEC MultiSyncs. You don't get the MultiSyncs' beautiful on-screen menus, but the ViewSonic's menus aren't too shabby either, offering full geometry control and separate color adjustments. If you want a little better image quality than the Best Buy CTX 1785GM, and can pay an extra \$100, check out the ViewSonic 17. *ViewSonic*, 800/888-8583, 909/869-7976 **Reader service no. 802**

ADJUSTING YOUR MONITOR'S controls can greatly enhance image quality. Some monitors, such as the Hyundai HL-7682P pictured above, feature button-based controls. Others, such as the NEC MultiSync XE17 below, use on-screen menus instead.



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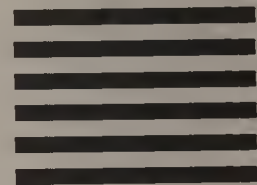
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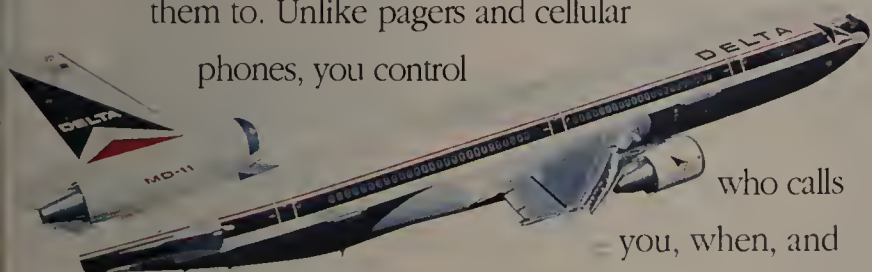
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Circle 114 on reader service card

TEST REPORT Most Monitors Make the Grade

	Brightness uniformity .7 or higher is acceptable	Contrast 200 or higher is acceptable	Geometric distortion 2 or less is acceptable	Misconvergence .45 or less is acceptable
ADI MicroScan 5EP	.95	340	.8	.2
Apple Multiple Scan 17	.86	430	.3	.48
CTX 1785GM	.84	412	2	.16
Daytek DT-1730	.81	279.33	2.4	.09
Delta Socos 1765 VAF	.77	485	1.9	.2
Hyundai HL-7682P	.87	410	1.5	.2
IBM 17P	.88	227.89	.5	.18
IBM 17S/S	.84	444.44	.5	.12
Iiyama VisionMaster 17	.93	440	1.4	.19
Link LM-1791WWR	.83	375.38	1	.09
Mag MXP17F	.85	196.84	.8	.09
Mitac L1782	.87	307.69	1	.22
Mitsubishi Diamond Scan 17FS	.87	321.25	.6	.16
Nanao FlexScan T2-17	.8	364.29	.8	.36
NEC MultiSync XE17	.85	550	.7	.1
NEC MultiSync XP17	.74	560	2	.15
Nokla Multigraph 447X	.75	262	.7	.33
Optique 4000TC	.88	393.75	1	.24
Orchestra Tuba	.88	602	.7	.12
Panasonic C-1792P	.83	451.11	2.4	.07
Philips 17B Model 1766DC	.86	565	.7	.31
Qume QM1791	.88	472.35	1.3	.08
Samsung 17GLs	.88	394.55	1	.14
Samtron SC-728SXL	.81	375	.6	.22
Smile CA1718	.84	94.88	1	.19
Sony Multiscan 17se	.94	547.5	.4	.46
Sony Multiscan 17sf	.84	417.5	1	.46
Tatung CM-17MKR	.8	409	.7	.1
Taxan ErgoVislon 880 LR	.91	78.44	.7	.19
ViewSonic 17	.79	305.45	1	.29
Best Buys in red	.7 ▶	200 ▶	◀ 2	◀ .45

Brightness uniformity and contrast are ratios. Geometric distortion is an index compiled from several line measurements. Misconvergence is measured in millimeters.

Test Methodology

We tested all monitors on a Pentium-based PC configured with a Diamond Stealth 64 PCI graphics accelerator with 4MB of VRAM. Monitors were tested at 1024 by 768 resolution at 256 colors and a 70-Hz vertical refresh rate. We used the DOS-based DisplayMate Professional Setup Display utility from Sonera Technologies to calibrate brightness, contrast, centering, and size.

Brightness Uniformity

We used a Minolta CRT Color Analyzer CA-100 instrument. We set the contrast control to maximum, then adjusted brightness so that the background raster lines were no longer visible. We measured brightness at the center of the display and in each corner. We then calculated the brightness uniformity as a ratio of the smallest measurement divided by the largest measurement. Margin of error is ± 0.05 .

Contrast

We used a Minolta CRT Color Analyzer CA-100. We set the contrast control to maximum, then adjusted brightness so the background raster lines were no longer visible. We used a test pattern that placed one white square in the center of the display and one in each corner and measured the brightness of each of the five squares. We then measured the brightness of the dark area adjacent to each square and reported the worst-case ratio. Margin of error is ± 20 .

Geometric Distortion

We used the Screen Distortion Measurement utility included with DisplayMate Professional. We measured a sampling of horizontal, vertical, and diagonal line lengths and computed screen size, aspect ratio, and squareness error; keystone, pincushion, or barrel distortion; bow curvature; and linear error. We distilled the computations into a single screen-distortion index. Margin of error is ± 0.20 .

Misconvergence

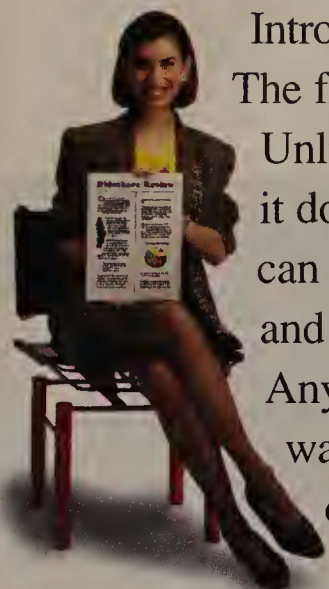
Misconvergence indicates how precisely a monitor's red, green, and blue electron beams strike the same pixel. Less misconvergence means greater screen image sharpness and truer color. Using a Klein Convergence Error Measurement Gauge, we measured vertical misconvergence at the screen's top center edge and horizontal misconvergence at the right center edge; we then summed the results. Margin of error is ± 0.1 .

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Complete integration vs. partial integration.

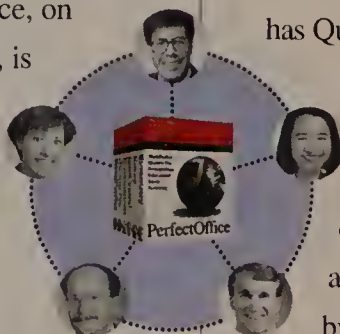
The programs in PerfectOffice have a consistent

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	PerfectOffice 3.0 Standard Edition	Microsoft Office 4.2 Standard Edition
Programs have consistent interfaces	YES	YES
Integrated E-mail, calendaring and scheduling**	YES	NO
Workgroup publishing features	YES	NO
Number of applications with OLE 2.0 support	Four	Three
Number of applications with on-the-fly spell checking	Three	One
Automated tasks that work independent of applications	YES	NO
Grammar checker can rewrite entire sentences	YES	NO
Intelligent find and replace	YES	NO
Ability to record scripts (macros) across applications	YES	NO
Supports both Visual Basic & AppWare programming tools	YES	NO
Six months of free, toll-free technical support*	YES	NO

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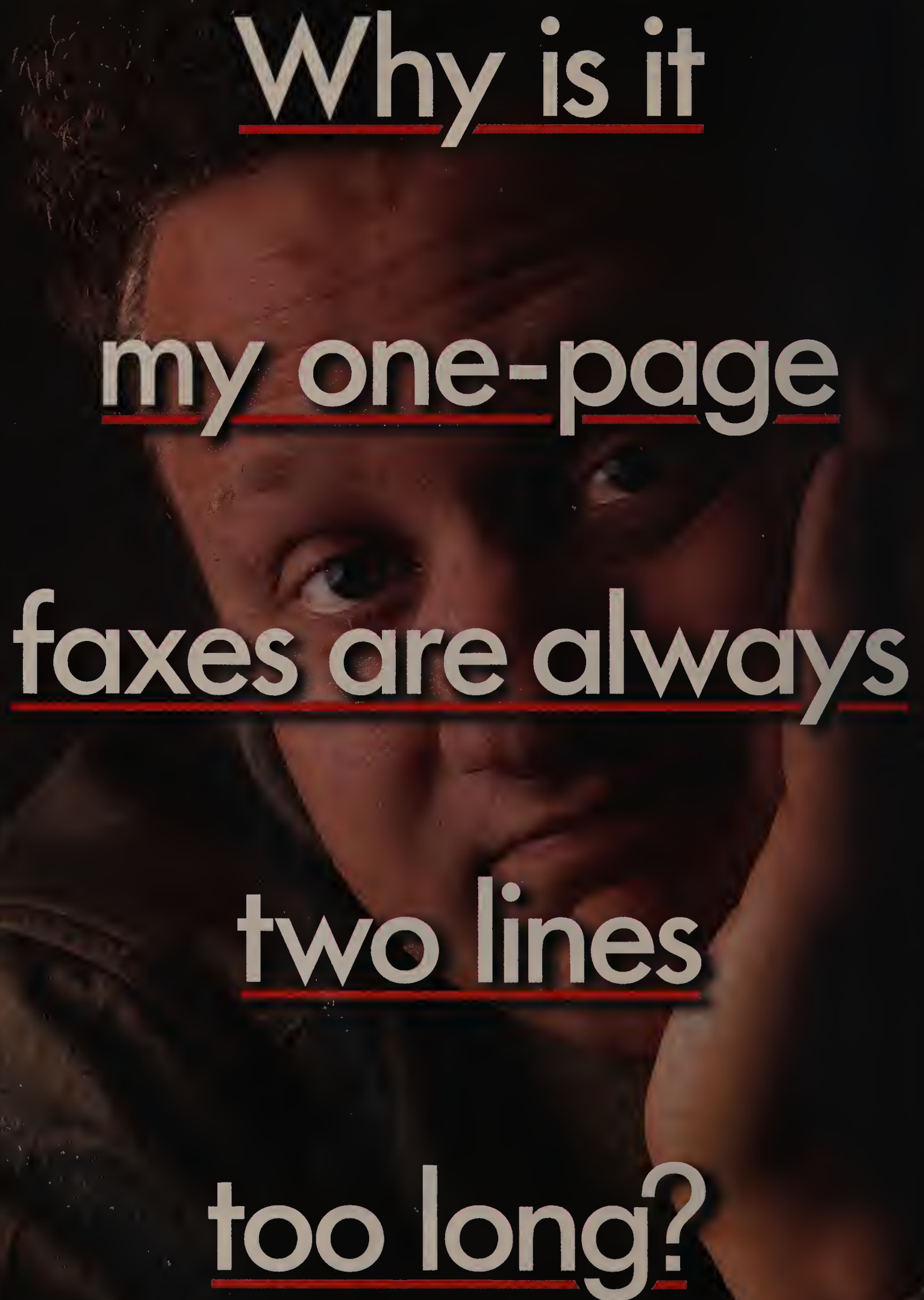
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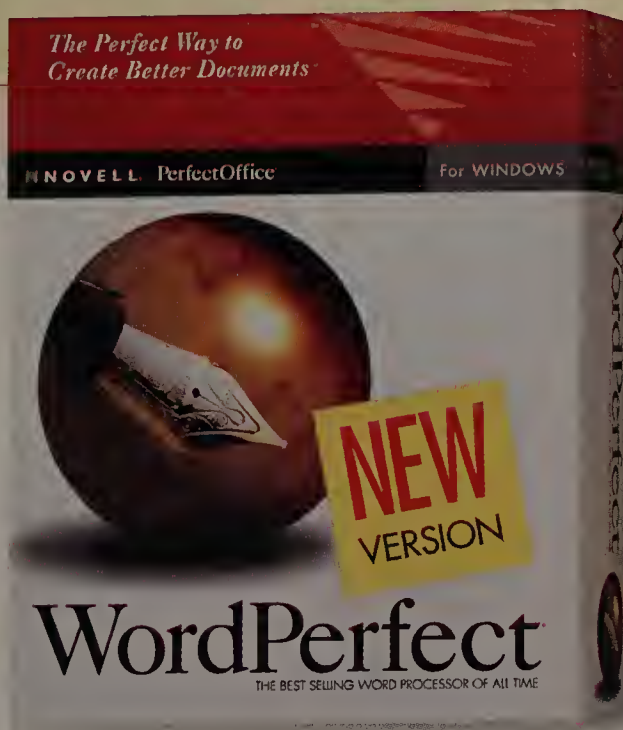
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are showing up in the most unexpected places. Our new FlexScan F2-15 and F2-17 models, for instance, are fast becoming the monitors of choice among everyday users around the world. And not just because the price is right. These monitors include an exciting new array of advanced technical features that continue Nanao's tradition of superior product innovation and industry leadership. Which means that all the performance features you've ever wanted for

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F2-15

Dot Pitch	0.28mm
Scan Freq.	H:30-69kHz, V:55-120kHz
Rec. Resol.	1024 x 768 @ up to 87Hz
Max Resol.	1280 x 1024 @ up to 66Hz
Standards	MPR-II, TCO

F2-17

Dot Pitch	0.28mm
Scan Freq.	H:30-69kHz, V:55-120kHz
Rec. Resol.	1024 x 768 @ up to 87Hz
Max Resol.	1280 x 1024 @ up to 66Hz
On Screen Control	ScreenManager™
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50 Spreadsheet

WHAT THE MANUALS WON'T TELL YOU

TIPS



*What's the easiest way to navigate that 30-sheet workbook in Excel? What's the best way to multiply a range of values in 1-2-3? How do you calculate the last day of a month in Quattro Pro? **

Don't know? Your spreadsheet does. And it would be happy to tell you, if only you knew how to ask. Sure, you could check the manual, but it won't tell you about the tools you really need to use your spreadsheet effectively. We will. In the following pages, you'll find all sorts of cool stuff—shortcuts, formulas, and crafty new uses for old tools—they left out of the manual. And be sure you look through *all* the tips, even those for apps you don't use: If you see the  icon next to a tip, the formula therein should (with minor modifications) work in any spreadsheet. So ditch that manual and turn the page. (And, oh yeah, for the answers to the questions above, turn the page upside down.)

* Right-click the scrolling buttons left of the sheet tabs (Tip 1, Find the Right Sheet); use matrix math (Tip 31, Across-the-Board Increases); and calculate the first day of the subsequent month, then subtract one (Tip 46, Finding the End of a Month).

Excel

1 Find the Right Sheet

Workbooks have a way of growing into unwieldy behemoths containing dozens of sheets. To make navigating easier, click the right mouse button on any of the scrolling buttons to the left of the sheet tabs. This will call up a list of the sheets in the workbook.

2 Know Where You're Going

Another way to make navigating a big workbook easier: Name a cell or range in each sheet, then use that name in the Go To command. Let's say you're keeping your budget figures in Sheet3 of your main workbook. Name cell A1 of Sheet3 **Bud**. Then, to move to sheet3 quickly, press <F5> and either type **bud** and press <Enter>, or double-click **Bud** in the dialog box.

3 If You're a One-Sheet User...

Make your life a little easier (and save disk space) by reducing the default number of sheets in your workbooks. Choose **Tools • Options** and select the **General** tab. Change the number of Sheets in New Workbook to what you like. Note: If you have a workbook template named BOOK.XLT in the XLSTART directory, its settings will override these changes next time you open Excel.

4 Delete Safely

Excel can't prevent you from deleting a worksheet on which another sheet depends for values. Your best defense is to open the Auditing tool bar before deleting the sheet (choose **View • Toolbars**, then select **Auditing**). Test significant cells (such as grand totals) in the sheet you're deleting by selecting each in turn and clicking the **Trace Dependents** button. If another sheet refers to the selected cell, you'll see a thin line with a tiny spreadsheet at the end.

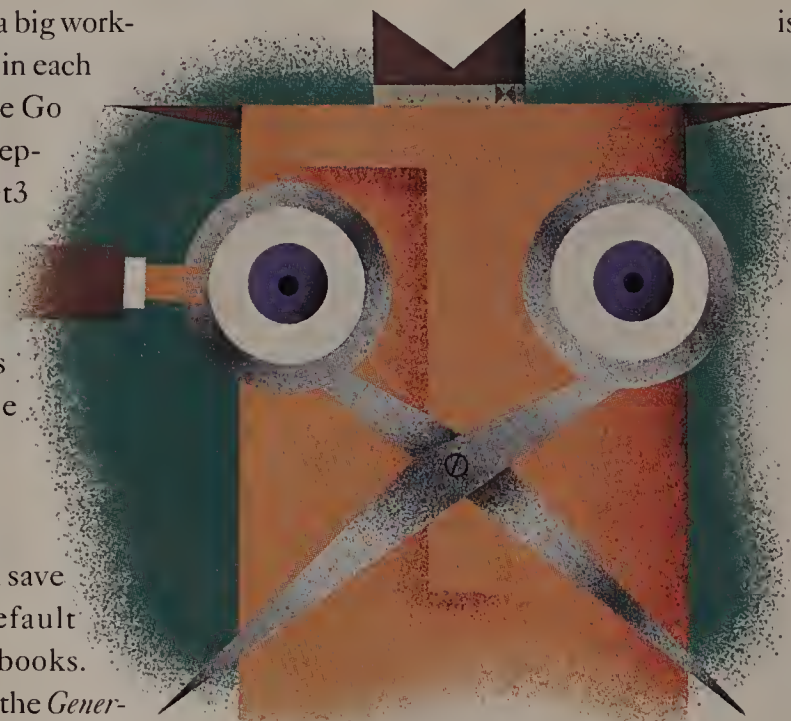
5 Keyboard Genealogy

You can use the Auditing tool bar to trace dependencies and precedents between cells. But if you don't want to bother fetching this tool bar to check just one cell's precedents, you can press <Ctrl>-] to select the cells to

which the active cell refers. If you also hold down <Shift>, you'll find the cell's *indirect* precedents—all cells that affect the value of the current cell. Similarly, pressing <Ctrl>-] selects cells with formulas that refer directly to the active cell, and <Ctrl>-<Shift>-] selects cells with formulas that refer to the active cell directly or indirectly.

6 Keyboard Cutting and Pasting

You probably know how to cut and paste a range with the mouse (highlight the range,



right-click, select **Cut**, right-click the destination, and select **Insert Cut Cells**). But keyboard users have their own shortcut: Select the range you want to move, then press <Shift>-<Delete> or <Ctrl>-X. Next, select the upper-left cell of the destination range and press <Ctrl>-<+> (the plus key on the numeric keypad). Choose **Shift Cells Right** or **Shift Cells Down** as you wish (using R, D, or any cursor key), and your selection will be inserted.

7 Tear-Off Palettes

When you're formatting a worksheet or chart, save yourself some time and hassle by dragging Excel's colors, patterns, or borders palettes so that they're closer at hand. Just drag any of the arrows attached to the Borders, Color, or Font Color buttons (on

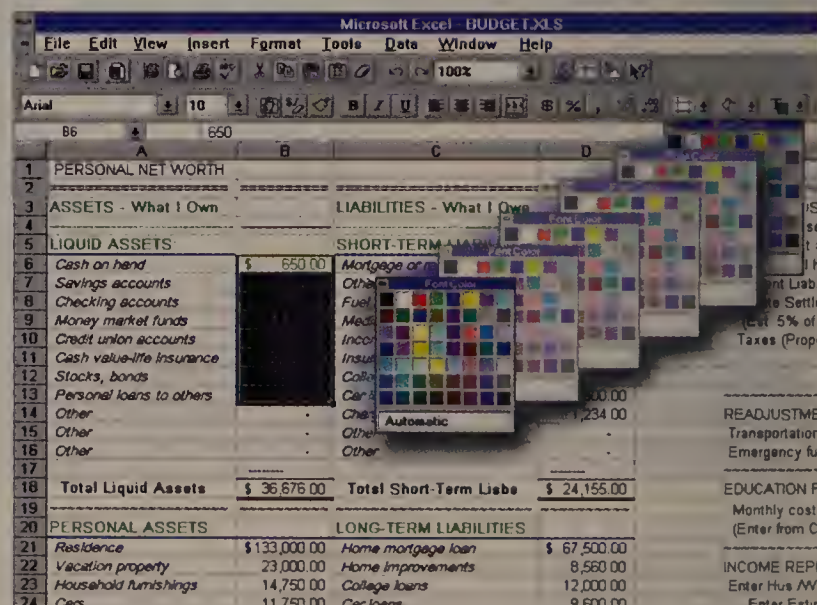
the Formatting tool bar) or the Pattern button (on the Drawing tool bar). The palette will display and move as you drag it. To close, just click the small Control button in the upper left-hand corner of the palette.

8 Mice Clear the Range

Many people know you can clear all or part of a selected range by dragging the fill handle back through it. As you drag, the selection goes gray one row or column at a time; when you release the mouse button, the gray area is cleared just as if you'd chosen **Edit • Clear • Contents**. But fewer people know you can use a similar technique to perform the equivalent of **Edit • Clear • All**. Drag the fill handle back through the selected range as before, but this time hold down <Ctrl>. When you release the mouse button, you'll have removed contents, formats, and notes.

9 Extending Your Reach

Let's say you've selected a range of cells: How do you make the selection bigger? If the active cell is in the upper left corner of the range, you can extend the selection to the right and downward by holding down <Shift> and using the mouse or the cursor keys. But what if you want to extend it left or up? The answer is to move the active cell: Hold down <Ctrl> and repeatedly press the <Period> key to move the active cell clockwise from corner to corner. To extend the selection upward, move the active cell to one of the lower corners; to extend it to the left, move to a corner on the right. You can also use this technique to shrink a selection.



PUT PALETTES WHERE THEY'RE USEFUL by dragging the arrows attached to the Borders, Color, Font Color or Pattern buttons.

10 Double-Function Tool Bar Tools

Excel 4.0 introduced the idea of dual-function tool bar buttons—tools that change function if you hold down <Shift> while clicking. Excel 5.0 has expanded the concept. Using dual-function buttons means you can trim your tool bars; when one button can do the work of two, you don't need as many buttons on tap. Another bonus: two functions—Fill Left and Fill Up—are accessible *only* by holding down <Shift> as you click a button. Some of the handier <Shift>-able buttons are shown in the table at right.

11 Faster Auto Fill

Creating auto fills in Excel is getting easier. In version 4.0, you needed two values—say, 1 and 2—in adjacent cells before you could drag the fill handle to fill subsequent cells with 3, 4, and so on. In Excel 5.0, you can get the same results by typing 1 in just one cell, then holding down <Ctrl> as you drag the fill handle. Of course, if you want series with increments other than 1 (such as 5, 10, 15, 20), you'll have to use the original method. Remember, filling also works in reverse for both methods: If you drag the fill handle up or to the left, the series will decrease.


12 Smarter Auto Fill

Excel's fill handles are also getting smarter. Let's say you have a two-column worksheet. Column A already contains data, and you want to fill column B with sequential dates, one for each of column A's filled rows. Normally, you'd have to select cell B1 and then drag the fill handle down through all the rows you want to fill (or use the Edit•Fill•Series dialog box). In Excel 5.0, you can simply double-click the fill handle. As long as there's data in each row in the column to the left or right of the one you want to fill, Excel will do the rest.

13 The Last Active Hero

Normally, if you want to move to the last non-empty cell in a column, you press <Ctrl>-<Down>. But if there are any blank cells between your current location and that last active cell, this method can be mighty tedious. Instead, move to the first row of the column, select the entire column by clicking its column header or pressing <Ctrl>-<Space> bar. Press <Shift>-<Enter> to move to the bottom of the column, then hit <Ctrl>-<Up> to move to the last active cell in the column.

14 Adding Labels

 If you enter numbers followed by a text label (such as '24 ft.'), Excel will treat the whole string as text. But what if you want to add those numbers up? If the text label is the same for all your entries, use an array formula to, in effect, delete the unwanted text label characters. Array formulas perform operations on several cells at once, so what might have taken a series of formulas can be accomplished with just one.

Let's say your text entries are in cells A1:A5; then, in cell A6, type the formula `=sum(1*left(a1:a5,len(a1:a5)-3))`, and press <Ctrl>-<Shift>-<Enter> (to add brackets to make what you've entered an array formula). In this example, the label we're deleting is three characters long; if yours is longer, change the '-3' accordingly.

Of course, the best thing to do is not use a suffix in the first place. Instead, select *Format•Cells•Number* and, in the Code box, enter a customized number format. In this example, you'd type #, a space, ft., and select *OK*. Your numbers will be labeled correctly, and you'll be able to use a simple SUM function instead of the array formula to add them up.



























15 Unhiding Columns With the Mouse

To unhide a column (or row), people usually select the columns (or rows) on either side of the hidden region and select *Format•Column (or Row)•Unhide*. But there are two lesser-known mouse tricks that will accomplish the same task.

If you position the mouse pointer between the column headings to the left and right of the hidden column, it will change into a solid black line with double horizontal arrows. If you then move the

mouse a bit to the right, the pointer will change into a pair of vertical lines with two horizontal arrows. Drag to the right and the hidden column will reappear. Alternatively, when the mouse pointer changes to the double vertical lines with horizontal arrows, press the right mouse button. This will select the hidden column and summon a shortcut menu from which you can choose *Unhide*.

DOUBLE-FUNCTION TOOLS

Button	Function	<Shift> function
	File Open	File Save
	File Save	File Open
	Print	Print Preview
	Print Preview	Print
	Undo	Redo
	Redo	Undo
	Insert	Delete
	Delete	Insert
	Clear Contents	Clear Formats
	Clear Formats	Clear Contents
	Paste Formats	Paste Values
	Paste Values	Paste Formats
	Insert Row	Delete Row
	Delete Row	Insert Row
	Ascending Sort	Descending Sort
	Descending Sort	Ascending Sort
	Left Align	Right Align
	Right Align	Left Align
	Center Align	Center Across Columns
	Center Across Columns	Center Align
	Increase Font Size	Decrease Font Size
	Decrease Font Size	Increase Font Size
	Fill Down	Fill Up
	Fill Right	Fill Left
	Zoom In	Zoom Out
	Zoom Out	Zoom In

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- ◆
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- ◆
- 7.8" Color Backlit STN VGA Display
- ◆
- Integrated Compaq EasyPoint™ Trackball
- ◆
- PCMCIA Type II Slot
- ◆
- NIMH Battery & AC Adapter
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- ◆
- PCI Local Bus IDE Interface
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- Compaq SVGA Color Monitor
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8MB RAM (expandable to 132MB)



420MB Hard Drive



256KB Cache Optional



PCI Local Bus Graphics



PCI Local Bus IDE Interface



Compaq SVGA Color Monitor
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3 Drive Bays, 3 Slots



Preinstalled MS-DOS 6,
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Compaq ProLinea

ProLinea Features:

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(other models available)



8MB RAM (expandable to 192MB)



420MB Hard Drive



256KB Cache



PCI Local Bus Graphics



PCI Local Bus IDE Interface



Compaq SVGA Color Monitor
1024 x 768



4 Drive Bays, 4 Slots



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16 Selective Unhiding

You've hidden a bunch of adjacent columns; now you want to unhide just one or two. Press **<F5>** and, in the Reference box, specify a cell that's in the hidden column you want to reveal and click *OK*. Once you're in the hidden column, select *Format•Column•Unhide*.

17 Tab Hunting

You can use your mouse or the keyboard to navigate those dialog boxes with multiple tabs (such as the one you get when you select *Tools•Options*). If you're a keyboardist, the manual tells you to use **<Ctrl>-<Page Down>**, **<Ctrl>-<Page Up>**, **<Ctrl>-<Tab>**, and **<Ctrl>-<Shift>-<Tab>**. But you can usually also navigate with the cursor keys or by typing the first letter of the tab's name. If two or more tabs share the same first letter, you may have to type it more than once to reach the tab you want. The exceptions to these navigation tips: Tabbed dialog boxes that don't open with the tab area active (*Insert•Object*, for example).

18 Easy Navigation

Savvy users take advantage of the *Go To* command to navigate large worksheets. Many use names to make big sheets more manageable. But few users know they can combine these tools to move around their sheets using plain English. Let's say you use a worksheet to keep track of your home expenses. Across the top you have the months, and down the side are the various budget categories—Car Payments, Clothes, Garbage, and so on. To make navigating easier, start by naming each column and row after its heading by highlighting it, then selecting


Insert•Name•Define. With your worksheet prepared this way, press **<F5>** to open the *Go To* dialog box and enter, for example, **Apr Christmas**. Excel will select the cell at the intersection of these two ranges.

19 Censoring Bad News


Sometimes you'd rather not face reality. If there are some results in your worksheet that you just don't want to see, use conditional formatting to make them disappear.

Let's say you don't want negative dollar amounts to appear on your sheet. Select *Format•Cells* (or press **<Ctrl>-1**) • *Number*. In the Category box, select *Currency*, and in the Format Codes box, a format containing a semicolon. In the Code box, replace the code after the semicolon with "" and click *OK*. From now on, your worksheet's negative numbers will be invisible, though they'll still appear in the editing window and will be used in all calculations.

20 File Name Formula

 Need a formula to return the current file's name? If you want the full path, it's easy: **=info("directory")**. But what if you want just the file name, not the full path? Try **=mid(cell("filename"),len(info("directory"))+1,12)**.

21 Beyond COUNTIF


 You can use Excel's *COUNTIF* function to count the number of values in a range that meet a given condition. Unfortunately, it lets you specify only one condition. For example, if you want to count all the cells in the range A1:A7 with values greater than 2 but not equal to 10, then *COUNTIF* won't be able to do it. But you'll accomplish your goal with the array formula **=sum((a1:a7>2)*(a1:a7<>10)))**. As with all array formulas, don't type the braces that begin and end the formula; instead, enter the formula and press **<Ctrl>-<Shift>-<Enter>**.



22 You Can Have It All

You probably know that you can select a column by pressing **<Ctrl>-<Space>** or highlight a row by pressing **<Shift>-<Space>**. But what you probably didn't know is that you can select the current region (the block of data surrounded by blank rows and columns) by pressing **<Ctrl>-<Asterisk>**.

23 Auto Everything

 The *AutoSum* button automatically selects and sums the closest contiguous range of values. But why stop there? With the help of some simple macros, you can extend this automatic calculation ability to averages, counts, and other common functions. Here, for example, is how you'd create an *AutoAverage* macro.

Start by selecting *Tools•Record Macro•Record New Macro*. In the Macro Name box, type **AutoAverage**, then click *OK*. Immediately click the *Stop Macro* button, then select the *Module 1* tab. Move to the end of the line reading 'Sub AutoAverage()', and press **<Enter>**, then **<Tab>**. Now, type **SendKeys "%={enter}"**, press **<Enter>** again, and then type **Application.OnTime Now,"Avg"**. Move to the end of the line reading "End Sub," press **<Enter>** twice, and type the line **Sub Avg()**. Press **<Enter>** again and type the line **Cells.Replace What:="sum",Replacement:="average"**. Press **<Enter>** to end the line and type **End Sub**.

To use the macro, highlight the row immediately below (or the column immediately to

	A	B	C	D	E	F
1	INCOME	JAN	FEB	MAR	APR	MAY
2						
3	HUSBAND	4850.00	4850.00	4850.00	4850.00	4850.00
4	WIFE				6120.00	6120.00
5						
6	TOTAL INCOME				0970.00	10970.00
7						
8						
9						
10	EXPENSE				APR	MAY
11						
12	BABY SITTING				500.00	500.00
13	BIRTHDAYS				100.00	100.00
14	GARBAGE				50.00	50.00
15	CAR PAYMENT				250.00	250.00
16	CAR/TRUCK INSURANCE	50.00	50.00	50.00	50.00	50.00
17	CAR/TRK MAINTENANCE	50.00	50.00	50.00	50.00	50.00
18	TRUCK PAYMENT	330.00	330.00	330.00	330.00	330.00
19	CHRISTMAS	0.00	0.00	0.00	0.00	0.00
20	CLOTHES	200.00	200.00	200.00	200.00	200.00

MOVE TO THE INTERSECTION OF TWO NAMED RANGES by typing both names in the *Go To* dialog box.

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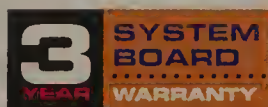
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the right) of the range of values you want averaged. Select *Tools • Macro*, pick *Auto-Average* from the list of macros, and click *Run*. Even better, assign the macro to a custom tool bar button; that way it will be automatically available in all of your worksheets.

26 Dollars and Sense


Entering dollars and cents figures goes a lot faster if you don't have to type the decimal point. Excel has an editing option just for this purpose: Select *Tools • Options • Edit*, check *Fixed Decimal*, and set *Places* to **2**, and the

macro in **FIGURE 1** enables you to toggle between Fixed Decimal and normal modes in a flash. First, select *Tools • Record Macro • Record New Macro*, type **DollarsAndCents**, select *Options*,


between 'Sub DollarsAndCents()' and 'End Sub' in Figure 4. Back in your worksheet, press **<Ctrl>-<Shift>-D** to toggle into or out of Fixed Decimal mode.

1-2-3 for Windows

27 Weekdays Only

 Want to enter a series of dates that includes only weekdays? A simple formula does the trick. Enter a starting date (weekday or weekend) in cell A1. Then, in cell A2, enter the formula **=a1+@choose (@mod(a1,7),2,1,1,1,1,3)** and copy it down as far as you want. Be sure you format the column to show dates.

28 To ERR Is Human

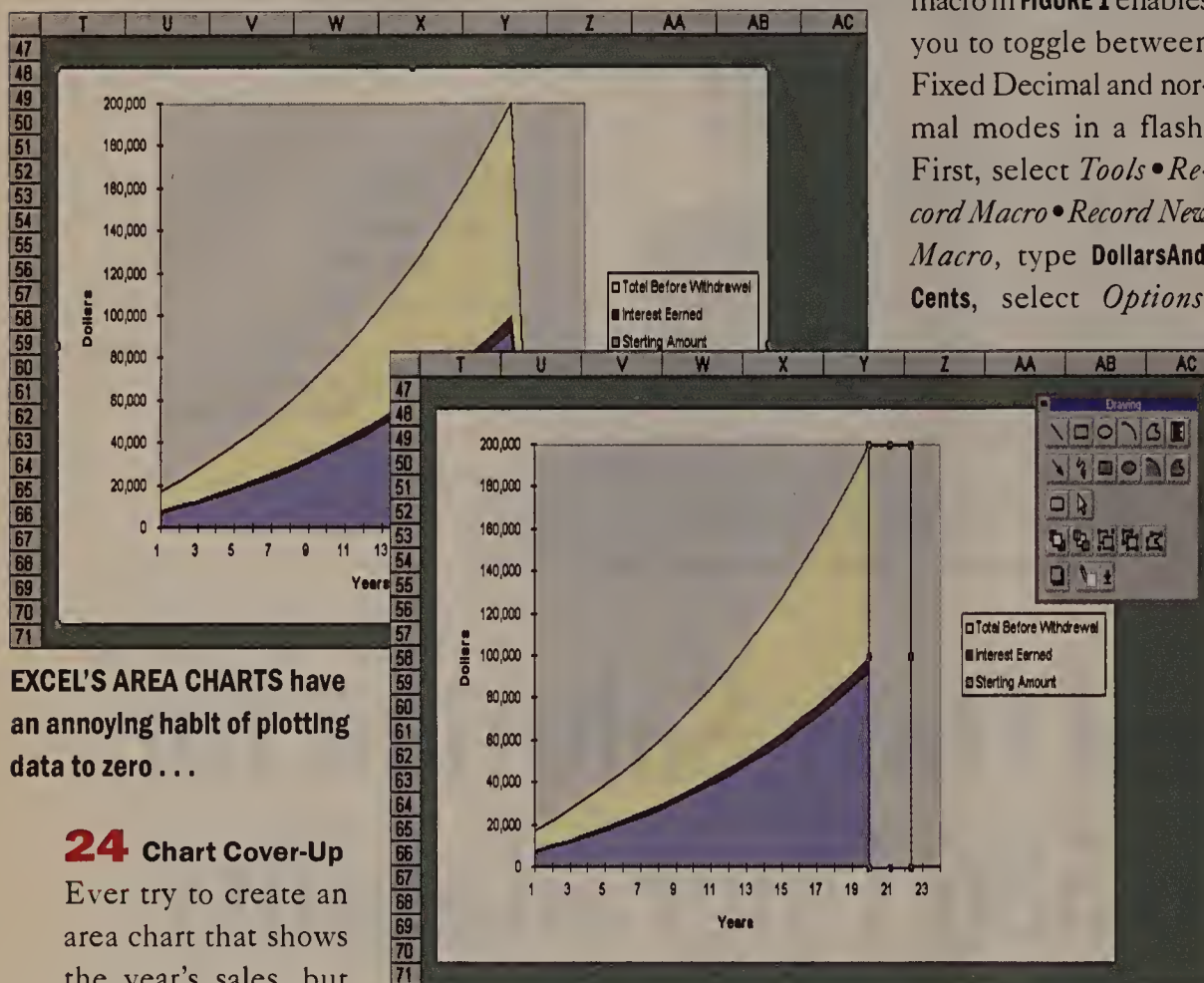
 If one of your formulas divides by zero, 1-2-3 will return an ERR message. Having a lot of ERRs in your worksheet is distracting, so you might be tempted to suppress their display with formulas such as **@if(b5,@sum(a1..a100)/b5,"")**. This tells the worksheet to display nothing if B5 is zero or blank. However, ERR messages are designed to alert you to problems. So, instead of simply hiding them, you should use a formula like **@if(b5,@sum(a1..a100)/b5,"missing data")** to return a more meaningful message.

29 More Than Just Status

1-2-3 release 5.0's status bar makes formatting selected cells easier and faster than using the Style menu. (If the status bar isn't showing, select *View • Set View Preferences • Status bar • OK*.) To change numeric formatting, click the leftmost box on the status bar to pull up a list of formats from which you can select. If the format you pick allows decimal fractions, click the next button on the status bar to set the places to the right of the decimal point. If you're using named styles, use the third status bar button to select a style for the selected cells. To change the font, click the fourth status bar button; to adjust the point size, click the next button to the right.

30 Improving Your Status

If the list of number formats called up from the status bar is too cumbersome, or if you use only a limited number of formats, you can customize the list called up in the previous





EXCEL'S AREA CHARTS have an annoying habit of plotting data to zero . . .

24 Chart Cover-Up

Ever try to create an area chart that shows the year's sales, but you have only three months' worth of data (see the screens above)?

Excel plots the data after the third month to zero, leading to an apparent sharp decline. Fortunately, there's a simple work-around.

Create your chart as usual. Then open the Drawing tool bar (*View • Toolbars*, check  *Drawing*, and click *OK*), and click the  Filled Rectangle icon. Draw a rectangle over the declining area of the chart, then double-click the rectangle to open the Format Object dialog box. Click the *Patterns* tab, and set *Border* to *None*.

25 Flexible Links

Do you want to link a cell or range from your worksheet to, say, a Word document? Make sure that you name the cell or range you're linking, and then use that name in the link. That way, if you make changes to your worksheet later, the links will adjust themselves correctly.

... BUT YOU CAN GET AROUND THIS PROBLEM by using Excel's Drawing tools to cover up the downward slope.

double-click the letter in the Ctrl+ box, hold down **<Shift>** and type **D**, choose the 'Store in' option, and press **<Enter>**. Click the *Stop Macro* button or select *Tools • Record Macro • Stop Recording*. Now, select *Tools • Macro*, click *DollarsAndCents* once, then click the *Edit* button. Type in the lines

```
Sub DollarsAndCents()  
  With Application  
    If .FixedDecimalPlaces = False Then  
      .FixedDecimalPlaces = 2  
      .MoveAfterReturn = True  
    Else  
      .FixedDecimalPlaces = False  
      .MoveAfterReturn = False  
    End If  
  End With  
End Sub
```

FIGURE 1: USE THIS MACRO TO TOGGLE between Fixed Decimal and normal editing modes.

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tip. First, select *Style • Number Format*. In the Format list, highlight each format you want to appear on the status bar and be sure the *Show in status bar* box is checked.

31 Across-the-Board Increases

Suppose you want to look at the impact of an across-the-board, 5 percent increase in costs on your budget. You could write a macro

that would increase all of your line items by 5 percent, but 1-2-3 release 5 has an easier solution. It's called matrix math.

Let's assume your data occupies the range C1..C10. In a blank cell, enter 1.05. Then choose *Range • Analyze • Multiply Matrix*. In the ensuing dialog box, specify A1..A10 as the first matrix, the cell containing 1.05 as the second matrix, and a blank output range for the

resulting matrix; if you want to replace the original values, specify A1..A10 as the resulting matrix. When you click *OK*, the increased values will appear in the output range.

32 Self-Adjusting Links

If formulas in several cells of a worksheet refer to a single cell in another worksheet, what happens if you move or

34 Connecting With Your Word Processor

Putting spreadsheet data in a word processing document is one of the most common computing tasks, yet it's also one of the thorniest. The problem: With so many options, it's hard to know which to use.

The basic procedure begins simply enough: Open your spreadsheet and word processor, then load your worksheet and document. In the spreadsheet, select the cells or chart you want and choose *Edit • Copy* (or press <Ctrl>-C or click your spreadsheet's Copy tool bar button). Then <Alt>-<Tab> to your word processor, select *Edit • Paste Special*, and ...

That's when it gets tricky. Depending on your word processor, you'll need to choose Paste or Paste Link and select from several different formats, including Spreadsheet Object, Formatted or Unformatted Text, Picture, and Bitmap. Fortunately, in everyday use you'll probably require only a few of the available permutations.

Simple Pasting

If your word processing document is a one-shot letter or memo, and the original spreadsheet data probably won't change, a simple paste is all you need. Pasting simply inserts a copy of the spreadsheet data into your word processing document. It's quick, and the imported data won't unduly bloat the document.

If you copied a range, several different format options will confront you in the Paste Special dialog box. But if you're just inserting a table in your document, the only options you need to worry about are *unformatted* and *formatted* text. Pasting unformatted text is the functional equivalent of typing the spreadsheet numbers into your document; if you copied a multicolumn range, the values will be separated by tabs or spaces. Pasting the range as formatted text is more useful: The range appears

in your word processing document as a table that you can then edit using your word processor's table tools.

Whichever format you decide to use, the paste procedure is simple. In Microsoft Word or WordPerfect, choose *Edit • Paste Special • Paste*, and then select *Unformatted text* or *Formatted text (RTF)*. In Ami Pro, use *Edit • Paste Special*, and then select either *Text* or *Rich Text Format*.

If you're copying a chart instead of a range, paste it as a *picture*. In Word and WordPerfect, select *Edit • Paste Special*, click *Paste*, then choose *Picture* from the As list; in Ami Pro, select *Edit • Paste Special* and choose *Windows Metafile*. Double-click the chart to launch your word processor's graphics tools to edit the chart as a *picture*; you won't be able to edit its underlying values.

Embedding

Pasting simply inserts a snapshot of the worksheet into your document. If you'll be revising the document repeatedly, and the spreadsheet data is subject to change, use *embedding* or *linking* instead.

If you're the only one editing the source worksheet, you're copying a single range (or chart) from your worksheet into a single document, and you can tolerate some file bloat, use embedding. Like pasting, embedding inserts a copy of the spreadsheet data into your document; unlike pasting, it lets you edit that data using your spreadsheet's editing tools.

On the downside, changes you make in the

original worksheet won't show up in the embedded object, and vice versa. Embedding is unwieldy if you're importing a table or chart from one worksheet into several documents: If you need to change the data, you'll have to do so separately in each document. For similar reasons, embedding can also be impractical if you're importing several ranges or charts into one document. Finally, embedding makes document files huge.

If you decide that embedding is the way to go, it's almost as easy as a simple paste: Just select the range or chart in your worksheet and choose *Edit • Copy*. In your word processor, select *Edit • Paste Special*. In Word or WordPerfect, you then select *Paste* and, in the As list, the appropriate object; if, for example, you've copied a chart from Excel, you'll choose *Microsoft Excel 5.0 Chart Object*. In Ami Pro, you simply select *OLE Embed*.

After you embed the table or chart, double-click it to start editing. If the source and target apps both support OLE 2.0 In-place editing (Word 6.0, Excel 5.0, Quattro Pro 6.0, and WordPerfect 6.1 do; Ami Pro and 1-2-3 don't), your spreadsheet's menus and tool bars will replace your word processor's. If your apps don't support in-place editing, double-clicking will start the source application itself. In either case, changes in the embedded worksheet are saved in your word processing document, not in the original spreadsheet file.

After you embed the table or chart, double-click it to start editing. If the source and target apps both support OLE 2.0 In-place editing (Word 6.0, Excel 5.0, Quattro Pro 6.0, and WordPerfect 6.1 do; Ami Pro and 1-2-3 don't), your spreadsheet's menus and tool bars will replace your word processor's. If your apps don't support in-place editing, double-clicking will start the source application itself. In either case, changes in the embedded worksheet are saved in your word processing document, not in the original spreadsheet file.

Linking

Linking inserts a pointer from your document to your worksheet file. Unlike embedding, linking keeps the word processing and spreadsheet



rename that second sheet? When you update the references, they're no longer valid and you'll get a bunch of ERRs. You could search and replace for references in all your worksheet's formulas, but there's an easier way: Instead of creating separate links to one cell in an external worksheet, put a formula in cell A1 that links to that external cell: `+«c:\data\original.wk4»a:4`. Then edit your

other formulas so that they refer to cell A1. If you change the link, all you need to do is edit cell A1; all the other formulas will then update automatically.

33 All the Formatting That Fits

In earlier DOS versions of 1-2-3, users could view cell formatting easily because formatting codes were displayed along with the cell

address in the editing box. Unfortunately, the Windows versions of 1-2-3 show only some, rather than all, formatting information on the status bar. To get the rest of the formatting story, you'll have to revert to the Classic or Wysiwyg menus. With the cell you want to know about selected, simply hit /, :, or <. The top line of the resulting menus will then display the formatting codes for the current cell.

data separate. Even if several people are working on the worksheet, their changes will show up in your word processing document. Linking also makes many-to-one or one-to-many connections between worksheet and document manageable; instead of updating each table and chart individually, you can update all of the imported data in one fell swoop. Finally, because linking inserts a pointer rather than data, your documents won't get that bloated feeling.

If you decide to paste a link, you'll have the same options that you do with regular pasting—text (formatted or not), picture (or bit map or Metafile), and object—and your choices will follow the same rules. For example, to link a single

cell from your worksheet to a Word or WordPerfect document, you'll select **Edit • Paste Special • Paste Link**, choose **Unformatted Text**, and click **OK** (In Ami Pro 3.01, select **Edit • Paste Link**). To import a chart, use the **Picture** or **Metafile** format; for a table or chart you can edit with your spreadsheet's editing tools, select the appropriate object from the format list (In Ami Pro, use **Edit • Paste Special • OLE Link**).

After Linking

Once you have established a link, changes in the worksheet are reflected immediately in the document if both apps are open. If your spreadsheet is closed, Word automatically fetches the

current value from the closed spreadsheet file; in WordPerfect or Ami Pro, you have to update the links manually (using **Edit • Links** in WordPerfect or **Edit • Link Options** in Ami Pro). Be aware that if you move or rename the worksheet, the link will be lost; if that happens, select **Edit • Links** in your word processor to reestablish the link path.

To edit the linked object, double-click it. If the spreadsheet and the linked worksheet aren't already open, Windows will launch them; if you make changes to the worksheet while the document is closed, you may need to update the link after you open the document.

—Richard Scoville

PASTE, EMBED, OR LINK?

Copy a spreadsheet range or chart, switch to your word processor, and select **Edit • Paste Special**. You'll find lots of choices there.

Unformatted text

Paste

Equivalent to typing data into the document; use word processor's standard tools to edit.

Paste Link

Inserts values from worksheet into document, like Paste, but any changes made to original worksheet appear in document.

Rich Text Format

Paste

Equivalent to creating a table and typing in data; use word processor's table editing tools to edit.

Paste Link

Like Paste Link • Unformatted text, but retains spreadsheet formatting when you update link. Edit with word processor's table editing tools.

Picture or Bit map

Paste

For charts. Double-click launches word processor's graphics editor; you can't edit chart's underlying data.

Paste Link

Links to chart in original worksheet. Double-click opens worksheet in spreadsheet for editing.

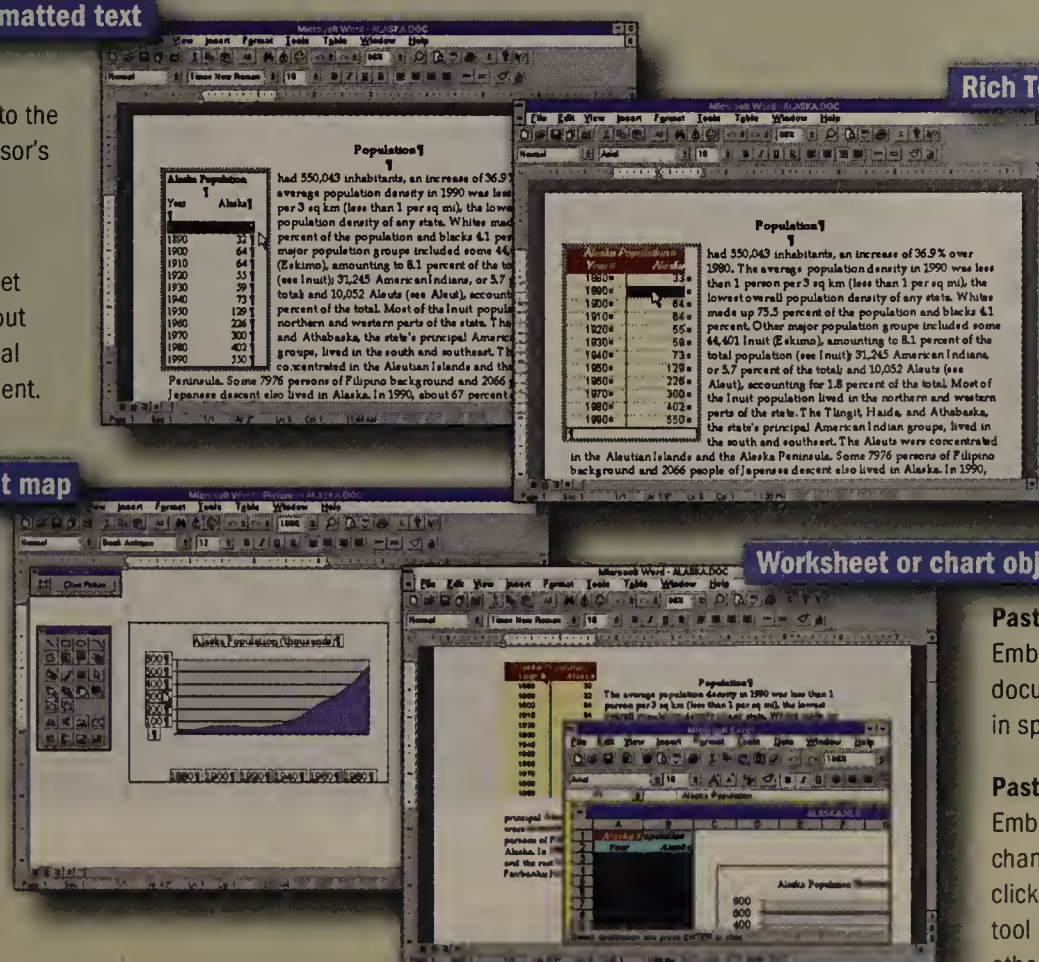
Worksheet or chart object

Paste

Embeds copy of worksheet or chart in document; double-click launches worksheet in spreadsheet for editing.

Paste Link

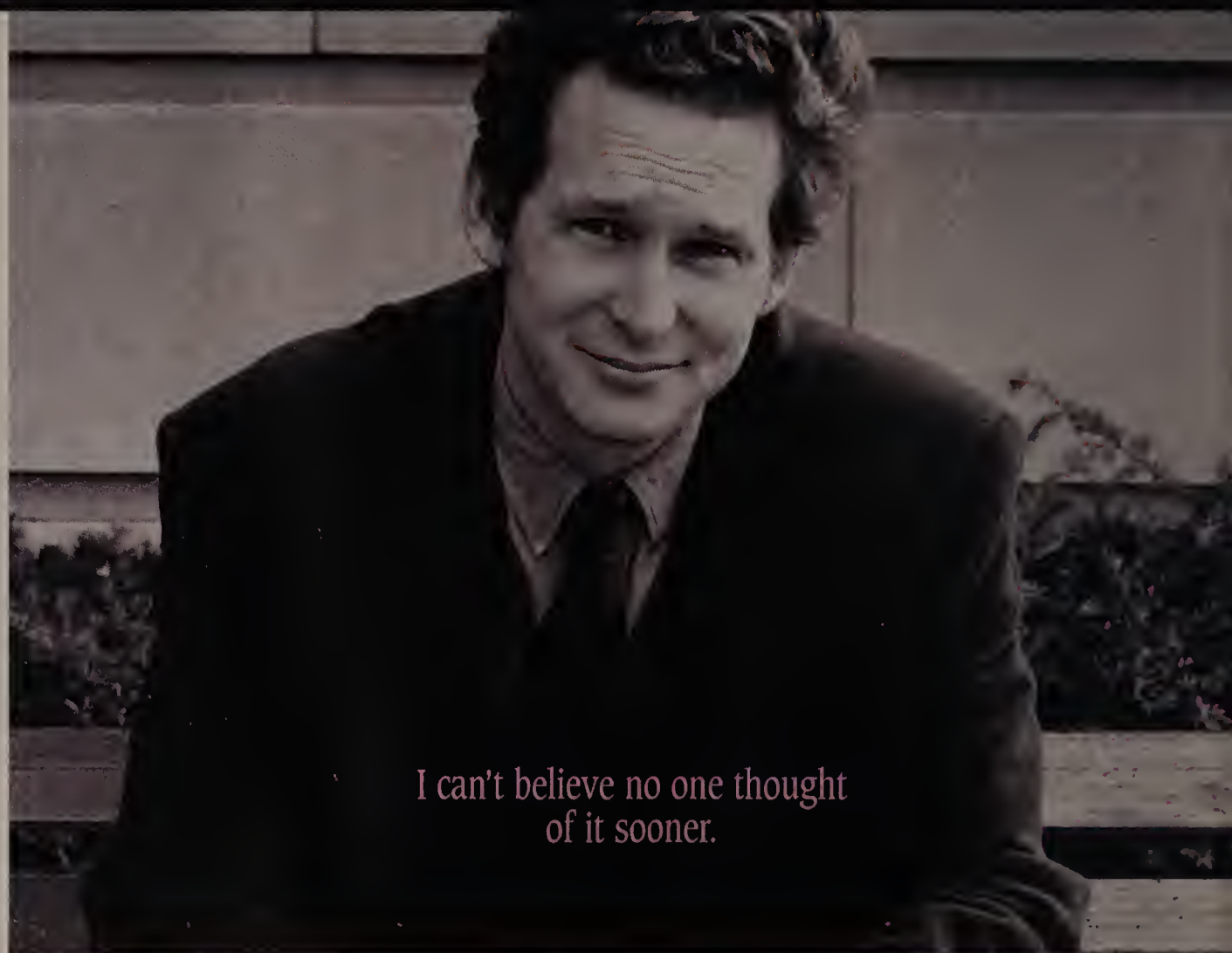
Embeds linked copy of worksheet or chart; changes in original appear in copy. Double-click in some apps replaces word processor's tool bars and menus with spreadsheet's; in others, opens worksheet in spreadsheet.





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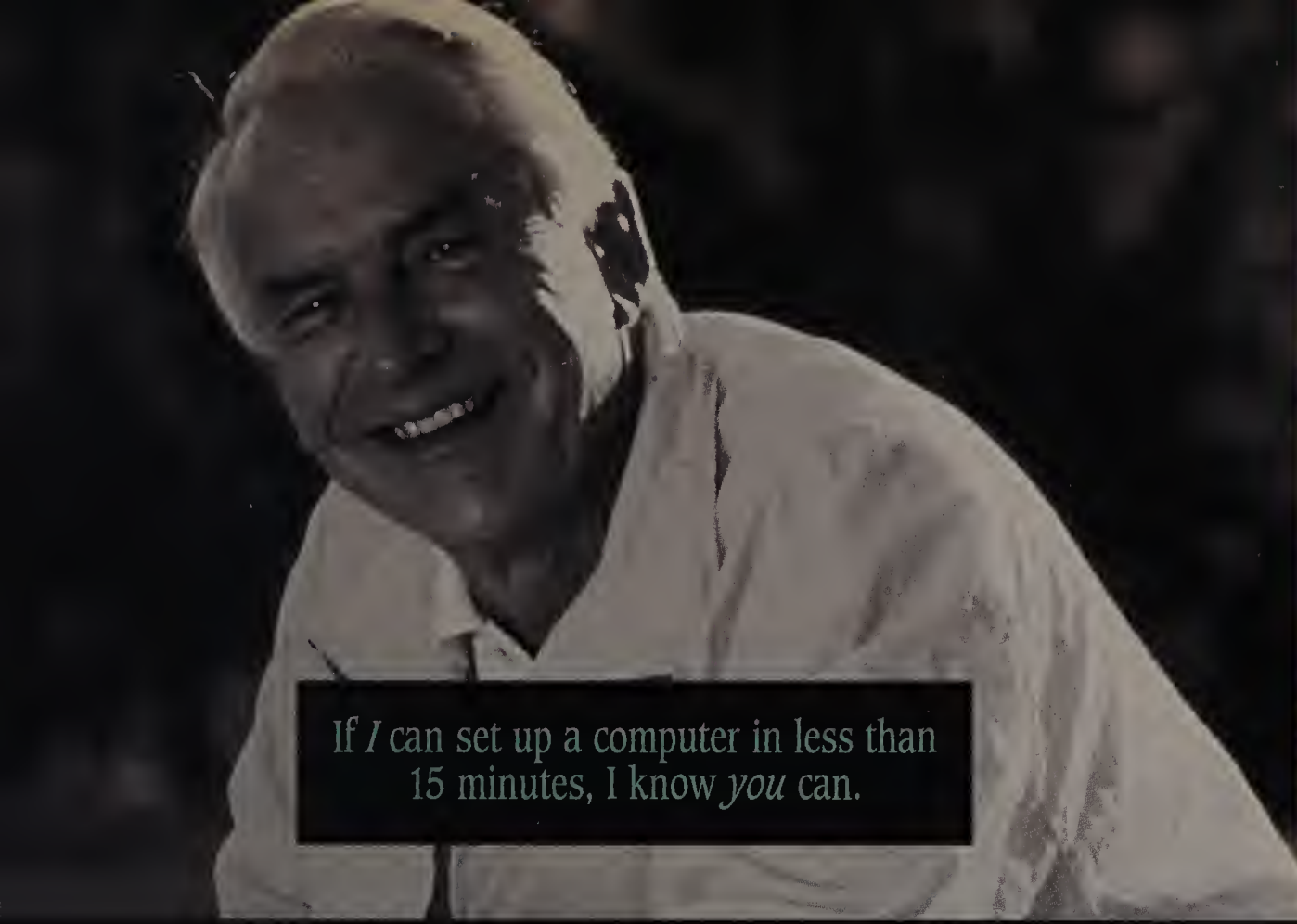


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35 Label or Value?


In 1-2-3, you can enter a value as a label by using a label prefix. But what happens if you then want to use that value in a calculation? You may forget you entered it as a label. The trick is to find out which it is. 1-2-3 can tell you by way of a simple formula: **@cell(type,a1)**. This formula will return the values 'l,' 'v,' or 'b' for label, value, and blank, respectively.

	Q	R	S	T	U	V	W	X
53 EXPENSES	OCT	NOV	DEC	JAN	FEB	MAR	TOT	
54 GARBAGE	50	50	50	50	50	50		
55 CAR PAYMENT	250	250	250	250	250	250		
56 CLOTHES	200	200	200	200	200	200		
57 ELECTRIC BILL	50	50	50	50	50	50		
58 GROCERIES	800	800	800	800	800	800		
59 HOUSE PAYMENT	2995	2995	2995	2995	2995	2995	8985	
60 HOUSEHOLD ITEMS	400	400	400	400	400	400	1200	
61 MAGAZINE	30	30	30	30	30	30	90	
62 MEDICINE	100	100	100	100	100	100	300	
63 PHONE BILL	100	100	100	100	100	100	300	
64 WATER BILL	60	60	60	60	60	60	180	
65 MONTHLY EXPENSES								

1-2-3'S SUM SMARTICON would have a hard time adding up these columns and rows unless you give it some assistance.

36 Summing Less Than Everything

Sometimes 1-2-3's Sum SmartIcon isn't so smart. Take the example in the screen above. Let's say you want to add columns U through W and rows 59 through 64. If you select X54:X64 and R65:W65 and click the Sum icon, 1-2-3 will include columns R through T and rows 54 through 58 in its calculations.

 The solution: Highlight U59:X65 first and then click the Sum SmartIcon.

37 Drag and Fill in Macros

If you're recording a macro in 1-2-3 release 5 and try to use drag-and-fill or drag-and-clear, 1-2-3 won't record it; only the cell selection is recorded. The work-around: Use the menus to fill the range: Select *Range • Fill by Example* or *Range • Fill*. The fill itself will be recorded. If you want to include drag-and-clear, select *Edit • Cut* or *Edit • Clear*.

38 Auto Everything II

Like Excel (see tip 23), 1-2-3 has a button—the Sum SmartIcon—that automatically selects and adds up values in a range. And, like Excel, you can use this tool as the basis for customized buttons that automatically calculate averages, counts, and other common functions.

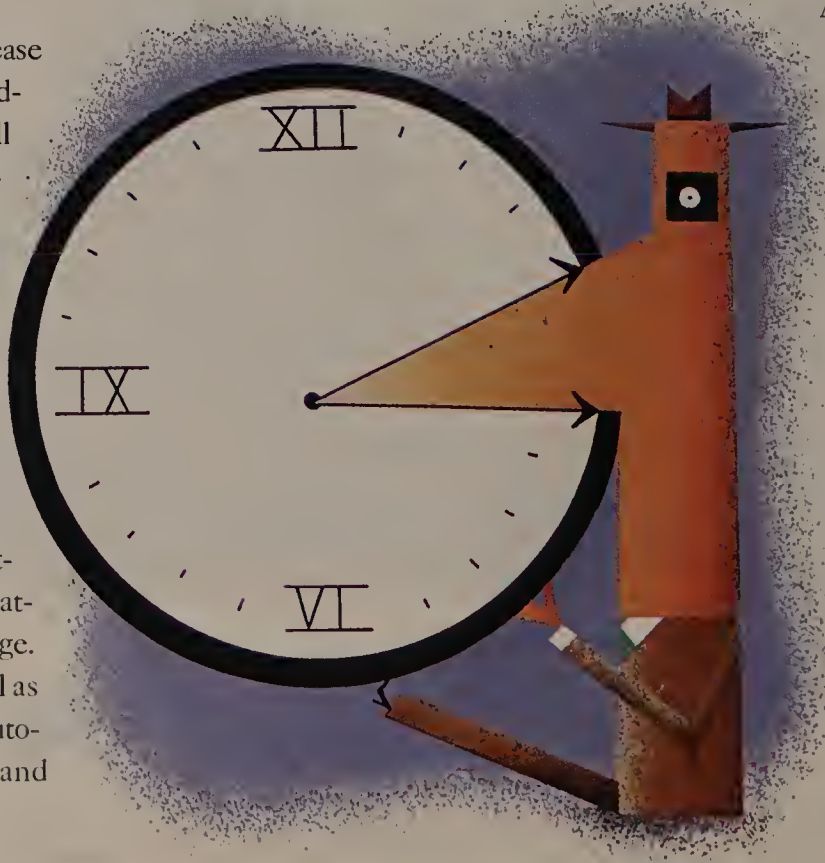
Start by entering **{smartsum}** in a worksheet cell, then enter **{edit-replace-all "sum";"formulas";"avg"}** in the cell below. Highlight both cells, select *Range • Name*, and enter **AutoAverage** in the Name box. To use the macro, highlight the cells where you want the averages (just below or to the right of the range of values), select *Tools • Macro • Run*, and select *AutoAverage* from the list. Even better:

Assign the macro to a custom SmartIcon.

39 SmartIcons for Non-Lotus Apps


1-2-3 comes with SmartIcons that can launch other Lotus apps, but what if you want to open a non-Lotus app from inside 1-2-3? Answer: You can do it with a macro, thanks to the Launch command.

Select *Tools • SmartIcons*, then click *Edit Icon*. In the Edit Icon dialog box, select *New Icon* and type in a name for the icon. In the ‘Enter macro here’ box, type **{launch, a space,** and then the path and file name of the application you want to launch in quotation marks (as in **launch "c:\wp\wp.exe"**) followed by another **}**. Enter a description in the Description box, then use your mouse to create an icon on the button blow-up—we used the letter *L*. Click *OK* when you’re done. Back in the



SmartIcons dialog box, find your new icon in the Available icons list, then drag it over to whichever SmartIcon set you wish.

40 Leading Zeros


 Want to fill a column with three-digit numbers from 001 to 999, with leading zeros where appropriate? Select *Range • Fill* to bring up the Fill dialog box. Select *Linear*, and in the Start, Increment, Stop, and Range boxes, enter **1**, **1**, **999**, and **A1..A999** (or the desired target range), respectively. Select *OK*. Enter the formula `@right("00"&@string(a1,0),3)` in cell B1 and copy it to cells B2..B999. Note that the numbers in column B are labels, so they won't calculate naturally. To use them in calculations, use the `@VALUE` function.

41 Turn Off Bubble Help

Bubble help is a great way to find out what different SmartIcons do. But it can also be irritating when those bubbles pop up every time your mouse pointer rests momentarily over a tool. If you want to suppress these bubbly little helpers, select *Tools • SmartIcons*, uncheck the Show Icon Descriptions check box, and click *OK*.

Quattro Pro

42 Hours and Minutes

 Need to calculate hours and minutes from decimal values, in order to translate, say, the value 8.75 to '8 hrs and 45 min'?

Assuming that the decimal value

appears in cell A1, try the following formula: `@string(@int(a1,0)&" hrs and "&@string(@mod(a1,1)*60,0)&" min".`

You can, of course, adjust the text strings as you see fit.

43 Keeping the Right DLL In the Right Place

Occasionally, installing Quattro Pro 6.0 for Windows bestows you with multiple copies of the file BWCC.DLL. In particular, you may end up with one in the \WINDOWS directory and one in the \WINDOWS\SYSTEM directory. If this happens, you may get an error message when trying to load QPW 6.0. To fix this problem, make sure that the



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BWCC.DLL file in your \WINDOWS-\SYSTEM directory is dated 1/24/94 or later, and delete any other copies of the file from your local hard drive (and from any network directory in your search path). Then exit and reload Windows.

44 Adding Suffixes to Numbers

Have you ever tried to add the appropriate ordinal suffixes to a range of numbers (i.e. '1st', '2nd', '3rd', and so on)? It's harder than it looks. The most flexible formula for the job is the following one: `@string(a1)&@choose((@mod(a1,10)<4)*@mod(a1,10)*(@int(@mod(a1,100)/10)<>1),"th","st","nd","rd")`.

45 New, Improved File Dialogs

Quattro Pro users have been clamoring for the ability to delete files from within QPW instead of having to use <Alt>-<Tab> to switch to File Manager. While Quattro Pro 6.0 by itself doesn't solve this problem, these poor souls can get what they want by using WordPerfect 6.1 (with shared code version 2.3).

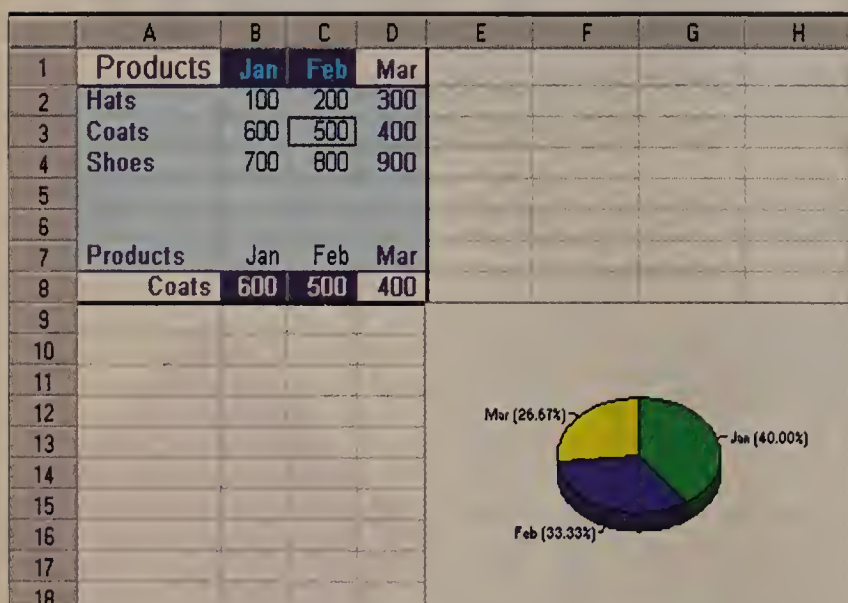
Assuming that you have both products installed, select Quattro Pro's *Property* but-

46 Finding the End of a Month

If you need to figure out the last day of any given month—for dating invoices, say—you can use the following formula. Enter any date in the month for which you want to know the last day in cell B1; be sure it's formatted correctly as a date. Then enter the formula `@date(@year(a2)+(@month(a2)=12),@if(@month(a2)<>12,@month(a2)+1,1),1)-1`. The formula adds one month to the current month, finds the date of the first of that month, then subtracts one day (unless it's December, in which case 1 is added to the year and January is set as the month).

47 Dynamic Graphing

Have you ever wanted a graph that would chart data dynamically, changing as you selected different ranges? Here is a simple way to do it: Assume your data is laid out in the range A1..D8, as in the screen shown at lower left. Copy the titles in cells A1..D8 to A10..D10. In cell A11 enter the formula `@@(a@string(@cellpointer(row),0))`. Copy this formula to cells B11..D11, changing the 'a' to 'b', 'c', and 'd' in cells B11, C11, and D11, respectively. Finally, to place your chart, highlight A10..D11 and click the Graph Tool. Drag the mouse to place the chart wherever you want on the worksheet. Now move your cursor to any row of the database and press <F9>. Each time you move to a new line and press <F9>, your graph will change to fit that row's data.



DYNAMIC GRAPHS IN QUATTRO PRO change as you move the mouse pointer; the trick is in using the `@CELLPOINTER` function.

ton, then *Application* • *File Options*, and check the *WordPerfect File Dialogs* box. Subsequently, when you select *File* • *Open* or *File* • *Save*, you'll see WordPerfect's dialog boxes, from which you can perform all sorts of everyday file management tasks, including copying, moving, renaming, deleting, and printing files, as well as creating, removing, and renaming directories.

48 Save Memory by Sparling Columns

Short on memory? One trick is to store information in as few columns as possible. In Quattro Pro, columns use more

memory than rows, so arranging your data in fewer columns will save some precious system resources.

49 Quirky Quattro Currency

Another Quattro Pro bug: Sometimes, when upgrading over QPW 5.0, the QPW.INI file is amended so that instead of displaying currency as '\$1.00', QPW displays it as '\$Quat-

tro1.00'. To fix this, start QPW6.0, then use *Property* • *Application* • *International* • *Currency* and edit the format or choose *Windows Default*.

50 AutoAverage III

Quattro Pro's SpeedSum button is one of the program's handiest tools. Wouldn't it be nice to have a similar icon to do quick averages? The macro in **FIGURE 2** will do the trick. Just enter it as written; if you wish, you can use the *Macros* button to pick the commands from a list. Once you've entered the commands, name the first cell of the macro (select *Block* • *Names*, then enter a name like *AutoAverage*). To use the macro, select the range where you want to enter averages and select *Tools* • *Macro* • *Play*, then select *AutoAverage*

```
{Speedsum}
{Search.Reset}
{Search.Block
@property("active_block.selection")}
{Search.Find sum}
{Search.ReplaceBy avg}
{Search.ReplaceAll}
```

FIGURE 2: USE THIS SIMPLE MACRO to do quick averages.

from the *Macros/Named Blocks* list. You can also add the macro to a tool bar, spreadsheet button, or custom dialog box.

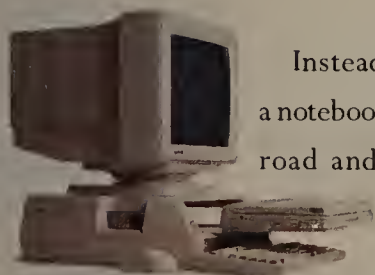
You can use similar macros to create other autofunctions: Just change 'avg' in the fifth cell to any legal function name; you could use count, median, max, min, mode, and std, to name just a few.

Shane Devenshire is author of Excel Professional Techniques and Using 1-2-3 Release 4 for DOS. Dan Miller is an associate editor and Richard Scoville a contributing editor for PC World. Contributors to this article include Shane Devenshire, Dan Finger-man (author of Using 1-2-3 Release 5 for Windows), Karl Koessel (senior technical editor, PC World), Barry Schnur (Novell NetWire sysop and treasurer of the Phoenix PC User's Group), Ralph Soucie (Excel consultant and author of Making Microsoft Office Work (Osborne/McGraw-Hill), and Cathy Pfeiler (a freelance writer based in Melrose, Massachusetts). Special thanks to Ray Whittemore for sample worksheets.

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BY JOHN GODDARD

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STUART BRADFORD



Frill or Feature?

Which Windows-based image editor serves your needs best? If you're brand-spanking-new to image editing, a high-end program is a bit much for simple touch-up jobs. On the other hand, if you plan to invest time and money in bigger and bigger graphics projects, a bargain-basement package will feel like playing with Crayolas during recess. For beginners, extensive tutorials and an organized, plain-English interface are the best bet. Also essential are easy-to-use features that can touch up—or radically alter—scanned photos without overwhelming lower-end PCs.

Business users should take special note of two programs: Micrografx Picture Publisher 5.0 and Corel Photo-Paint 5 Plus. Both support Windows OLE 2 (object linking and embedding), so you can import and touch up photos directly in popular programs like Freelance, Persuasion, Word, and Excel—no messing with confusing file formats. Graphics professionals, on the other hand, demand precision tools that can produce predictable results quickly for clients.

Image Editing Layer by Layer

Your time is limited. To simplify the image editing process, most programs now use a technique called *layering*, which offers an easy way to create a collage on your computer. You select (or *mask*) parts of images and layer them without needing to glue each piece down. Instead, each layer floats independently and can be rearranged anytime you want to try out new ideas. When you are satisfied, either drop all the masked parts down to the background surface or save the image “live,” with floating layers intact, using the program's own layer file format. All the programs reviewed use various methods to float masked-object layers and allow you to flatten the image so you can save it in a common file format most applications can read. Unfortunately, no standard layer file format dominates the market yet so that you can import and export layered images between these packages.

While creative effects are the glitz of image editing, eventually they can lose their luster from overuse. To counter that, most packages support Adobe's method of allowing you to plug in new effects. Written by a host of outside graphics experts, these effects can greatly enhance any special-effects arsenal. If you plan to buck the tide with a bevy of fancy imaging effects, it's smart to invest in an image editor that lets you plug in additional tools (see the sidebar “Creative Resources: Cool Tools and Collections”).

Whatever your image editing needs are—whether you're working on business presentations or a fancy newsletter, or just trying out your own creative style—one of these programs may be just right for you. To help you pinpoint which program suits you best, we've put the pros and cons above each product reviewed, along with a report card summarizing the quality of the components listed in the features table. If you're looking to illustrate your ideas with images, these powerful tools can help—but the most important resource is your imagination.

John Goddard is an assistant editor for PC World.

For more information about all products in this article, circle reader service no. 910.

BEST BUYS



Adobe Photoshop 3.0 earns our award for high-end photo manipulation. Its full-featured design and creative potential are streamlined with layering. Though the huge 16MB RAM requirement and steep \$895 price may humble beginners, professionals looking for a solid crossplatform graphics engine probably know this program by heart.

At \$595, Micrografx's Picture Publisher 5.0 is the best choice for powerful imaging potential on a modest budget. It can manipulate large images without taxing your PC, and it allows you unlimited levels of undo—something no other PC imager is capable of.

Corel Photo-Paint 5 Plus's robust image editor and ample supply of extras will surprise users looking for lots of tools at a rock-bottom \$249 price (\$99 for the CD-ROM only).



Adobe Photoshop 3.0 for Windows

PROS: Excellent feature interaction, multiple floating layers, zoom-in previews

CONS: Expensive, no OLE 2 support, awkward text tool

Photo retouching	A
Image creation	A
Tools and features	A
Output precision	A



Photoshop 3.0 for Windows, a full 32-bit feature-for-feature twin of the Mac version, still reigns as the ultimate photo manipulation tool on the PC. Its well-integrated assortment of powerful tools easily reproduced our test image. Even if you don't know what you're doing, a journey down the Effects menu can produce some unexpectedly cool results.

Photoshop isn't for everyone. If you only need to do casual touch-up jobs, this is overkill. The steep \$895 price and porcine 16MB of



Adobe Photoshop 3.0 for Windows' masked layers, customizable palettes, and precision output tools are significant upgrade pluses.

RAM recommendation can be daunting. But if you're looking for a cornerstone graphics engine for yourself or your design department, Photoshop is your best choice.

Certainly the most welcome (and requested) addition to version 3.0 is the ability to "float" selected image elements in layers. Before layering was added, only those familiar with Photoshop's underworld of alpha channels could undo unwanted effects. Most of us simply cut and pasted elements, but one step past undo and they were permanent. Layering lets you rearrange or remove elements anytime. This significantly broadens the creative potential of Photoshop, but bear in mind that each new layer dramatically increases memory demands.

Photoshop can also be tailored to work the way you do. Tabbed feature palettes roll up tightly to save screen space, and you can pull a feature from one palette and move it to another. You can also move frequently used commands onto the Command Palette so you have instant access to everyday features.

Special-effects filters are still slow, but Photoshop's filter previews show you what will happen to your graphic if you choose OK. Unlike those of other programs, many Photoshop previews sport a zoom tool so you can scrutinize effects close up or from a distance. And Photoshop's Lighting Effects tool is a quick way to add ambience to a bland background. Photoshop's color printing preview can also save time—and money. It spotted colors on our test image that would not print well, so we used the sponge tool to saturate or absorb the problem colors until the preview indicated it was OK to print.

There are some things to find fault with: You must enter text into a dialog box instead of on screen; you can't record macros; and there's no OLE 2 support. A CD-ROM is included, with sample photographs, fonts, several plug-in effects, and a tutorial. No surprise here: For high-end image editing, Photoshop is a Best Buy. *Adobe Systems Inc.*, 800/833-6687, 415/961-4400 **Reader service no. 805**

Corel Photo-Paint 5 Plus

PROS: Roll-up palettes, checkpoint undo, texture generator

CONS: Can't completely open images larger than 16MB

Photo retouching	A
Image creation	B
Tools and features	A-
Output precision	A



For the same price as Photoshop, CorelDraw's mammoth bundle of graphics programs gives you everything under the sun. But if you just do image editing and painting, Corel's stand-alone Plus version of Photo-Paint 5 may be all you need. It sports all the high-end features: independent floating layers, a variety of masking tools, on-screen text entry and editing, and plug-in support.



Corel Photo-Paint 5 Plus's low price buys a surprising host of high-end features, including object layering, textures, and checkpoint undo.

THE REAL-WORLD TESTS: ADS AND LOGOS

To test these programs, we re-created two challenging (yet typical) graphics projects and used them to evaluate each program's potential for photo manipulation and image creation. For our image editing test, we designed a modest 15MB photomontage that

could be used for a small business publication or ad. We scanned images, adjusted tonality, touched up flaws, altered areas with special-effects filters, threw a shadow behind text, blended (*feathered*) image edges together, and layered masked portions of other photos into the main image.

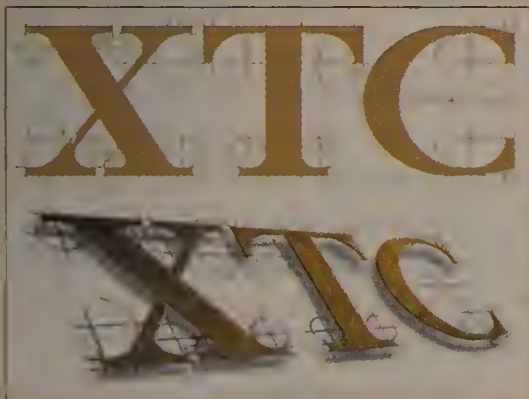
Our second test was a simple redesign project so we could gauge each program's capabilities for creating a logo using text and paint tools. During this process, we evaluated how easy it was to find and use each program's features; for instance, were certain features right at the surface, buried in submenus, or simply missing?

We gave points for usability features such as roll-up and user-customizable toolboxes, unlimited undo, and macro recorders, and we



Each program rebuilt this high-resolution ad on a DX2-66 with 16MB of RAM.

knocked off points if the quality and quantity of photo retouching tools were lacking. We were also on the lookout for unique extras, as well as image management and conversion features. Finally, to see if a program supported plug-in filters, we added texture to type using third-party plug-ins. The more features a program offered, the better it succeeded in reproducing our test image.



Before and after: The task was to improve logos without losing the original design.

CorelDraw users will recognize the space-saving roll-up palettes, color ribbon, and color calibration system. It doesn't match Photoshop's or Picture Publisher's power, but for just \$249 (\$99 for the CD-ROM-only version), it comes close. If you're looking for full features on a tight budget, Photo-Paint 5 Plus is a choice low-end Best Buy.

You get a ton of popular plug-in filter effects, over 300 seamless textures, 1000 photos, 10,000 clip-art graphics, 50 floating objects, 100 fonts, Corel Mosaic image organizer, and Corel Capture. You can also create textures, rotate pictures on a 3-D plane, and designate an undo checkpoint in your current imaging session if you think that you will need to undo later changes. There's one big trade-off, however: Photo-Paint only opens a portion of any image exceeding 16MB. Anyone designing full-page, high-resolution images should seriously consider this limitation before investing in this program. But if your projects are more modest, Photo-Paint's rock-bottom price and breadth of features make it a fine Best Buy choice for novices. *Corel Corp.*, 800/772-6735, 613/728-8200 Reader service no. 806

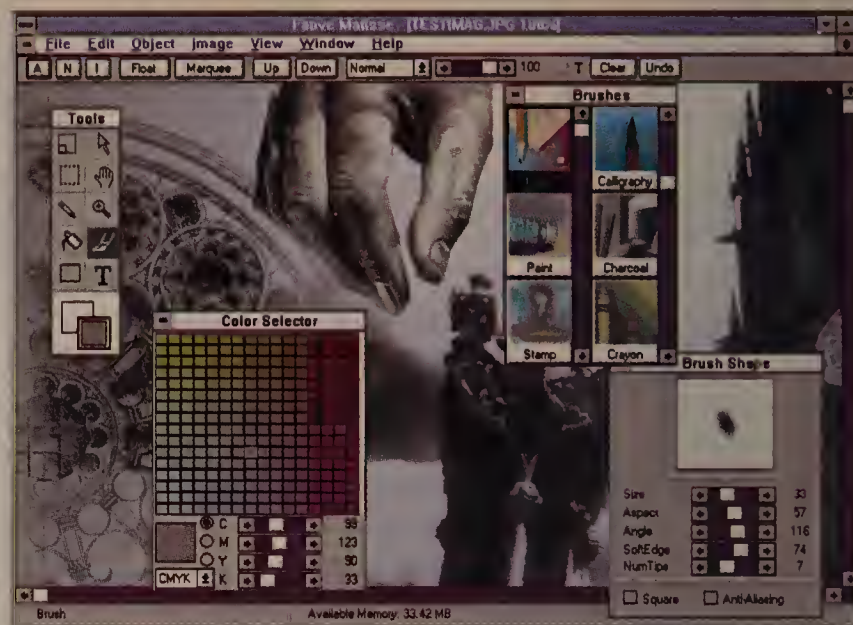
Fauve Matisse 1.26

PROS: Inexpensive, strong paint simulation, floating layers

CONS: Uses TrueType fonts only, no floating-layer list

Photo retouching	A
Image creation	B+
Tools and features	B
Output precision	C

In 1908, Henri Matisse described painting as a condensation of sensations. Fauve Matisse causes quite a stir with its dense array of image-enhancement tools and palette of paint simulation features for only



You can touch up images or design your own custom painting style using Fauve Matisse's remarkably full palette of tools and brushes.

\$149. Though this low-price alternative to Fractal Design Painter doesn't compare stroke for stroke in the special effects arena, its basic image-editing tools, file management, and file-format support fill some gaps in Painter.

Matisse's collection of brushes is impressive—it offers pens, pencils, airbrushes, crayons, felt-tip pens, charcoal, watercolors, oils, and pastels—but by far the most vivid brush strokes in this program mimic the pointillist, cubist, and fauve painting styles. All the brushes are customizable, and you can name and save favorite brushes that you've created for specific effects. You can also preview filters and plug in

GET A GRIP ON GRAPHICS: IMAGE ORGANIZERS

Graphics software may have come a long way, but the road is littered with incompatible file formats. If you've ever had trouble finding or converting an important image, image management tools offer varying degrees of sophisticated cataloging and search techniques, as well as tools to capture, touch up, and convert images to a broad variety of file formats. Most of them also integrate nicely with other Windows programs that use OLE 2 drag-and-drop support. If your image editing needs are light, one of these graphics suites—priced from \$50 to \$249—may be all you need.

Collage Complete 1.0, priced at \$149, supports ten file types (bit map only), including JPEG compression. The image editor is lean, but the DOS and Windows capture utility can be tamed to

grab transition screens; and the thumbnail manager can convert, print, or re-size images in batches. You can also give a slide show from DOS. • *Inner Media*, 800/962-2949, 603/465-3216 Reader service no. 811

FreezeFrame 2, a \$50 introduction to the world of graphics, is a suite of basic image management, screen capture, photo manipulation, drawing, and desktop publishing programs. More than 40 file formats are accessible, and the AutoTrace tool converts bit-map files to vector drawings. • *DeltaPoint*, 800/446-6955 Reader service no. 812

Graphics Tools can capture, manage, and convert more than 50 types of media files, and the image editor supports vector, bit-map, and fax file formats. Priced at \$99. • *DeltaPoint*, 800/446-6955 Reader service no. 813

HiJaak Graphics Suite 3.0 for Windows sports an image librarian that can assign keywords automatically to your vector files. If you're dealing with a long list of obscure file types, this \$169 graphics suite offers access to more than 70 media formats, and it supports Windows OLE 2. HiJaak also has the capability to capture DOS and Windows screens. • *Inset Systems*, 800/374-6738 Reader service no. 814

ImagePals 2 hosts a better-than-average image editor and a media manager that lets you visually organize and convert nearly 50 file formats. You can even use it to edit images inside common Windows business programs using OLE 2. Included in the \$249 program is a CD-ROM that holds a collection of 2000 images. • *Ulead Systems*, 310/523-9393 Reader service no. 815

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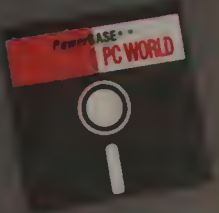
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CREATIVE RESOURCES: COOL TOOLS AND COLLECTIONS



Even the best special effects look canned after a while. If the creative spark dims when you're in the middle of your new project, try rekindling it with these imaging extras. Here's our pick of eight creative resources to boost your imagination, for as little as \$59.

CD-ROM Collections

Everyday Objects Sometimes clip art just doesn't cut it. If your design needs a more realistic-looking metaphor, such as a black sheep, piggy bank, or kitchen sink, each \$99 CD-ROM contains 100 royalty-free photographed objects. • *CMCD, Inc.*, 800/664-2623 Reader service no. 816

Art Textures & Backgrounds Looking for an artsy backdrop for presentations or publications? Each \$349 CD-ROM has 100 photographed backgrounds you can crop to fit your designs. • *FotoSets*, 800/577-1215, 415/621-2061 Reader service no. 817

Photo/Graphic Edges Some darkroom effects are tough to simulate digitally. This \$199 CD-ROM for Photoshop contains more than 650 photographic borders you can apply to digital images for a darkroom-developed look. • *Digimation Corp.*, 800/839-2008, 603/430-8373 Reader service no. 818

PhotoGear Each \$59 volume contains more than 80 high-resolution photos of backgrounds, skies, mountains, and fabrics. A \$99 volume offers images of 85 everyday objects that come premasked and with drop shadows. • *Image Club Graphics, Inc.*, 800/661-9410 Reader service no. 819

ClipPix This \$149 CD-ROM has 500 stock photos of people, scenes, and backdrops for on-screen projects. For printing, 17 subject-specific volumes—each below \$299—offer high-quality images ranging from Americana to world trade and Italian art. • *PhotoDisc*, 800/528-3472 Reader service no. 820

Special Effect Plug-Ins*

Gallery Effects Each \$149 volume contains 16 painterly filter effects, such as fresco, texturizer, film grain, and plastic wrap. • *Adobe Systems*, 800/628-2320, 206/622-5500 Reader service no. 821

Kai's Power Tools 2.0 for Windows This \$199 set of powerful plug-in tools is a must for any special-effects arsenal. Give logos a metallic sheen or a worn texture as you explore, design, and preview textures and color gradients. • *HSC Software*, 805/566-6200 Reader service no. 822

KPT Convolver If special effect filters lose their luster, this \$199 tool lets you explore and design your own. The sleek interface, quick preview window, and 200 levels of undo make filter creation fun. • *HSC Software*, 805/566-6200 Reader service no. 823

*Editor's note: Plug-in tools work only with programs using Adobe's plug-in standard.

more effects. The painting tools are one of Matisse's most outstanding features, especially if you pair the program with a pressure-sensitive graphics tablet (prices for Wacom, Kurta, and Hitachi tablets range from \$199 to \$299).

On the plus side, we liked Matisse's logically organized tool bars, icons, and menus, and its JPEG file compression. On the downside, it doesn't show you a list of image layers; you can only use TrueType fonts; and it doesn't support Windows OLE 2.

Despite these few rough edges, Matisse is a terrific bargain that offers many high-end features found in pricier programs. *Fauve Software*, 800/898-2787, 919/380-9933 Reader service no. 807

Fractal Design Painter 3

PROS: Incredible special effects, strong layering, animation

CONS: Limited file-format support, meager color calibration, no cropping tool

Photo retouching	A-
Image creation	A
Tools and features	A-
Output precision	B

If you fancy yourself a creative left-brain type swimming against the tide, Painter 3 for Windows may be your kind of program. For starters, when you pop open the can (it doesn't ship in a box), you're greeted with the aroma of enamel. Painter's variety of natural-looking brush strokes—such as airbrushes, watercolors, oil paints, and colored

pencils—are so sophisticated you can mimic the methods of famous artists like Van Gogh and Seurat, as well as apply gallery lighting, paper textures, and glass surfaces on existing images. Painter also floats objects separately and lets you preview special effects quickly.

At \$499, version 3 sports a friendlier, drawer-based interface and includes more than 50 new features. For example, Painter can now



With just one stroke of Painter 3's Image Hose brush, we sprinkled clover leaves over our test image for a spectacular visual nuance.

Windows Image Editing: Powerful Photo Manipulation Tools

4 = excellent
3 = very good
2 = average
1 = below average
0 = not available

**Price/system requirements** 15% weighting¹

	Adobe Photoshop 3.0	Corel Photo-Paint 5 Plus	Fauve Matisse 1.26	Fractal Design Painter 3	ImageWare ImageWizard 1.03	Micrografx Picture Publisher 5.0
List price	\$895	\$249 ²	\$149	\$499	\$199	\$595
Recommended RAM (MB)	16	8	4	8	4	8
Disk space required (MB)	20	16	7	11	18	15

Photo retouching tools 20% weighting¹

Magic wand color selector	4	4	3	2	3	4
Color masking	4	4	3	3	3	3
Mask selection pointer	4	4	3	3	3	4
Bézier selector	4	4	3	4	0	4
Crop	4	3	2	0	0	2
Clone	4	4	3	3	2	4
Dodge and burn	4	3	3	4	0	3
Blur	4	3	3	3	2	4
Fill	4	4	2	3	2	3
Magnify	4	4	2	4	2	3
Text	2	4	2	3	2	4
Paintbrushes	2	2	3	4	1	2

Creative effects 15% weighting¹

Lighting tool	4	0	0	3	0	0
Seamless texture	3	4	2	4	0	3
Color gradient generator	1	4	2	4	2	1
User-designed effects	4	3	2	4	0	3
Instant drop shadows	0	0	0	4	0	0
Distortion	4	3	3	4	2	3
Morphing	4	0	0	2	2	3
Animation	0	0	0	4	0	0

Help and tips 10% weighting¹

Tutorial	4	3	1	3	4	3
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¹Weighting in overall scores. ²For CD-ROM and floppy versions; \$99 CD-ROM only.

Help and tips (cont'd)

Documentation
Online help

Interface features 20% weighting¹

Object layering
Effects preview
Macro recording and playback
Icon clarity
Custom command palettes
Screen real estate for palettes
Menu organization
Hot keys
Undo

Professional features 10% weighting¹

Color calibration
Custom color palette support
Color printing preview
EPS read/write
Filter speed
Support for third-party plug-in effects
Prepress separations

Image management features 10% weighting¹

Image file manager
File conversion
JPEG image compression
OLE 2 support

Overall weighted score

open and enhance QuickTime and Video for Windows files using all the same tools that you would use on still images. An "onionskin" option lets you see up to five transparent frames at once so that you can plan animated sequences smoothly. This is a great tool for creating animated sequences or for painting video clips with Painter's complete studio of effects.

Another cool tool in Painter is the Image Hose brush, which sprays a series of graphical objects (called nozzles) on screen, the way a brush applies paint to a canvas. An included CD-ROM offers a library of extra Image Hose objects—such as coins, arrows, clover leaves, and seaweed—to add distinctive nuances to your designs and presentations. You can create your own nozzles from still images or even use frames from QuickTime and AVI movies. If you're searching for new ideas, a swipe of this tool can get you started.

Painter's new drawer interface reduces the prior version's 14 palettes to just eight, but some minimized palettes still eat up screen space. Though you can tear favorite tools from the palettes, you can't create

or mix palettes as in Photoshop or Picture Publisher. However, Painter's VCR-like controls let you record and play back tricks you've mastered, and you can create your own multicolored brushes, lighting effects, papers, and texture weaves.

Painter's simulated painting effects can look remarkably real, especially when the program's paired with a pressure-sensitive pen-tablet. And to make painting more comfortable, users can rotate images quickly to work with elements at any angle.

Painter mastered our tests with style, but it had some quirks: For starters, it couldn't recognize the 'TrueType' font in our logo redesign. It also has limited color calibration options and lacks JPEG image file compression, a simple cropping tool, and Windows OLE 2 support.

These limitations aside, Painter is one of the most creative (and fun) painting and animation applications available, though it doesn't take top honors. You'll optimize its design potential if you use it in tandem with a full-scale image editor. *Fractal Design Corp.*, 800/297-2665, 408/688-8800 **Reader service no. 808**



Adobe Photoshop 3.0	Corel Photo-Paint 5 Plus	Fauve Matisse 1.26	Fractal Design Painter 3	ImageWare ImageWizard 1.03	Micrografx Picture Publisher 5.0
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39	44	35	38	31	42
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ImageWare ImageWizard 1.03

PROS: Low price, object layering, good image management

CONS: No support for plug-in special effects, limited manipulation tools

Photo retouching	C
Image creation	C
Tools and features	D+
Output precision	C

This \$199 program is a playful introduction to image editing for a young person or anyone who's just dabbling—launch it and you're greeted by a band of waddling penguins and a bearded wizard.

ImageWizard's tool bar icons are very colorful but a little hard to decipher at first glance. Other basic features, such as crop, dodge, and burn tools, and plug-in support, are missing, but to its credit you can preview filter effects, layer multiple objects, and use it with other Windows OLE 2 apps. It also sports a robust thumbnail-oriented image management utility. Image Wizard's 11MB animated tutorial and online manual is comic-book material, but it does an impressive job of

showing you around the block with the program.

Though we had a rough time reproducing some advanced effects in our test image, ImageWizard can do the basic tasks a novice would expect of a low-priced photo manipulation package. *ImageWare Software Inc.*, 800/842-4199, 619/673-8600 **Reader service no. 809**

Micrografx Picture Publisher 5.0

PROS: Proxy editing sessions, unlimited undo, user-defined toolboxes and macros

CONS: Cropping tool cuts too hastily, buried icons

Photo retouching	A
Image creation	B+
Tools and features	A
Output precision	A



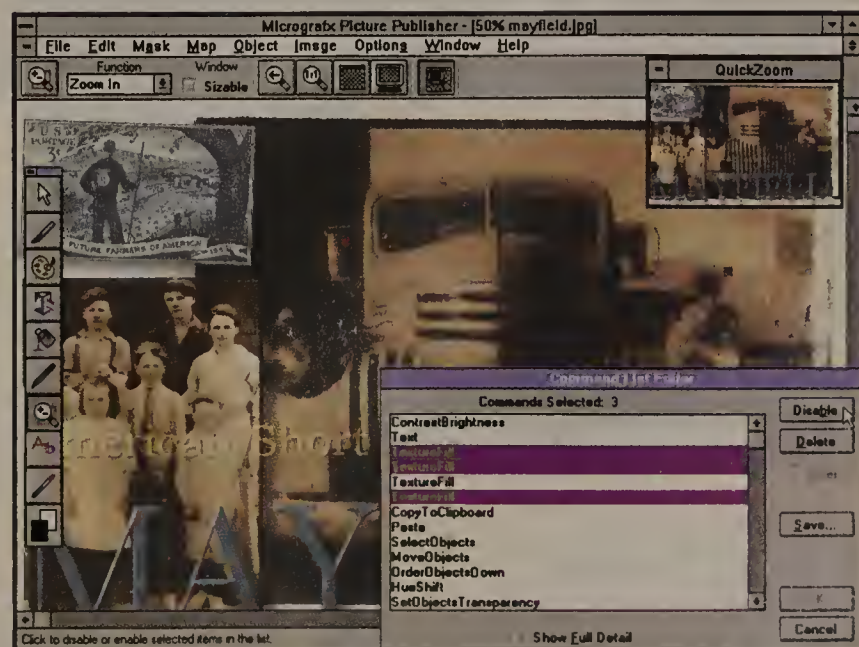
It's unusual for someone to mention Micrografx Picture Publisher without referring to Adobe Photoshop in the same breath. At \$595, Picture Publisher 5.0 costs \$300 less than

Photoshop, and for the second version in a row, it beats Photoshop to the punch with cutting-edge features. The previous version of Picture Publisher introduced floating mask layers; this one offers multiple levels of undo and proxy image editing so you can edit large images faster.

We quickly knocked around a low-resolution (proxy) copy of our test image while the program recorded all our actions in a list of commands. Anytime during the session, we could edit, undo, or move any listed command. When we perfected the session we played it back to build our high-resolution image.

Picture Publisher is strong in the ease-of-use department: You can group and save favorite tool sets, as well as record, edit, and play back tricks you've mastered. Another strength is text: Unlike Photoshop, Picture Publisher lets you edit, resize, or switch type styles right on screen. We liked how we could select specific colors from our image with the Chroma Mask tool. The program also supports Windows OLE 2 and Kodak's color correction and calibration system.

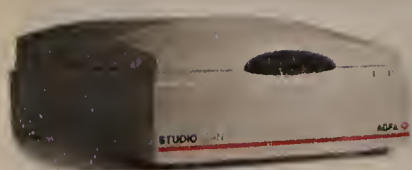
We have just two gripes: The cropping tool cuts before you can resize the area, and many icons are hard to find. Otherwise, Picture Publisher is the most forgiving program in this review, making it an excellent midrange Best Buy choice for both casual and serious users. *Micrografx, Inc.*, 800/676-3110, 214/234-1769 **Reader service no. 810**



You can undo any command anytime and edit huge images quickly using low-resolution substitute images with Picture Publisher 5.0.



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HAD IN MIND
WHEN WORKING
ON OUR
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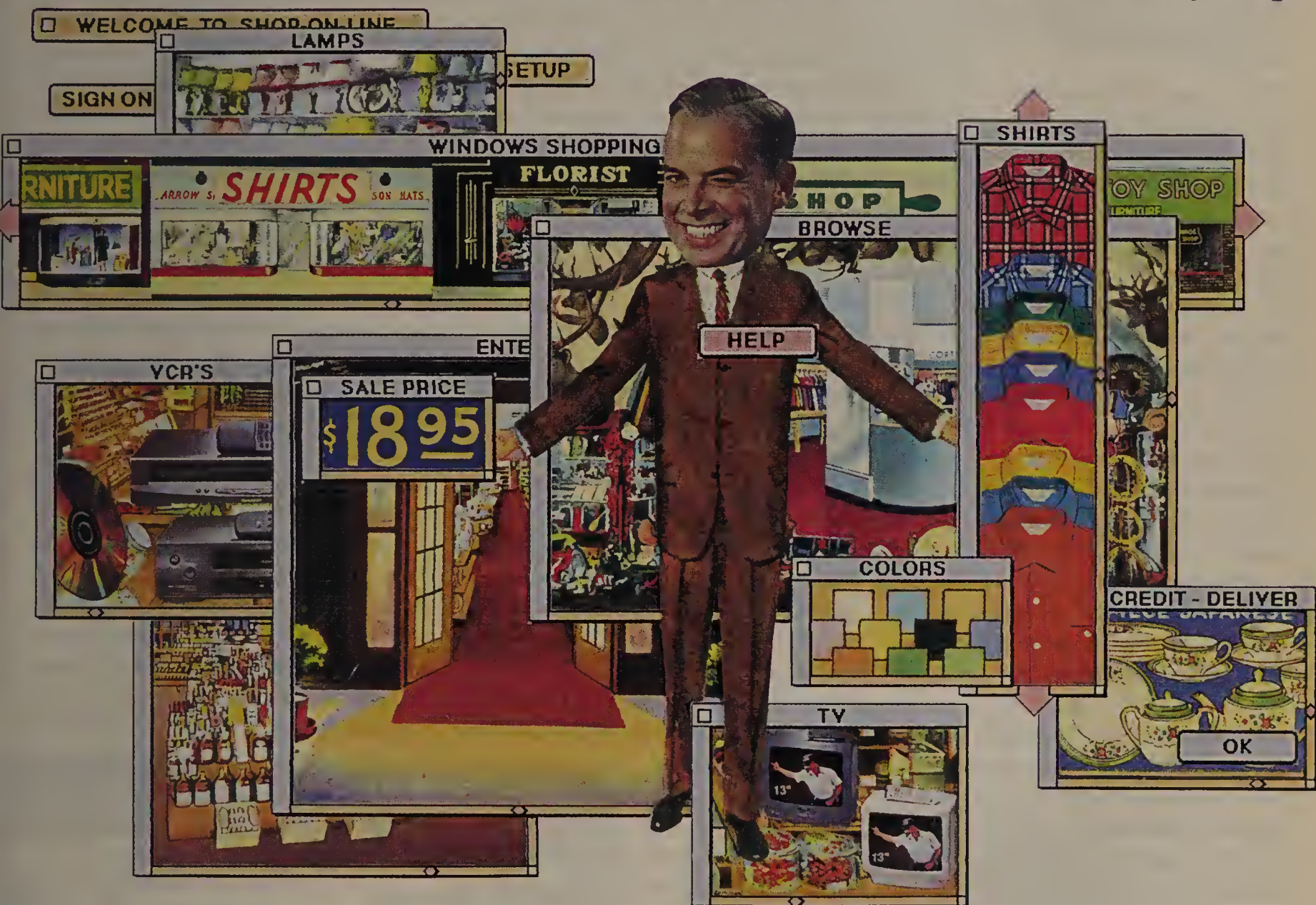
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The complete picture.

The Merchants of Cyberspace

Hundreds of stores are setting up shop online, hawking everything from PCs to pj's. But if you think your modem will replace the mall, read on before you log on.



I needed a VCR but hated the idea of spending hours studying *Consumer Reports* and heading, otherwise defenseless, into the dens of hungry salespeople at my local electronics stores. So, from the safety of my desk, I tried the online route.

I logged on to America Online and searched the *Consumer Reports* database for recommended models. A few keystrokes brought up the information I need-

ed. Feeling confident, I signed up for a membership with Shoppers Advantage, an online shopping mall containing more than 250,000 household items, so I could buy my VCR right from my computer. The Shoppers Advantage interface was little more than a series of text screens, but those screens were packed with information. I answered some questions about what I wanted: four heads, stereo capabili-

ty, and VCR Plus, on a budget of \$350 or less. In seconds, I had a list that suited me perfectly. No parking hassles, no fending off slick sales sharks in search of a commission. I was ready to make popcorn.

I'm not the only one looking for easier ways to spend my money. In the land of

By Anita Amirrezvani

rampant consumerism, shopping is the American pastime. In 1993 Americans spent more than \$1.5 trillion in retail stores, \$53 billion through catalogs, and \$2.5 billion through TV shopping channels, according to Forrester Research, a Cambridge, Massachusetts, market research firm. Although by comparison the \$200 million spent online in 1993 is a pittance, this electronic venue—in theory—is poised to become the next big medium of commerce.

Right now, however, online shopping is in its infancy. It offers none of the excitement or selection available in a store or catalog. And it doesn't yet make up for this lack with convenience. It's great for some items. But if you were thinking of skipping the off-ramps to the malls altogether, read on *before* you log on.

One, Two, Three: Charge!

To shop online, all you need is a modem, access to an online service, such as America Online, Prodigy, or CompuServe—or access to the Internet—and a credit card.

But while it's easy to get online, finding what you need there isn't any easier than driving to the mall (unless your car is unreliable). For one thing, pictures are rare, so it's like shopping in the dark: You can search for hours, finally giving up in frustration.

Most online services offer a selection of merchants ranging from mainstream stores like Sears to esoteric shops like The Moose Factory ("wonderful, whimsical trophy animal heads"). But compared to what you'd find in a store or mail-order catalog, the selection is minimal (see "Shopping Online Meets Catalog Shopping").

A Few Good Places to Shop

Shopping via modem makes more sense than a trip to town when you're stocking up on staples like groceries, office supplies, or disposable contact lenses, or purchasing quick gifts that you want someone else to process, especially flowers. It's also handy for buying items whose titles or product

The Five-Inch Shopping Center



If you want photos, sound, and gobs of information all in one place but don't want to wait for online services to come up to snuff, CD-ROMs have the technology right now.

Magellan's The Merchant is free and features at least 20 catalogs from major merchants, including Lands' End, Tiffany & Co., and Buick, as well as a mixed bag of lesser-known companies with intriguing names such as Biobottoms and Self-Care. Shopping2000, \$4.95 from ContentWare (800/273-5757), includes catalogs from 54 merchants, plus a directory of 4000 mail-order companies. Apple, America Online, and Medior have joined forces to provide shoppers with 2Market, a CD-ROM featuring more than 20 catalogs (see *New Products* in this issue). America Online also hosts a 2Market area that doesn't require you own the CD-ROM.

Why would you want to shop this way instead of by print catalog—which is, after all, portable and offers sharper photos? The primary advantage is that you

can search a bunch of catalogs at once. But although the merchandise looks good, these catalogs seem dated and incomplete. With The Merchant, for example,

you have to call an 800 number to get real prices that include tax, handling, and shipping.

The most convenient CD-ROM catalogs let you try software before you buy it. Test Drive Superstore from TestDrive Corporation (800/788-8055), for example, lets you try out more than 70 programs. If you decide to buy, just call the 800 number and provide credit card information in exchange for a "key" that unlocks the software right on your CD-ROM.

Obviously, the next step is to allow you to order goods and receive instant catalog updates by logging on directly from the CD-ROM. Magellan plans to upgrade its CD-ROM for interactive shopping in late 1995. CompuServe is already starting to do just that with its CompuServe CD (for Windows), a magazine on disc that features articles, software demos, and ads, and, most important, adds a graphical interface to shops in the electronic mall (800/848-8199). CompuServe will dedicate one issue in 1995 to its electronic mall—minus the usual articles and ads. The bimonthly disc magazine is available for \$5.95 per issue plus shipping and handling.

names you already know, like books, CDs, and computer software and hardware.

One unusually rich online shopping resource is the Compact Disc Connection, which I accessed on the Internet through Delphi. The interface was primitive, but the information was voluminous. Some 90,000 titles are listed, and many listings include data from Phonolog and reviews from the All-Music Guide.

Delphi users have to pay an extra \$3 per month to shop this way on the Internet. But that charge also includes access to Book Stacks Unlimited, a large bookstore, and to PC Catalog, a computer hardware and software seller.

And when you're shopping for big-ticket items such as cars, VCRs, and computers, a computer and a mo-

dem arm you with information that puts you in a stronger bargaining position.

Buying a car is a major undertaking. One of the best online resources is Prodigy's Autos section, which offers useful services for buyers of both new and used cars, including *Consumer Reports* data and safety reports. The AutoVantage Online area lets you easily access all kinds of information on



2MARKET ON AMERICA ONLINE is a graphical way to shop from your desk. But don't expect your computer to replace your retailer—yet.

When you're shopping for big-ticket items, a computer and a modem can save time and arm you with information that puts you in a stronger bargaining position.

new and used cars, though depending on the service you subscribe to, there may be fees attached to this.

Members can look up list and dealers' prices and download the details about a car's standard and optional features. Unfortunately, Prodigy is one of the most advertising-oriented online shopping services, and the distinction between unbiased information and advertising isn't always clear. For example, when I entered the "Online Showroom" expecting general information about cars, what I got was an unabashed plug for Ford.

Computers by Modem

If you're shopping for computer stuff, you might want to try a service dedicated to the purpose. NECX Direct (508/538-8100), a computer hardware and software distributor, is packed with information and allows you to pinpoint your needs precisely with a narrow search. After you install the NECX Direct software, simply dial up the company as you would any online service. Then, if you're shopping for a computer, you can either browse a vendor's offerings or search by an extensive group of criteria, including price, CPU type, amount of RAM, hard disk size, number of slots, and so on. As you add each search criterion using AND/OR/NOT operators, the program provides a running count of the number of matches. You can then view each match and, if desired, print out detailed spec sheets on the products you're considering. The selection on NECX Direct is impressive, and the prices seem to be in line with those on the market.

Consumers and Consumables

Not all online shopping services are strictly product oriented. CompuServe's Consumer Forum is an excellent resource that includes extensive library files on where to complain about shoddy products and services—Better Business Bureaus, insurance commissioners, public utilities commissions, car manufacturers, and so on. You can also send questions to David Horowitz of the *Fight Back!* television program via this forum.

If you're always pressed for time and live in the right area, you'll want to look into a couple of new services that promise to take

the drudgery out of grocery shopping—if you don't mind someone else selecting your tomatoes for you. Chicago-based Peapod has hooked up with local Jewel food stores and with Safeway stores in the San Francisco Bay Area to deliver groceries to your door (S.F. 415/929-1600, Chicago 708/864-8900). You can order by fax or phone or through an online kit. The online software includes thousands of items complete with prices. You simply fill in an order form and send it in along with the time you want it delivered.

But unless time is your most valuable asset, you may find the charges prohibitive. The software costs \$29.95 plus shipping and handling. In the Chicago area, the monthly fee is \$6.95, and delivery costs \$5 plus 5 percent of your bill; in the Bay Area, the \$35-a-month fee covers unlimited deliveries.

America Online subscribers in big cities can get groceries and prescriptions delivered thanks to Shoppers Express, a shop-at-home company based in Bethesda, Maryland (301/229-2700); the cost varies by area. As an extension of its shop-by-phone service, Shoppers Express has arrangements with enough retailers to cover about 40 percent of the major metropolitan markets in the country. Not exactly blanket coverage; more like a lap quilt. Call AOL at 800/999-1387 to see if your area is covered.

Most online shopping services are text oriented and weak on illustrations. It's a pleasure, therefore, to use Worldshop (800/530-9055), a new online shopping service that's as graphical as a CD-ROM (see the sidebar "The Five-Inch Shopping Center"). This well-designed service is the PC version of the Home Shopping Network, and it includes merchandise from about 50 different stores as diverse as Radio Shack and The TreeHouse ("manufacturer of silk and preserved trees"). Color photos



allow you to see exactly what you're ordering—clothing, flower arrangements, and so on. The service costs \$4.80 per hour or \$8.95 per month for three hours of use.

Coming to an Internet Address Near You

If you're connected to the Internet, you may have noticed the recent explosion of commercial services. Last September the Home Shopping Network acquired The Internet Shopping Network, which had built a fairly successful online mall featuring more than 15,000 hardware and software products, as well as information from *InfoWorld* and other PC buying guides. The electronic mall keeps the same name, but HSN has dressed up the look.

Another new shopkeeper is phone company MCI, which last November

A PICTURE IS STILL worth a thousand words especially when it comes to shopping for clothes online.

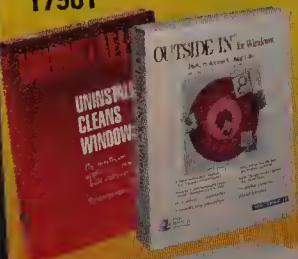
Below, the bizarre online description of a dress; at left, a photo of the real thing.



"...In flattering double-breasted styling, it features a shawl collar and four-button front. With shapely princess seams and mock pockets, short sleeves. Add a pretty pin (not included) and you're set for office or dinner out! Dry clean only. Color: Lapis"

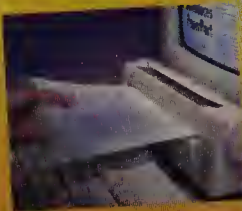
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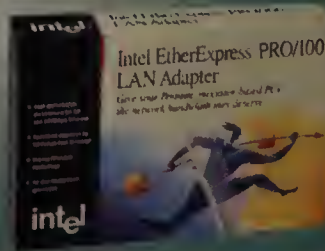
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signed a deal with Netscape Communications, formerly Mosaic Communications, to supply secure credit card transaction services within an online service called internetMCI. MCI intends to make its service colorful and easy to use and plans to offer high-speed access for businesses. In addition, Netscape has signed agreements with Bank of America, one of the country's largest merchant banks, and with First Data, one of the world's biggest credit card payment processors, to provide secure credit card transactions. Microsoft and Visa have also recently joined forces to tackle the cred-

it card issue. These agreements go a long way toward removing one of the most persistent obstacles to shopping on the Internet: the problem of secure credit card transactions.

"The Internet is an open system that was designed to provide widespread access, unlike private online services," explains William Wong, a project leader for CommerceNet, a Menlo Park, California, organization formed by Internet merchants to provide a forum for developing security "fire walls" to guard sensitive transactions such as credit card purchases.

Shopping With a Digital Assistant

Forrester Research predicts that online shopping will generate \$4.8 billion a year in sales by 1998, so it's no surprise that new services are being developed and that TV companies are scrambling to form alliances with them. TCI (Tele-Communications, Inc.), for example, recently purchased a 20 percent stake in The Microsoft Network—an acquisition that hints at a future in which we'll be able to access that network from cable television.

Like many companies, QVC—which has plans to roll out a shopping service called

A Map to the Shops Online

● = Yes ○ = No

	Type of service	Goods available	Sample of major vendors
America Online	subscription-based general interest	books, cars, computers and peripherals, flowers, groceries ¹ , office supplies, travel information, Shoppers Advantage items	Shoppers Advantage (including Apple, AT&T, London Fog, Maytag, Panasonic, and Yamaha)
CompuServe	subscription-based general interest	boats, books, cars, clothing, club memberships, cosmetics, flowers, food, home electronics, jewelry, magazines, music, office supplies, pet supplies, real estate, sports equipment, toys, travel information, videos, Shoppers Advantage items	800 Flowers, Air France, Cadillac, Hammacher Schlemmer, H&R Block, IBM, JC Penney, Lands' End, Metropolitan Museum of Art, Microsoft Press, Patagonia, Sears, Shoppers Advantage (including Apple, AT&T, London Fog, Maytag, Panasonic, and Yamaha)
Delphi	subscription-based general interest	books, cars (including parts and services), gourmet coffee, Shoppers Advantage items	Shoppers Advantage (including Apple, AT&T, London Fog, Maytag, Panasonic, and Yamaha)
GEnie	subscription-based general interest	books, cameras, computers and peripherals, contact lens supplies, credit reports, flowers, gifts, gourmet food, music, office supplies, Shoppers Advantage items	Lands' End, Shoppers Advantage (including Apple, AT&T, London Fog, Maytag, Panasonic, and Yamaha)
Global Network Navigator (O'Reilly & Associates)	Internet-based general interest	books, computers, eyeglasses, food, legal books and services, music, sports equipment, travel information	Digital, Fodor's, NordicTrack
The Internet Mall	Internet-based general interest	art, beauty products, books, collectibles, computer hardware and software, craft supplies, financial services, flowers, jewelry, music, personal items, real estate, toys, travel information	Adaptek, CyberMedia, First Virtual, FTD Direct, Godiva, Journal Graphics, Pizza Hut, Powell's Books, Webster
The Internet Shopping Network (Home Shopping Network)	shopping oriented	computer hardware and software	over 600 companies, including Adobe, Canon, Hewlett-Packard, IBM, Microsoft, and Sony
NECX Direct	computer oriented	computer hardware, software, supplies, and accessories	Borland, Hewlett-Packard, IBM, Intel, Lotus, Microsoft, Panasonic, Toshiba
Prodigy	subscription-based general interest	clothing, computer hardware and software, financial services, flowers, food, gifts, home electronics, magazine subscriptions, music, sports equipment, stamps, stationery, tickets for entertainment events, travel information	Chrysler, Columbia House, Dell Computer, Ford, Hammacher Schlemmer, JC Penney, Lands' End, L.L. Bean, Patagonia, Sears, Spiegel, Toyota
Shopping2000 (ContentWare)	linked Web pages	auto accessories, bed and bath, clothing, consumer electronics, gifts, home furnishings, jewelry, music, sports equipment	Artistic Greetings, FTD Direct, Marshall Field's, NordicTrack, Parsons Technology, REI, Sara Lee Direct, Spiegel, Sunnyland Farms, Tower Records
Worldshop	shopping oriented	auto parts, clothing, computer supplies, food, insurance, music, videos	Hammacher Schlemmer, Radio Shack

¹ Through Shoppers Express.

² Shoppers Advantage requires \$39 yearly membership fee or per-item purchase fee.

³ SLIP or PPP Internet connection as well as World Wide Web browser required.

Merchants could also target you by using regional buying patterns, your buying history in other shopping venues, and even your personal perception of issues such as quality.

Q-online—intends to create a “smart agent” that will collect detailed information from consumers and target products specifically at those individuals. For example, if you’re married to a ballroom dancer and your kids play soccer, you might get solicitations about dance wear and soccer gear. Merchants could also target you by using regional buying patterns, your buying history in other venues, and even your perception of issues such as quality.

AT&T PersonaLink Market Square plaza, the shopping arm of a new online service called AT&T PersonaLink Services, promises a similar approach. Currently available for personal digital assistants like Sony’s Magic Link, the service will be available for PCs sometime this year. The company plans to offer a mall-like interface that will allow users to browse through graphical storefronts containing “aisles” of products from such merchants as Lands’ End and



JOHN CRAIG

Mall access	Online pictures	Basic price	Extra cost for shopping	Contact	Reader service no.
from the Welcome screen, select Go To • Keyword, then type shopping	●	\$9.95 per month for 5 hours of basic services	○ ²	800/827-6364	621
select shopping Icon or type go mall	●	\$9.95 per month for unlimited access to basic services	○ ²	800/848-8199	622
type shopping at prompt on first screen	○	\$10 per month for 4 hours or \$20 per month for 20 hours of basic services	○ ²	800/695-4005	623
select keyword, then type shopping	○	\$8.95 per month for 4 hours of standard connect time	○ ²	800/638-9636	625
http://gnn.com	○	free ³	○	http://gnn.com	626
FTP (ftp://ftp.netcom.com/pub/Guldes/Internet.Mall) or E-mail (taylor@netcom.com with send mall in subject line)	○	free ³	●	taylor@netcom.com with send mall in subject line	627
http://shop.Internet.net	●	free ³	○	800/677-7467 or info@Internet.net	628
dial up 508/538-8675 (download interface software) or go to Web site http://necxdirect.necx.com	○	free	○	508/538-8100	629
select shopping Icon	●	\$9.95 per month for 5 hours of basic services	○	800/776-3449	630
http://www.shopping2000.com	●	free ³	○	415/856-8265 or marcf@netcom.com	631
software required	●	\$8.95 per month for 3 hours of use and \$4.80 per hour; nonsubscribers \$6.50 per hour	○	800/530-9055	632

For more information about all products in this table, circle reader service no. 903.

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- MS-DOS® & Windows® for Workgroups

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• Microsoft Office Professional 4.3 CD

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- C** • 32MB RAM, 1.2GB IDE hard drive
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\$3,899 (Business Lease \$133/month)



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- Intel 90MHz Pentium processor
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- PCI 64-bit graphics accelerator (2MB)
- "Tool-free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Office Professional 4.3 CD

- A** • 16MB RAM, 1GB SCSI-2 hard drive
• 15" Micron 15FGx, 1280NI, .28mm

\$3,499 (Business Lease \$119/month)

- B** • 32MB RAM, 2GB SCSI-2 hard drive
• 15" Micron 15FGx, 1280NI, .28mm

\$4,799 (Business Lease \$164/month)

- C** • 64MB RAM, 4GB SCSI-2 hard drive
• 17" Micron 17FGx, 1280NI, .26mm

\$6,999 (Business Lease \$229/month)

466PCI MAGNUM

- Intel 486DX2 66MHz processor
- Pentium Technology Ready (ZIF)
- 256K write-back cache, Flash BIOS
- 4 ISA, 2 PCI, 1 ISA/PCI slots
- 2X CD-ROM drive, 3.5" floppy drive
- "Tool-Free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups

- A** • 8MB RAM
• 420MB 14ms IDE HD (PCI)
• PCI graphics accelerator (1MB)
• 14" Micron 14FG, 1024NI, .28mm
• Microsoft Works Multimedia CD

\$1,699 (Business Lease \$61/month)

- B** • 16MB RAM
• 850MB 12ms IDE HD (PCI)
• PCI graphics accelerator (1MB)
• 15" Micron 15FGx, 1280NI, .28mm
• Microsoft Office Professional 4.3 CD

\$2,399 (Business Lease \$86/month)

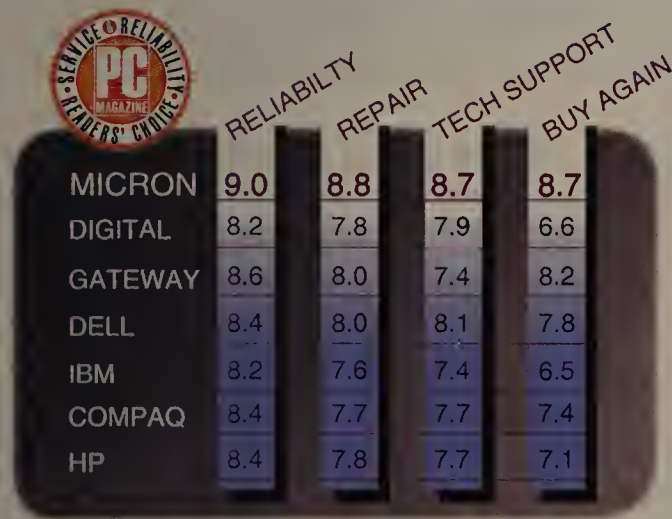
▶ With DX4 100MHz Processor **\$1,799** (Business Lease \$64/month) **\$2,499** (Business Lease \$89/month)

▶ With Pentium 66MHz Processor **\$1,799** (Business Lease \$64/month) **\$2,499** (Business Lease \$89/month)

- ▶ With Pentium 75MHz Processor subtract **\$200***
▶ With Pentium 100MHz Processor add **\$200***
▶ With Optional Full-Size Tower add **\$100**

*Applies only to P90PCI PowerStation and PowerStation Plus

AWARD-WINNING SERVICE & RELIABILITY



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

P90 HOME MPC

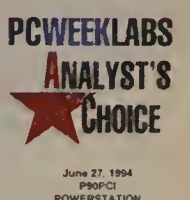
- Intel 90MHz Pentium processor
- 8MB RAM, 256K write-back cache
- 527MB 14ms IDE hard drive (PCI)
- 2X CD-ROM drive, 3.5" floppy drive
- SoundBlaster16, joystick & speakers
- 14.4 Fax/ Modem & WinFax Lite
- 64-bit graphics accelerator (2MB)
- 14" Micron 14FG, 1024NI, .28mm
- "Tool-Free" desktop or mini-tower
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- Microsoft Works Multimedia CD
- Microsoft Encarta® CD
- Quicken® Deluxe Edition CD
- On-line trial services: Compuserve, Prodigy and America On-Line
- 3 LucasArts CD games: Rebel Assault, Indiana Jones and the Fate of Atlantis & Day of the Tentacle

\$2,499

466 HOME MPC

- 486DX2 66MHz processor
- 8MB RAM, 128K cache
- 420MB 14ms IDE hard drive
- 2X CD-ROM drive, 3.5" floppy drive
- SoundBlaster16, joystick & speakers
- 9600/2400 Fax/Modem & WinFax Lite
- Local bus graphics (1MB)
- 14" Micron 14FG, 1024NI, .28mm
- Low profile desktop case
- Microsoft Mouse, 101-key keyboard
- MS-DOS & Windows for Workgroups
- MS Works Multimedia CD, Encarta CD
- Quicken Deluxe Edition CD
- On-line trial services: Compuserve, Prodigy and America On-Line
- 3 LucasArts CD games: Rebel Assault, Indiana Jones and the Fate of Atlantis & Day of the Tentacle

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Circle 217 on reader service card

Shopping Online Meets Catalog Shopping

Mail-order retailers are hitting the information highway in growing numbers: JC Penney, Spiegel, Lands' End, and Hammacher Schlemmer offer electronic versions of their catalogs online. Even the Metropolitan Museum of Art is selling hieroglyph neckties and Pompeian scarves online. But is shopping via PC practical? How does it compare to shopping from catalogs? I logged on to find out.

JC Penney's catalogs on CompuServe and Prodigy are slim shadows of its phone book-size catalog, offering fewer than a dozen products each in categories such as "Clothes." Worse, there are no pictures. Entries consist of vague descriptions like "After a long day of work, you will look forward to slipping on this cable-knit pullover sweater. Styled with the casual look you love to relax in." I may be a computer geek, but I still like to know what my clothes look like before I buy them.

The Spiegel catalog on Prodigy does offer sales on items not available in its catalog, but who can order a bedspread on the basis of this

watery description: "Hand guided outline-quilting accents a winsome rose/cream floral, machine wash, scalloped edges"?

The Hammacher Schlemmer catalog on CompuServe is full of intriguing gadgets, like Heated Slippers and Home Warm Wax Therapy System. Many are illustrated, but again, the pictures leave something to be desired. The Wristwatch Spy Camera looks like a satellite weather photo of a football field. The Lighted Tie Rack looks like a .357 magnum.

Obviously, the best things to buy online are those you don't need to see, like floppy disks or paper clips. For years I ordered office supplies through Penny Wise on CompuServe. Delivery was fast and free, and prices were low. Then I came across Penny Wise's 800 number and catalog. That was more convenient than tapping around CompuServe. Recently, however, I dis-

covered a local Office Max with even lower prices. Penny Wise lost my business.

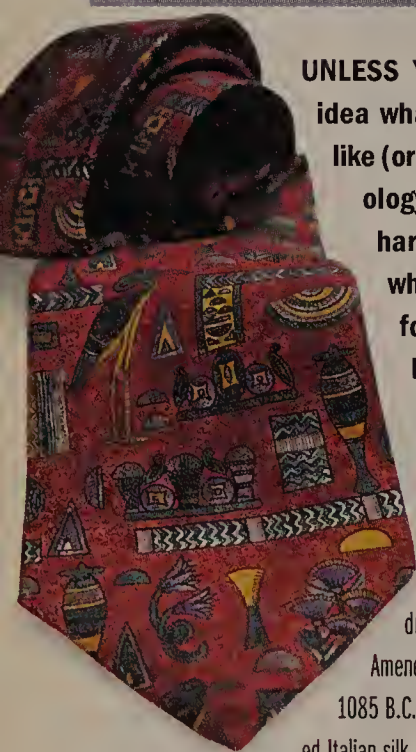
The problem with online shopping is that the prices are the same as those in mail-order catalogs, but the inconvenience is greater. Merchants usually don't pick up orders until a day or two after you post them, plus you're robbed of the pleasure of indolently thumbing through



PICTURES DON'T ALWAYS make shopping online compelling. This photo illustrates a wristwatch spy camera.

catalogs while on the phone or eating lunch.

Maybe when modems are faster and the pictures on our PC screens are as clear as those on the Home Shopping Network, online shopping will take off. Until then, I'll stick to flipping through the catalogs that arrive in my mailbox. —Judy Heim



UNLESS YOU HAVE a good idea what old coffins look like (or a degree in archaeology), you'll have a hard time deciding whether this tie is one for your collection. Below, the online description of the tie at left.

"...An intriguing Egyptian motif inspired by drawings on the outer coffin of Amenemhote (Dynasty 20, c.1113-1085 B.C.), Made in Canada of imported Italian silk, 4" wide, Wine background"

Tower Records. And merchants will be able to track customers' buying habits. "If for three weeks a customer 'walks' into an online store and buys nothing, the company could provide a discount or offer some help," says AT&T PersonaLink marketing director Bill Fallon.

The PC Versus the TV

Since many households have both cable and a computer, some companies are exploring ways to hook the two together. "Cable has a much wider bandwidth for transmitting data than the telephone does, and it's about 1000 times faster," says John Raftrey, communications manager for Intel. That's why Intel is developing an adapter that would allow you to receive gobs of information via your cable hookup. Intel displayed the CablePort adapter at the Western Cable Show last November and is now conducting trials with Viacom in Castro Valley, California.

Jacob Tanz, Intel marketing director, expects the CablePort to be available the second half of 1995. Pricing hasn't been set, but he says the adapter will sell for under \$500—more than a high-speed modem, but less than one of those 18-inch DirectTV dishes.

Merchants won't stop at making your computer more like a TV. They also plan to make the TV more like a computer. One way is with set-top boxes that will let you shop interactively from your TV. To this

end, marriages of technology, TV, and retail companies are happening faster than you can say "Charge it!" But experts say interactive TV won't get off the ground for at least five to ten years. When it does happen, though, interactive TV could combine the best of both worlds. "You'd be able to call up products you're interested in any time of the day or night," says Cynthia Woll, an executive producer for Time Warner Interactive who is involved in trials for Catalog 1, a home shopping cable show. "You'd get all the best elements of shopping in a store from the comfort of home."

No one knows what the outcome of all these plans and alliances will be. But it's possible that the two blockbuster products of the twentieth century, though separated at birth, will turn out to be identical (or at least fraternal) twins.

Anita Amirrezvani and Judy Heim are contributing editors for PC World. Research assistance provided by Anita Hamilton, Peggy Nauts, Richard Overton, and Peter Scisco.



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Circle 139 on reader service card



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Introducing The First Notebook To Maximize The Pentium's Full Potential.

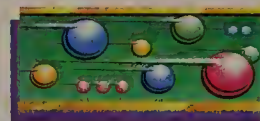
When the rush was on to introduce a notebook with a Pentium™ processor, Texas Instruments decided to do what others thought couldn't be done.

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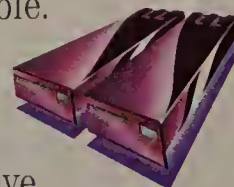
And for flexible connectivity, we designed a way to allow external access from the PCI bus to the latest peripherals.

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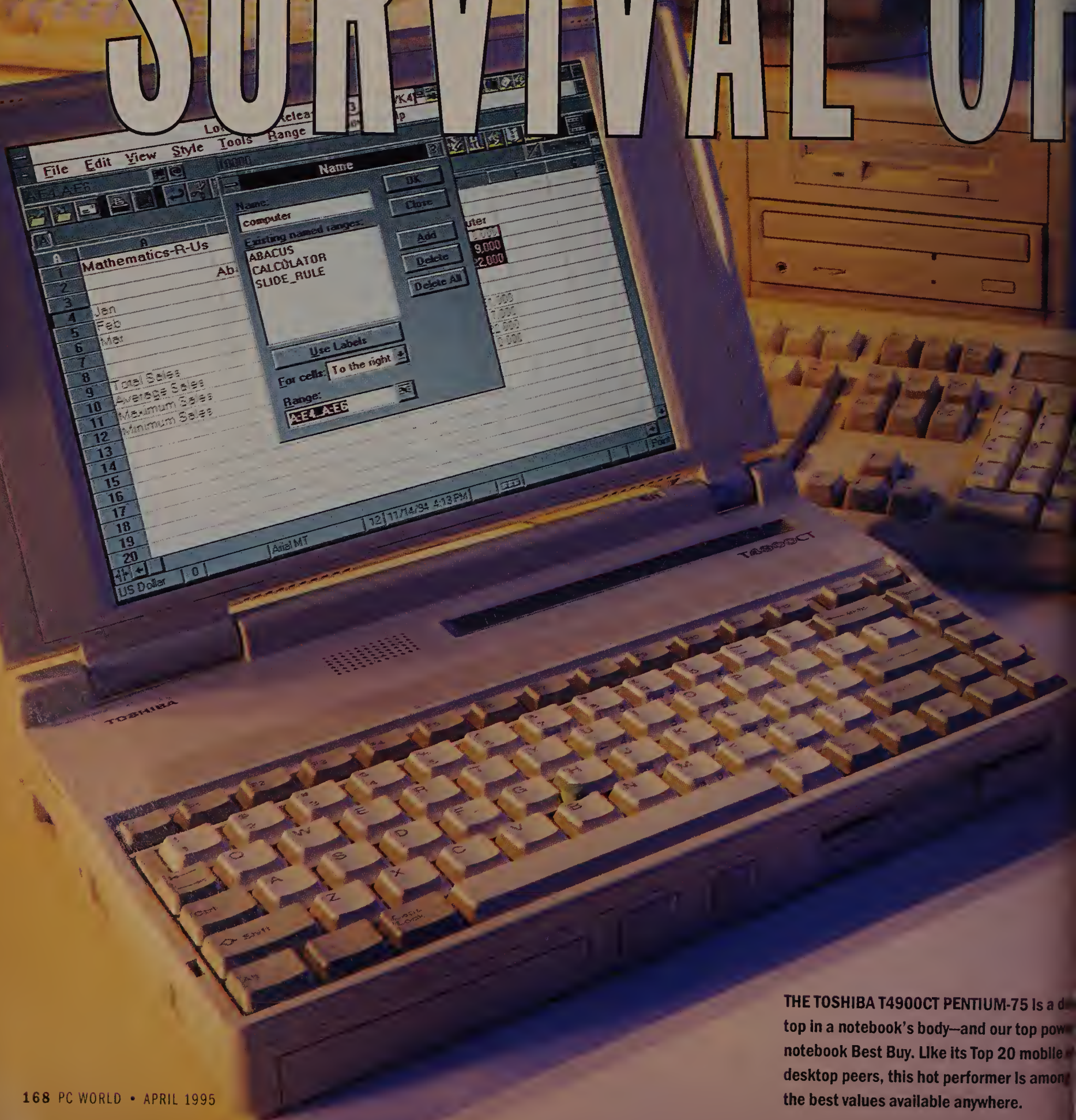


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Circle 244 on reader service card

TOP 20 PCs

SURVIVAL OF



THE TOSHIBA T4900CT PENTIUM-75 is a d top in a notebook's body—and our top pow notebook Best Buy. Like its Top 20 moble desktop peers, this hot performer is among the best values available anywhere.

THE FITTEST

For the first time ever, four number ones repeat, fending off all the latest challengers. At the top: Micron P90PCI PowerStation, MIS Slimline 66, Toshiba T4900CT, and WinBook XP DX2/50.

By Rex Farrance and Michael Desmond

You can't get the job done right without the right tools. When it comes to buying a new system, *PC World's* Top 20s give you what you need to make the right decision—reviews of the hot new systems, plus continually updated ratings for *all* the best PCs on the market, drawn from our Test Center's current database of more than 300 desktop and notebook systems reviewed over the previous ten months.

If you've been reading *PC World* for a while, you know that in the year and a half we've been running our Top 20s, we've fine-tuned them to increase their usefulness. This month we introduce a major redesign that makes our Top 20s even more indispensable.

As you scan our pages, you'll note expanded coverage of the systems that appear on our Top 20 charts. We now include monthly evaluations for every Top 20 system—even those units originally reviewed in a previous issue. As always, we take an in-depth look

ROBERT CARDIN

THE TOP 20
PC WORLD

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page 184

at every Top 20 system we're reviewing for the first time. For these new systems, we also provide comprehensive features comparisons and test reports. Worthy new contenders that don't qualify for our Top 20s receive briefer write-ups, listing their main features, strengths, and shortcomings. These units are discussed in our "System Snapshots" section. The changes don't stop there—our Top 20 tables have a new look as well. We now add information on CD-ROM drives and indicate which systems are likely purchases for home use. Our object is to give you more of the information you need—in context—so that you can see at a glance how the machine you're considering stacks up against the other contenders in its class.

Best of the Best

Enduring success is the mark of a true champion, and this month's top winners demonstrate that kind of staying power. Our teams of Best Buys are led by four stalwarts, each of which won its class last month. Micron's \$3199 P90PCI PowerStation holds our heavyweight crown for the third month in a row. In our estimation, this compact Pentium-90 system represents the best power desktop value available—bar none. It comes with 16MB of RAM and a hefty 1080MB hard drive,

Buying Smart: Consumer Tips

Use a credit card.

Unless you already have a reliable credit arrangement with the vendor, use a credit card to order all equipment. The credit card company can help mediate any disputes that arise or can give you a refund if you fail to receive a product that you've paid for.

Insure against power damage.

Buy a high-quality surge protector with a UL 1449 surge-protection rating of 330 volts and phone line connectors for your modem. The unit should handle a minimum spike of 13,000 amps to protect against catastrophic power surges. Prices run from \$50 to \$100; the best vendors include free lifetime coverage against power-related damage both for the product and for all connected equipment.

Install SCSI CD-ROM drives in the office.

Buy a SCSI, caddy-type CD-ROM drive for heavy office use. SCSI lets you add more devices, and caddy-feed mechanisms withstand heavy use better than the tray feeds in cheaper drives.

and it delivers smashing performance. Among the budget desktop contenders, MIS's Slimline 66 system is back at the top, likewise for the third straight month. This no-frills winner provides the basics, with rock-solid DX2-66 performance, 8MB of RAM, and a 420MB hard drive, all for just \$1495.

The budget notebooks scene reveals no newcomers, just a steady lineup of low-cost, high-value machines. The top budget system is a solid champ: The WinBook XP DX2/50 monochrome notebook gives you a DX2-50 CPU, 8MB of RAM, a 255MB hard drive, and 6.8-hour battery life, and it costs just \$1999. Like the leading desktop Best Buys, it's completing its third straight month at the top.

Power on the Move

Power notebooks are clearly in a period of transition; six new systems break into the power division of our Notebooks Top 20. Despite this high turnover rate, our first-place titleholder—the \$7479 Toshiba T4900CT Pentium-75—repeats its victory of last month. It features fantastic performance, a magnificent 810MB hard drive, and a stunning 10.4-inch active-matrix color screen that displays 65,536 simultaneous colors. You also get Toshiba's truly superior support.

When it comes to power notebooks, the strong keep getting stronger. You'll no longer find a DX2 system anywhere among our power notebooks. Four of the ten power systems on our Notebooks Top 20 have DX4-75 processors. Four more are powered by DX4-100s, and a fast Pentium-75 drives the number one Toshiba T4900CT. The mightiest processor in this division, a muscular Pentium-90, powers the MidWest Micro Elite Pentium SoundBook Plus. This \$5599 unit is the fastest notebook we've ever tested, with performance comparable to that of a typical Pentium-66 desktop.

All this power does not diminish battery life: Every Top 20 power notebook battery lasted at least 3 hours. One system—the AST Ascentia 910N DX4-75—kept going for almost 8 hours, and two others surpassed 6.5 hours. Among the long-life elite, the Best Buy Ascentia 910N and the Dell Latitude XP 4100CX use lithium-ion batteries, a new type of power cell that can undergo many more recharge cycles before needing replacement than batteries using earlier recharge technology. You'll find out more about lithium ion's advantages in the reviews of the individual notebook systems.

Screen quality is another important consideration for buyers of mobile PCs. Here, the picture continues to brighten. For example, NEC's Versa M/75HC, which didn't quite earn a place on our Top 20 chart, provides the first 800 by 600 screen we've seen on a notebook. And IBM has added features on its ThinkPad 755 screens that considerably enhance viewability under adverse lighting conditions. These fresh developments—along with up-to-date ratings—are the hard facts you need when you're looking for a new system. Every month, you'll find the latest right here.

Rex Farrance and Michael Desmond are associate editors for PC World. They can be reached on PC World Online (see page 12 for contact information). PC World staff members John Goddard, Anita Hamilton, Arden Hoffman, Owen Linderholm, Melissa Riofrio, and Valerie Singer contributed to this article. Testing by Dean Andrews, Dave Casini, Ulrike Diehlmann, Susan Silvius, and Kirk Steers; research and support by Mike Salayko.

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THE TOP 20

PC WORLD

POWER DESKTOPS



1 Micron P90PCI PowerStation
Speedy three-time top system.

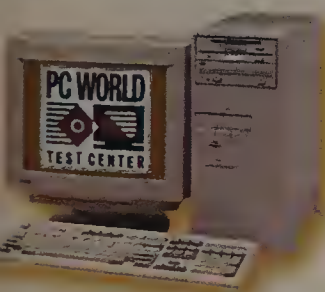
		Last month	Months on chart	First reviewed	Overall rating	Performance rating	Reliability/service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	 Micron P90PCI PowerStation	1	3	Feb 95	90	86	71/85	\$3199	Pentium-90	16	1080
2	 Dell Dimension XPS P90	4	2	Mar 95	89	83	77/81	\$3673	Pentium-90	16	1080
3	 Quantex QP5/90W-3	2	2	Mar 95	88	79	73/78	\$2997	Pentium-90	16	1080
4	 Dell OptiPlex XMT 590	6	4	Jan 95	87	82	77/81	\$3500	Pentium-90	16	1080
5	 Everex Step SP/100	3	2	Mar 95	87	86	75/65	\$3295	Pentium-100	16	1275
6	Austin Power System 90	5	7	Oct 94	86	83	71/75	\$3499	Pentium-90	16	1060
7	Dell Dimension XPS P100	7	2	Mar 95	86	77	77/81	\$3887	Pentium-100	32	1080
8	Micron P90 Home MPC	8	4	Jan 95	85	79	71/83	\$2499	Pentium-90	8	530
9	USA Flex PT-90 Power System	—	1	current	85	82	71/73	\$4114	Pentium-90	16	1080
10	Gateway 2000 P5-100XL	12	2	Mar 95	85	84	73/72	\$4299	Pentium-100	16	1060
11	Tagram Thunderbolt XL	16	3	Feb 95	85	86	²	\$2901	Pentium-90	16	540
12	Zeos Pantera 90	9	9	Aug 94	85	80	71/76	\$2995	Pentium-90	16	720
13	Acer AcerPower MiniTower	10	3	Feb 95	84	80	78/68	\$3265	Pentium-90	16	730
14	Blackship P90 Neptune	—	1	current	84	77	71/69	\$2960	Pentium-90	16	540
15	DFI Diamond P90	13	3	Feb 95	84	84	²	\$3795	Pentium-90	16	1080
16	Acma P90	11	3	Feb 95	84	88	78/68	\$2968	Pentium-90	16	540
17	Zeos Pantera DX4-100	17	7	Oct 94	83	75	71/76	\$2582	DX4-100	16	720
18	Gateway 2000 P5-75 Family PC	14	2	Mar 95	83	69	73/72	\$2499	Pentium-75	8	730
19	ALR Evolution X/75	18	2	Mar 95	83	70	78/74	\$3174	Pentium-75	16	1090
20	Robotech Cobra RS p90	15	4	Jan 95	83	84	²	\$3152	Pentium-90	16	730



¹ Call 800/434-4495 (for payment by Visa or MasterCard) or 900/993-2972 (for telephone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews (\$4.95), a single capsule review plus features table

and test report (\$4.95), an entire month's review (\$9.95), and a list of all systems tested by the PC World Test Center (\$4.95). In addition, you can order next month's Top 20 charts and capsule reviews in

2 Dell Dimension XPS P90
Muscle from reliable Dell.






4 Dell OptiPlex XMT 590
Classy, has three-year warranty.



3 Quantex QP5/90W-3
\$2997 buys 17-inch monitor.



5 Everex Step SP/100
Pentium-100, 17-inch monitor.

CD-ROM drive	Bus slots	Monitor size/dot pitch	Vendor contact number	Fax reprint number ¹	Reader service no.	Comments	 Recommended as home system
2X	ISA, PCI	15"/.28	800/223-6571	3184	646	Last month's no. 1 Best Buy has top blend of power, price, and features.	
3X	ISA, PCI	15"/.28	800/613-3355	3202	647	Newest version of popular and successful Dell Pentium.	
2X	ISA, PCI	17"/.26	800/288-0566	3200	648	Cheapest Best Buy, loaded multimedia system with big monitor.	
2X	ISA, PCI	15"/.28	800/613-3355	3173	649	Corporate version of Dell's solid Pentium-90 design is also a good value.	
—	ISA, PCI	17"/.28	800/821-0806	3201	650	Top Pentium-100. Large monitor and great performance. Should have a CD-ROM drive.	
2X	ISA, PCI	17"/.28	800/331-1501	3142	651	Loaded Pentium-90 with large hard drive is a very good deal.	
2X	ISA, PCI	15"/.28	800/613-3355	3203	652	100-MHz version of the no. 2 Best Buy. Disappointing performance despite great features.	
2X	ISA, PCI	14"/.28	800/223-6571	3172	653	Great home PC, but could use a little more RAM in a power configuration.	
4X	ISA, PCI	17"/.26	800/872-3539	3215	654	Serious multimedia powerhouse with quad-speed CD-ROM drive and 17-inch monitor.	
4X	ISA, PCI	17"/.26	800/846-2000	3204	655	Another multimedia powerhouse with quad-speed CD-ROM drive and big monitor.	
4X	ISA, PCI	15"/.28	800/824-7267	3187	656	Fast and cheap—a good general-purpose system.	
2X	ISA, PCI	15"/.28	800/554-5220	3123	657	Good office Pentium-90 at a great price.	
2X	ISA, PCI	15"/.28	800/368-2237	3186	658	Solid minitower could be a few hundred dollars cheaper.	
4X	ISA, PCI	15"/.28	800/531-7447	3216	659	Nice multimedia system could use a larger hard drive.	
2X	ISA, PCI	17"/.26	800/275-3342	3188	660	Very fast, fully loaded home system.	
2X	ISA, PCI	15"/.28	800/786-6888	3185	661	No longer the fastest system we've tested, this is still the fastest PC on the Top 20.	
2X	ISA, PCI	15"/.28	800/554-5220	3140	662	The lone non-Pentium survivor on the Top 20 bests some Pentiums' performance.	
2X	ISA, PCI	15"/.25	800/846-2000	3205	663	Slowest system on the Top 20, but one of the cheapest. Could use more RAM.	
—	ISA, PCI	15"/.28	800/444-4257	3206	664	Slow, but has a big hard drive. Should have a CD-ROM drive.	
2X	ISA, PCI	15"/.28	800/533-0633	3174	665	Fast system comes with a generous bundle of graphics software.	

advance (The Top 20 Flash Report, \$9.95). Touch-tone phone required. ² Insufficient customer responses to our Reliability and Service Monitor to gauge service performance and reliability. For our overall evaluation, we use an average rating derived from all companies for which we have received fewer than 125 responses.

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

Top 20 Power Desktops

THE POWER DESKTOPS TOP 20 REMAINS STABLE, with just two new systems, both Pentium-90s: the number 9 USA Flex, and the number 14 Blackship. Meanwhile, Micron's P90PCI PowerStation stays on top for the third month. All the Best Buys have at least a Pentium-90 CPU (Everex's is a Pentium-100) and 16MB of RAM. Their hard disks range from 1080MB to an impressive 1275MB. The mix includes two 17-inch monitors, yet the most expensive one, Dell's Dimension XPS P90, costs under \$3700, while Quantex's QP5/90W-3 goes for a mere \$2997.

This Top 20 features three Pentium-100 systems, two Pentium-75s, and one DX4-100; Pentium-90s still hold the majority. Reasonable pricing continues, while memory, storage, graphics controllers, displays, and multimedia offerings are more robust than ever.

1 Micron P90PCI PowerStation

REVIEWED: February 1995

PROS: Blazing speed, generous RAM, jumbo hard disk, flat-screen monitor, CD-ROM drive

CONS: Could do better than ordinary one-year warranty, slight cable clutter inside

This highly expandable \$3199 three-time top Best Buy Pentium-90 compact has 16MB of RAM, an unusually large 512K secondary cache, a 1080MB hard drive, a CD-ROM drive, a high-quality flat 15-inch Mag monitor, and a 2MB 64-bit PCI graphics controller.

2 Dell Dimension XPS P90

REVIEWED: March 1995

PROS: Lightning-fast Pentium-90 performance, generous RAM, jumbo hard disk, clean design

CONS: Unlike Dell's Optiplex line, lower-cost Dimensions come with just a one-year warranty

This nicely expandable \$3673 Pentium-90 minitower unit has 16MB of RAM, a 256K secondary cache, a 1080MB hard disk, a CD-ROM drive, a 128-bit 4MB PCI graphics controller, and a 15-inch monitor.

3 Quantex QP5/90W-3

REVIEWED: March 1995

PROS: Generous RAM, jumbo hard drive, 17-inch monitor, CD-ROM drive, 14.4-kbps fax-modem

CONS: Could do better than ordinary one-year warranty, some cable clutter inside

Super-expandable, affordable \$2997 Pentium-90 tower has 16MB of RAM, a 1080MB hard drive, a CD-ROM drive, a 14.4-kbps fax-modem, a 2MB 64-bit PCI graphics controller, a huge 17-inch monitor, and good—but not great—performance.

4



Dell OptiPlex XMT 590

REVIEWED: January 1995

PROS: Terrific Pentium-90 performance, generous RAM, jumbo hard drive, very clean design, three-year warranty

CONS: Long seven-day turnaround policy on service center repairs

Expandable \$3500 Pentium-90 minitower super-performer comes with 16MB of RAM, a 1080MB hard drive, a CD-ROM drive, a nifty combo floppy drive that accepts both standard formats, a 2MB PCI graphics controller, a 15-inch monitor, and a three-year warranty.

5



Everex Step SP/100

REVIEWED: March 1995

PROS: Super performance, largest hard disk on Power Desktops Top 20, good expandability

CONS: Everex provides no toll-free technical support

Highest-ranking Pentium-100 costs just \$3295 with 16MB of RAM, a huge 1275MB hard drive, a 2MB 64-bit graphics controller, a 17-inch monitor, and a two-year warranty—but no toll-free tech support.

6

Austin Power System 90

REVIEWED: October 1994

PROS: Fast Pentium-90 performance, highly expandable, good support

CONS: Documentation on this model could be more detailed

7

Dell Dimension XPS P100

REVIEWED: March 1995

PROS: Jumbo hard drive, fine 4MB, 128-bit PCI graphics controller, clean basic design

CONS: A bit pricey, not all that fast for a Pentium-100, one-year Dimension warranty

8

Micron P90 Home MPC

REVIEWED: January 1995

PROS: Quick Pentium-90 performance, great price, full set of multimedia features

CONS: Ordinary one-year warranty; 14-inch monitor is small, especially for a multimedia PC

9

USA Flex PT-90 Power System

NEW THIS MONTH

PROS: 17-inch monitor, three-year warranty, multimedia configuration, 14.4-kbps fax-modem

CONS: Price is on the high side, some cable clutter inside big tower case

The \$4114 price won't appeal to penny-pinchers, but USA Flex's PT-90 Power System is truly a tower of power. The 90-MHz CPU and jumbo 1080MB hard drive in this big floor-standing PC will grab the power user's attention. Granted, the Flex Pentium isn't the fastest PC we've tested, but it compares well with its 90-MHz Pentium peers.

Along with 16MB of RAM (expandable to 128MB) and 256K of secondary cache, you get an attractive multimedia setup, including large Altec Lansing speakers and a Sound Blaster 16 sound board with a wave-table MIDI card. The quad-speed Teac CD-ROM drive should perform well, but testing for our December review, "CD-ROM Drives: The Power and the Glory," showed it to be not much faster than a quick double-speed drive. The expansive 17-inch monitor is



just what we like on a multimedia PC, and the 2MB Stealth 64 VRAM PCI graphics controller matches it admirably. And let's not forget the 14.4-kbps fax-modem.

Even with all the goodies, the Flex Pentium still has two free 16-bit ISA slots, one free PCI slot, and a free slot that accepts a PCI or an ISA card. Three externally accessible drive bays are available as well.

USA Flex tops it all off with a stack of software, including CD-ROM games and reference titles. Finally, customers responding to our fax-back polls are generally impressed with the company's ability to resolve problems—an important service indicator. In February, we mistakenly dinged USA Flex for having a one-year warranty. Let us correct that: You get a three-year warranty with 24-hour tech support, plus a 30-day money-back guarantee and a year of on-site service for a reasonable \$49. The bottom line? This system rates a strong Power Desktops Top 20 recommendation.

10 Gateway 2000 P5-100XL

REVIEWED: March 1995

PROS: Fast Pentium-100 performance, 17-inch monitor, jumbo hard drive, three-year warranty

CONS: Would cost less without the extras, long waits on hold for technical support

11 Tagram Thunderbolt XL

REVIEWED: February 1995

PROS: Ultrafast Pentium-90 performance, reasonable price, three-year warranty

CONS: Interior somewhat crowded, cable clutter inside case

12 Zeos Pantera 90

REVIEWED: August 1994

PROS: Solid Pentium-90 performance, good expandability, 24-hour tech support

CONS: Ordinary one-year warranty

13 Acer AcerPower MiniTower

REVIEWED: February 1995

PROS: Good Pentium-90 performer, big hard disk, 24-hour tech line, multimedia configuration

CONS: Ordinary one-year warranty surprising from a company of this size

14 Blackship P90 Neptune

NEW THIS MONTH

PROS: Reasonable price, solid array of multimedia and home-office features

CONS: Performance just so-so for a Pentium-90, one-year warranty, no weekend tech support

To make our power Top 20, a multimedia desktop must also be a capable business PC. The \$2960 Blackship P90 Neptune earns its place in the sun with a quality multimedia and home-office configuration. It comes with a quad-speed Teac CD-ROM drive, a Sound Blaster sound card, speakers, a 14.4-kbps voice fax-modem, and three CD-

ROM apps. The Teac drive is fine for current multimedia use, although tests for our December CD-ROM drive review show its performance to be closer to that of a quick double-speed drive. The Pentium-90 Blackship has 16MB of RAM and 256K of secondary cache. These days a 540MB hard drive is minimal on a power box,

but the 2MB graphics controller and 15-inch monitor are well matched.

This compact unit has one free PCI slot, two free 16-bit ISA slots, and one free slot that accepts either an ISA or a PCI card. You'll also find two free drive bays (one externally accessible). Blackship offers just a one-year warranty, but it's backed by on-site service and a 30-day money-back guarantee. Tech support is

available 10 hours daily, weekdays only. Even with its less-than-sterling support package, however, the P90 Neptune is an impressive unit and a deserving new member of our Power Desktops Top 20.



15 DFI Diamond P90

REVIEWED: February 1995

PROS: Fast Pentium-90 performance, solid multimedia and home-office features

CONS: No toll-free technical support, somewhat pricey for a Pentium-90

16 Acma P90

REVIEWED: February 1995

PROS: Extremely impressive Pentium-90 performance, PCMCIA slot installed in unit

CONS: One-year warranty, no weekend tech support, drive cage obstructs a free slot

17 Zeos Pantera DX4-100

REVIEWED: October 1994

PROS: Excellent DX4-100 performance, 24-hour tech support, optional \$49 integrated SCSI

CONS: Ordinary one-year warranty, limited number of slots accept full-length cards

18 Gateway 2000 P5-75 Family PC

REVIEWED: March 1995

PROS: Attractive bundle of home applications, three-year warranty

CONS: Long hold times on the phone when trying to reach technical support

19 ALR Evolution X/75

REVIEWED: March 1995

PROS: Solid Pentium-75 performance, jumbo hard drive, excellent design, great support

CONS: Unit priced relatively high for a Pentium-75 system

20 Robotech Cobra RS p90

REVIEWED: January 1995

PROS: Fantastic Pentium-90 performance, impressively large and varied software bundle

CONS: Minitower case a little crowded, some cable clutter under the hood






THE TOP 20

PC WORLD

BUDGET DESKTOPS



1 MIS Slimline 66
Basic business DX2-66 for \$1495.

		Last month	Months on chart	First reviewed	Overall rating	Performance rating	Reliability/service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	 MIS Slimline 66	1	3	Feb 95	85	50	85/88	\$1495	486DX2-66	8	420
2	 Quantex QP5/60PM-2	89	1	Jan 95	81	61	73/78	\$2198	Pentium-60	8	540
3	 Micro Express MicroFlex-VL/80	2	2	Mar 95	81	57	69/71	\$1549	Am486DX2-80	8	420
4	 Zeos Pantera DX2-66	4	5	Dec 94	81	55	71/76	\$1845	486DX2-66	8	530
5	 Zeos Pantera 60	7	5	Dec 94	81	66	71/76	\$2123	Pentium-60	8	530
6	Expotech Platinum 486DX2/66	6	5	June 94	81	49	73/59	\$1671	486DX2-66	16	500
7	Polywell Poly 486-80VB	11	3	Feb 95	80	63	²	\$1795	Am486DX2-80	8	540
8	Gateway 2000 P4D-66	8	11	June 94	80	46	73/72	\$1884	486DX2-66	8	730
9	Blackship Atlantis	9	3	Feb 95	80	45	71/69	\$1695	486DX2-66	8	540
10	DTK QuIn-35	—	1	current	79	72	75/73	\$2200	Pentium-90	8	545
11	Polywell Poly 560MPC	30	—	Jan 95	79	65	²	\$1995	Pentium-60	8	545
12	Micron 4100 PCI Magnum	10	7	Aug 94	79	62	71/83	\$1999	DX4-100	8	420
13	Axlk Ace Cache 466 VG2 Cutlass	3	2	Mar 95	79	47	85/65	\$1645	486DX2-66	8	540
14	Quantex Q486DX2/66MM-4	16	6	June 94	79	42	73/78	\$1698	486DX2-66	8	540
15	Diamond DT DX4/100 VIP	14	2	Mar 95	79	60	67/64	\$1699	DX4-100	8	540
16	Quantex QP5/60W-2	12	5	Dec 94	79	63	73/78	\$2215	Pentium-60	16	540
17	MIS M5P/60	13	3	Sept 94	79	52	85/86	\$2220	Pentium-60	8	270
18	Micron Family MPC LPX	33	—	Dec 94	78	51	71/83	\$1909	486DX2-66	16	420
19	MIS M466T	15	5	July 94	78	36	85/86	\$1580	486DX2-66	8	270
20	USA Flex PT-60 Tower	24	—	Nov 94	78	60	71/73	\$2048	Pentium-60	8	425



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and test report (\$4.95), an entire month's review (\$9.95), and a list of all systems tested by the PC World Test Center (\$4.95). In addition, you can order next month's Top 20 charts and capsule reviews in

2 Quantex QP5/60PM-2
17-inch monitor, great home PC.







4 Zeos Pantera DX2-66
Robust business PC.



3 Micro Express MicroFlex-VL/80
Am486DX2-80 runs like Pentium-60.



5 Zeos Pantera 60
Fast and solid.

CD-ROM drive	Bus slots	Monitor size/dot pitch	Vendor contact number	Fax reprint number ¹	Reader service no.	Comments	 Recommended as home system
—	ISA, VLB	15"/.28	800/733-9188	3191	666	Very cheap system with good performance, from a little-known vendor.	
2X	ISA, PCI	17"/.26	800/288-0566	3217	667	Big price cut moves feature-rich multimedia Pentium onto Budget list.	
—	ISA, PCI	15"/.28	800/989-9900	3208	668	Cheap and fast, ordinary reliability and service scores.	
2X	ISA, PCI	14"/.28	800/554-5220	3167	669	Fast for a DX2-66, member of the solid Pantera family.	
2X	ISA, PCI	14"/.28	800/554-5220	3163	670	Pentium version of no. 4 system costs more but is fastest Best Buy.	
2X	ISA, VLB	15"/.28	800/215-3976	3102	671	Poor service scores, lots of RAM, can take a second processor. (Formerly VTech.)	
2X	ISA, VLB	14"/.28	800/999-1278	3194	672	AMD DX2-80 system is faster than many DX4-100s, and it's cheap.	
2X	ISA, PCI	15"/.28	800/846-2000	3096	673	Huge hard drive in basic system from major vendor.	
2X	ISA, VLB	15"/.28	800/531-7447	3192	674	Decent value home PC with ordinary service and reliability.	
—	ISA, PCI	14"/.28	800/289-2385	3218	675	Low-cost Pentium-90 only lacks a CD-ROM drive.	
2X	ISA, VLB	14"/.28	800/999-1278	3219	676	Large price cut moves cheap multimedia Pentium system onto Top 20.	
2X	ISA, VLB	14"/.28	800/233-6571	3125	677	Top-rated budget DX4-100 is fast without a big price.	
—	ISA, PCI	14"/.28	800/234-2945	3209	678	Solid desktop value at a low price, but no CD-ROM.	
2X	ISA, VLB	15"/.28	800/288-0566	3212	679	Full multimedia PC is loaded but slow.	
—	ISA, PCI ³	14"/.28	800/989-7253	3211	680	Low-cost system is a bit slow for a DX4-100.	
2X	ISA, PCI	15"/.28	800/288-0566	3164	681	Low-cost Pentium with lots of RAM.	
2X	ISA, PCI	15"/.28	800/733-9188	3193	682	Cheap Pentium needs a bigger hard drive.	
2X	ISA, VLB	14"/.28	800/223-6571	3220	683	Big price cut boosts low-cost home PC onto chart.	
—	ISA, PCI	14"/.29	800/733-9188	3195	684	Cheap desktop is also the slowest on the Top 20.	
—	ISA, PCI	15"/.28	800/872-3539	3221	685	Basic value system could use a CD-ROM drive.	

advance (The Top 20 Flash Report, \$9.95). Touch-tone phone required. ² Insufficient customer responses to our Reliability and Service Monitor to gauge service performance and reliability. For our overall evaluation, we use an average rating derived from all companies for which we have received fewer than 125 responses. ³ Also has VLB expansion slots.

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

Top 20 Budget Desktops

IF YOU LIKE YOUR PCs ECONOMICALLY PRICED and capably configured, check out our Budget Desktops Top 20, where the price ceiling is now \$2250. For the third straight month, our top system is MIS's Slimline 66. This no-nonsense business desktop is buoyed by solid DX2-66 performance and a near-irresistible \$1495 price. The most expensive of our five Best Buys, the Quantex QP5/60PM-2 Pentium-60, goes for just \$2198 with a 17-inch monitor. Next down on the price list is the Zeos Pantera 60 Pentium-60, which costs just \$2123 with a 530MB hard disk and a CD-ROM drive. The Am486DX2-80 processor is making a splash in April's budget pool: One of this month's Best Buys, the Micro Express MicroFlex-VL/80, features this hot new AMD, achieving Pentium-like performance for a price much more typical of a 486DX2-66.

The only newly reviewed system on this month's Budget Desktops Top 20 is the number ten DTK Quin-35, a \$2200 Pentium-90. The CPU mix runs rich on the Budget chart; five processors are represented, including both 60-MHz and 90-MHz Pentiums, DX4-100s, Am486DX2-80s, and 486DX2-66s. The prices on the chart run from \$1495 to \$2220, and every unit is a solid budget business machine.



MIS Slimline 66

REVIEWED: February 1995

PROS: Excellent price for a basic business PC with snappy 486DX2-66 performance

CONS: Ordinary service policies with just a one-year warranty and no weekend tech support
Fast, expandable DX2-66 desktop boasts a 15-inch monitor, a 420MB hard drive, and 8MB RAM. This great entry-level system is a steal at \$1495. Reader feedback on MIS reliability and service is very good.



Quantex QP5/60PM-2

REVIEWED: January 1995

PROS: Quick Pentium-60 performance, 17-inch monitor, hefty software bundle, good price

CONS: Could do better than ordinary one-year warranty, some cable clutter inside
This quick and eminently expandable Pentium-60 minitower system costs a very reasonable \$2198 and comes with a big 17-inch moni-

tor that would be right at home on a power desktop. In addition, you get a CD-ROM drive and a 14.4-kbps fax-modem. A hefty software bundle includes Borland Office and Quicken.



Micro Express MicroFlex-VL/80

REVIEWED: March 1995

PROS: High performance for a particularly low price, minitower case has good expandability

CONS: Below-average reliability and service scores from reader fax-back survey
AMD's new Am486DX2-80 CPU pays off in good performance for this Micro Express minitower, which has 8MB RAM, a basic 420MB hard disk, and a 15-inch monitor paired with a 2MB graphics controller. You also get good expandability for the amazing \$1549 price.



Zeos Pantera DX2-66

REVIEWED: December 1994

PROS: Unusually good performance for 486DX2-66 system, CD-ROM drive, 24-hour tech support

CONS: Standard monitor just a 14-incher, one-year warranty mediocre in today's market
This fast, expandable 486DX2-66 desktop has 8MB RAM and a 128K secondary cache. Zeos provides a solid 530MB hard drive, a CD-ROM drive, and a 2MB PCI graphics controller. With a 14-inch display the system costs \$1845, but a 15-inch display upgrade adds just \$95 to your purchase price. The one-year warranty doesn't compare well these days, but Zeos's 24-hour technical support is commendable.



Zeos Pantera 60

REVIEWED: December 1994

PROS: Strong Pentium-60 performer, expandable, integrated SCSI option, 24-hour tech line

CONS: Standard monitor just a 14-incher, one-year warranty mediocre in today's market
This system is quite expandable, with strong Pentium-60 performance, 8MB RAM, a 256K secondary cache, a 530MB hard drive, a CD-ROM drive, a 1MB graphics controller, and 12-bit audio. It provides a nice step up from 486DX2-66 computing and costs just \$2123. You can upgrade the small 14-inch monitor to a 15-incher for \$95 when you buy your system and add integrated SCSI-2 for \$49.



Expotech Platinum 486DX2/66

REVIEWED: June 1994

PROS: Fast DX2-66 performance, dual-processor option, CD-ROM drive, three-year warranty

CONS: Limited expandability, poor service scores in our Reliability and Service Monitor



Polywell Poly 486-80VB

REVIEWED: February 1995

PROS: Pentium-60 performance from budget-price Am486DX2-80, CD-ROM drive

CONS: Polywell provides a small 14-inch monitor at the bargain price



Gateway 2000 P4D-66

REVIEWED: June 1994

PROS: Basic business 486DX2-66 desktop has CD-ROM drive, nice-size 730MB hard disk

CONS: Generally long hold times for Gateway technical support



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Seiko Instruments

9 Blackship Atlantis

REVIEWED: February 1995

PROS: Great price, solid 486DX2-66 performance, multimedia and home office features

CONS: Ordinary one-year warranty, no weekend tech support, cable-crowded interior

10 DTK Quin-35

NEW THIS MONTH

PROS: Eminently affordable Pentium-90 system with good expandability

CONS: A bit slow for a Pentium-90, no weekend technical support, 14-inch monitor

If you think that being on a budget rules out getting a Pentium-90, better think again. The DTK Quin-35 Pentium-90 costs an astonishingly affordable \$2200. That price and the solid array of basic features are the primary factors that vault this system onto our Budget Desktops Top 20. In truth, if the Quin-35 had recorded slightly faster performance scores, it would have added a Power Desktops Top 20 appearance to its accomplishments.

Don't get the idea this system is slow; it's not. But its level of speed is much closer to that of a fast Pentium-66 than of a snappy Pentium-90. Still, when you factor in the cost, you come up with a very good price/performance ratio. And if you expanded the RAM and the secondary cache, you would likely net a modest boost in performance. But while performance is an important factor in evaluating a budget PC, it does not carry the same weight as in the power category.

The configuration is sound on this medium-size tower unit. You get 8MB of RAM expandable to 128MB and 256K of secondary cache expandable to a hefty 1MB. The 14-inch monitor isn't a great match for the 2MB PCI graphics controller. There's little to criticize in the expandability department, because DTK left a lot of room for upgrades: an impressive seven free drive bays, along with three free 16-bit ISA slots, two free PCI slots, and an additional slot that takes either an ISA or a PCI card. Two free SIMM sockets leave ample space for adding RAM. Furthermore, the sockets are very easy to reach—a significant point for Quin-35 buyers, who are likely to want to bring their standard 8MB of RAM up to 16MB, more typical of a Pentium, as one of their first upgrades.

DTK offers a solid two-year warranty, though toll-free technical support is available only 9 hours a day and just during the week. The lack of weekend tech support is likely to affect you most if you're buying the system for home or home-office use. DTK enjoys above-average scores in our monthly reliability and service fax-back polls. The prime factor keeping this system from a higher rating is its lack of sterling Pentium-90 performance. But on balance it's still a relatively fast budget system and—for the dough—a very fine value.



11 Polywell Poly 560MPC

REVIEWED: January 1995

PROS: Low price for a PC with fast Pentium-60 performance and a voice fax-modem

CONS: 14-inch monitor definitely on the small side for a system with this much power

12 Micron 4100 PCI Magnum

REVIEWED: August 1994

PROS: Outstanding DX4-100 performance for a great price, great problem-solving gives

Micron one of the highest service ratings on the Budget Desktops Top 20

CONS: Ordinary one-year warranty, 14-inch monitor small for a powerful PC

13 Axik Ace Cache 466 VG2 Cutlass

REVIEWED: March 1995

PROS: Impressively low price, good expandability, good 486DX2-66 performance

CONS: Ordinary one-year warranty, small 14-inch monitor

14 Quantex Q486DX2/66MM-4

REVIEWED: June 1994

PROS: Great price for 486DX2-66 multimedia system, a nice home PC

CONS: One-year warranty, lack of free SIMM sockets makes RAM upgrades pricey

15 Diamond DT DX4/100 VIP

REVIEWED: March 1995

PROS: Price unusually low for a DX4-100 system

CONS: So-so warranty, no weekend technical support

16 Quantex QP5/60W-2

REVIEWED: December 1994

PROS: Ample configuration with many extras, good Pentium-60 performance

CONS: Ordinary one-year warranty, no weekend technical support

17 MIS M5P/60

REVIEWED: September 1994

PROS: Very attractive price for a multimedia Pentium-60 system

CONS: 270MB hard drive small for a Pentium system—especially a multimedia PC

18 Micron Family MPC LPX

REVIEWED: December 1994

PROS: Good DX2-66 performance, complete multimedia configuration, company rated top problem-solver by customers responding to our Reliability and Service Monitor

CONS: Ordinary one-year warranty, 14-inch monitor small for a multimedia PC

19 MIS M466T

REVIEWED: July 1994

PROS: Highly expandable 486DX2-66 compact at a very attractive price

CONS: 14-inch monitor, one-year warranty, 270MB hard drive, mediocre performance

20 USA Flex PT-60 Tower

REVIEWED: November 1994

PROS: Solid Pentium-60 performance, expandable, three-year warranty

CONS: Some fairly minor cable clutter inside full-size tower case



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THE TOP 20

PC WORLD

NOTEBOOK PCs



1 Toshiba T4900CT
Pentium-75 luxury model.

POWER SYSTEMS

	Last month	Months on chart	First reviewed	Overall rating	Performance rating	Reliability/service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1 Toshiba T4900CT	1	2	Mar 95	93	54	80/73	\$7479	Pentium-75	8	810
2 AST Ascentia 910N	—	1	current	92	42	66/66	\$5349	DX4-75	8	510
3 AT&T Globalyst 250	—	1	current	92	51	74/76	\$5154	DX4-75	8	540
4 Compaq LTE Elite	2	7	Oct 94	91	37	83/82	\$5179	DX4-75	8	340
5 Dell Latitude XP 4100CX	—	1	current	91	42	69/73	\$4799	DX4-100	8	340
6 Toshiba T4850CT	3	2	Mar 95	90	41	80/73	\$5280	DX4-75	8	505
7 MidWest Micro Elite Pentium SoundBook Plus	—	1	current	90	67	³	\$5599	Pentium-90	16	720
8 IBM ThinkPad 755CE	—	1	current	90	48	78/77	\$7624	DX4-100	24	540
9 Austin Business Audio 4/100	4	5	Dec 94	89	54	72/62	\$4548	DX4-100	16	525
10 IBM ThinkPad 755CD	—	1	current	88	46	78/77	\$7599	DX4-100	8	540

BUDGET SYSTEMS

1 WinBook XP DX2/50	1	3	Feb 95	90	28	³	\$1999	486DX2-50	8	255
2 Dell Latitude 450C	29	1	Jan 95	90	30	69/75	\$2668	486DX2-50	8	525
3 Acom Patriot 4000	9	2	Mar 95	84	35	³	\$2240	486DX2-66	8	325
4 Austin Business Audio 4/75	3	3	Feb 95	84	36	72/62	\$2689	DX4-75	8	250
5 WinBook XP DX4/75	4	3	Feb 95	84	37	³	\$2259	DX4-75	8	125
6 CTX EzBook	2	2	Mar 95	84	28	³	\$1978	486DX2-50	8	340
7 BSI GN8549D	6	4	Jan 95	84	29	³	\$2285	DX4-100	4	340
8 Arm ArmNote TS30M	5	2	Mar 95	83	26	³	\$1549	486DX2-50	8	200
9 ZDS Z-Star EX	7	3	Feb 95	83	29	67/75	\$2248	486DX2-50	8	200
10 AT&T Globalyst 200 (486SX-33)	8	5	Dec 94	82	26	74/76	\$2570	486SX-33	8	170



¹ CA = color active, CD = color dual-scan, CP = color passive, MD = mono dual-scan, MP = mono passive. ² Call 800/434-4495 (for payment by Visa or MasterCard) or 900/993-2972 (for phone billing) and use the fax reprint numbers listed above to order fax copies of system reviews. You can order three systems' capsule reviews (\$4.95), a single capsule review plus features table and test report (\$4.95), an entire month's review (\$9.95), and a list of all systems tested by the PC World Test Center (\$4.95).

2 AST Ascentia 910N
Fast DX4-75 has 8-hour battery.



1 WinBook XP DX2/50
\$1999 for steady monochrome.

2 Dell Latitude 450C
Color DX2-50, 525MB hard drive.



Weight (pounds)	Battery life (hours)	Screen type/size ¹	Vendor contact number	Fax reprint number ²	Reader service no.	Comments
7.6	3:57	CA/10.4"	800/334-3445	3677	686	Good at everything, and a huge hard drive to boot.
7	7:55	CA/10.4"	800/876-4278	3683	687	Longest-running battery we've seen.
8.6	3:49	CA/9.5"	800/225-5627	3684	688	Heavy, fast, and relatively cheap.
7.2	6:32	CA/9.5"	800/345-1518	3650	689	Slowest Top 20 power note, but has a good battery.
7.4	6:46	CA/9.5"	800/613-3355	3685	690	Very good battery life and service.
8.4	4:22	CA/10.4"	800/334-3445	3678	691	Decent and relatively inexpensive, but slow.
8.2	3:28	CA/10.4"	800/728-8582	3686	692	Desktop-level performance—best desktop replacement.
7.4	3:33	CA/10.4"	800/426-2968	3687	—	IBM quality and classic power features with no compromises.
8.4	3:08	CA/9.4"	800/331-1501	3661	693	Cheapest Top 20 power notebook.
8.6	3:11	CA/10.4"	800/426-2968	3688	—	Built-in CD-ROM drive in a full multimedia setup.
6.8	6:46	MP/9.5"	800/468-2162	3673	694	Cheap, with good battery life and features.
7	3:13	CD/9.5"	800/613-3355	3689	695	Big price cut takes solid color notebook onto chart.
8.4	3:30	CP/10.3"	800/898-2665	3682	696	Big screen. Price cut moves it up chart.
8.2	3:57	CD/9.5"	800/331-1501	3676	697	Very fast budget notebook with good audio.
7	5:39	CP/9.4"	800/468-2162	3674	698	Fastest budget notebook, but slow for a DX4-75. Tiny hard drive.
7.2	4:25	MP/9.5"	800/888-9052	3680	699	Large hard drive, low price, otherwise ordinary.
7.6	3:55	CD/9.5"	800/872-4547	3670	700	Very slow for a DX4-100, needs more RAM.
7.2	4:05	MP/9.5"	800/765-1767	3681	701	Cheapest budget notebook is also among the slowest.
6.8	3:09	CP/9.5"	800/533-0331	3675	702	Modular notebook with optional multimedia kit.
7	4:45	CD/9.4"	800/225-5627	3665	703	Nice design, but needs a bigger hard drive.

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

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

Top 20 Notebooks

THIS MONTH'S POWER NOTEBOOKS SHOW THE biggest turnover among our Top 20 divisions. Six of the ten top units are new, featuring innovative design and technology: The AST Ascentia 910N and Dell Latitude XP 4100CX provide lithium-ion batteries, the latest and greatest in rechargeable power. And two new ThinkPads feature IBM's Black Matrix screens, which are easier to view under bright lights. Last month's top Best Buy, the Toshiba T4900CT Pentium-75, repeats; the number two AST Ascentia 910N is new. We also boast our first Pentium-90—a record-setting speedster from MidWest Micro.

You don't expect budget notebooks—with their \$2750 ceiling—to offer the bells and whistles of their upscale power cousins. There are no Pentiums or active-matrix color screens here. One unit has a DX4-100 CPU, however, and a couple have DX4-75s. The rest have 486DX2-66, 486DX2-50, and 486SX-33 processors. Performance figures are generally less impressive, although any budget notebook here will handle basic Windows computing easily. And it's not all sackcloth and ashes: Just three budget notes lack a color screen, and despite generally smaller storage, Dell's Best Buy Latitude 450C DX2-50 provides a hefty 525MB hard drive. No new budget notebooks break into our Top 20 this month; the field is monopolized by systems reviewed during the last several months. For the third consecutive time, the top budget Best Buy goes to the WinBook XP DX2/50.

Power Notebooks



Toshiba T4900CT

REVIEWED: March 1995

PROS: Great performance, 10.4-inch color active screen, giant hard disk, three-year warranty

CONS: Price among the highest on our Notebooks Top 20

Hot-performing 7.6-pound Pentium-75 notebook has 8MB of RAM, an 810MB hard drive, a 10.4-inch color active screen, 65,536 simultaneous colors, a 4-hour battery life, and 24-hour technical support.



AST Ascentia 910N

NEW THIS MONTH

PROS: Nearly 8-hour battery life, lithium-ion battery, fast DX4-75 performance, small and light

CONS: Fairly high price for a DX4-75, some looseness in the screen hinge

If you think there is nothing truly new under the sun, you probably haven't seen the latest AST Ascentia models. Like other members of the Ascentia family, this unit is made expressly for power users. It takes a fast 75-MHz DX4 processor and a spacious, good-looking 10.4-inch active-matrix color display and backs them up with a rock-solid power configuration: 8MB of RAM expandable to a healthy 32MB, an easily removable 510MB hard drive upgradable to 720MB, and a PCMCIA Type III slot that alternatively accepts two Type II cards (or even a single Type I card, if you still happen to have one around). As you might deduce from the system's excellent standing on our chart, the good news continues. The Ascentia 910N is loaded with all the right stuff, including a number of high-class touches that contribute to its lofty \$5349 street price—and to its Best Buy rating.

The Ascentia 910N's performance leaves little to be desired, even if today you generally expect the notebook speed standard to be carried by a DX4-100. This system ran our tests noticeably faster than a typical DX4-75 notebook. It even outperformed some of the slower DX4-100 systems we've had in for evaluation—a feat that goes to show you can't judge a system's performance entirely by its processor. The vendor's implementation and configuration are at least as important to system performance. And despite the high-octane processor, the system's battery life is fantastic. This svelte portable dazzled us with a run-down time of nearly 8 hours—close to the best we've seen from any notebook computer. The model's lithium-ion battery pack provides more power capacity for its weight than the more common nickel-cadmium (NiCd) and nickel-metal-hydride (NiMH) cells. You don't have to drain lithium-ion cells fully before recharging them, you can use them three times longer than NiMH batteries before you have to replace them, and they drain much more slowly when stored with a full charge. However, lithium-ion batteries cost up to twice as much as NiMH batteries and four times more than NiCd cells. But clearly you receive value in kind.

As beautiful a unit as it is, the AST Ascentia 910N isn't completely flawless. For example, the display hinge on our test unit was somewhat loose. As a result, even a bout with relatively routine in-flight turbulence could jolt the screen closed. And for our fingers, the Track-Point-like pointing device mounted in the keyboard was uncomfortably stiff for prolonged use. However, these quirks strike us as relatively minor, and the Ascentia 910N's slight 7-pound traveling weight and tiny battery adapter make it a joy to carry. AST's one-year warranty is minimal these days, but in contrast to many other companies AST allows you to extend the warranty for another year for \$99. Furthermore, AST's 24-hour toll-free technical support line is available seven days a week. With all these advantages, the Ascentia 910N quickly wound up as one of our favorite notebooks. It earns an outstanding power rating and a solid power Best Buy.



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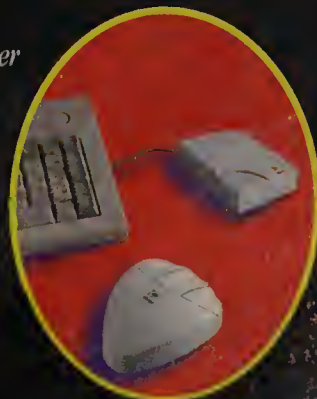
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3 AT&T Globalyst 250

NEW THIS MONTH

PROS: Excellent performance, good design, strong reliability and service, integrated audio

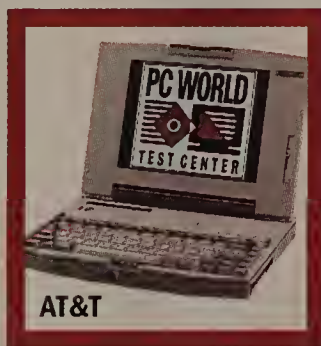
CONS: 8.6-pound traveling weight rather heavy for a notebook without a CD-ROM drive

To rate high on our shortlist, a power notebook needs more than performance; it also needs excellent expandability, a superior display, and solid ergonomic features. And it must be backed by impeccable service and reliability. The AT&T Globalyst 250 meets every one of these tough criteria, meanwhile complementing its blazing performance with outstanding design. As a result, the \$5154 Globalyst 250 is a near Best Buy.

Built around a 75-MHz DX4 processor and 8MB of RAM expandable all the way to 40MB, this handsome notebook is one of the fastest DX4-75s we've tested. It tore through our application tests much faster than a typical DX4-75 notebook and even significantly outpaced most DX4-100 notebooks. With its removable 540MB hard drive, integrated audio, and Type III PCMCIA slot, the Globalyst 250 is equipped to handle applications into the future. Although its 9.5-inch active-matrix color display is smaller than the 10.5-inch screens of many high-end notebooks, color and viewability are outstanding. We did find the system's 8.6-pound traveling weight cumbersome on long hikes. Battery life tested just shy of 4 hours, a respectable showing.

The Globalyst 250 excels with its comfortable design, including a front-mounted trackball that has good roll resistance and gives you excellent control and comfort. The quiet keyboard is nicely laid out, and we were impressed by the system's generally solid construction and the easy access to all the removable components.

AT&T boasts an excellent three-year warranty with 24-hour toll-free technical support seven days a week. A year of free on-site service surpasses most notebook vendors' policies, while the company enjoys fine ratings in our monthly fax-back polls on service quality. If you need that kind of blue-chip support along with serious performance and the fine feature comforts of a well-designed notebook, the AT&T Globalyst 250 should be right up your alley.



from scratch. Now we're seeing the new Dell notebooks, and they impress us greatly with their thoughtful, innovative design and state-of-the-art components.

The \$4799 Dell Latitude XP 4100CX is an outstanding example of the notebook maker's art. While performance is merely decent, the hot-swappable battery pack's 6.75-hour life is remarkable for a unit with a DX4-100 processor. Contributing to this feat is lithium-ion technology, a breakthrough we've seen on only a few elite power notebooks so far. Lithium-ion batteries provide more power capacity for the weight than NiCd and NiMH cells. And you can recharge lithium-ion cells even if they aren't completely discharged. If you try this trick regularly with NiCd and NiMH batteries, you'll reduce their short- and long-term life. Furthermore, lithium-ion batteries last over three times as long as NiMH batteries before they need replacement, and they drain much more slowly when stored with a full charge. That's an advantage you'll prize if you use your notebook's battery only periodically—say, once every week or two. No more will you find yourself running short of power on the commuter special because your battery has dipped to half charge while sitting in the closet.

The Latitude's configuration is the stuff solid, basic power notebooks are made of: 8MB of RAM (36MB max), a 340MB removable hard drive, a 1MB local bus graphics controller, and a 9.5-inch active-matrix color screen. While not as large as the displays on most luxury models, the screen still yields sharp, vivid color graphics. Given Dell's considerate price, we think you'll find the somewhat smaller screen size a pretty fair compromise. Dell fills out the basics with a PCMCIA Type III slot that alternatively accepts two Type II devices.

Every design element in this light 7.4-pound notebook stands out. For example, the keyboard has large keys, a logical layout, and full key travel. Only the function keys on the top row are reduced in size—a logical compromise. The keystroke click should satisfy desktop users without being obtrusive. The front-and-center trackball is also a pleasure, making a believer of one reviewer who previously felt uncomfortable with anything but a standard desktop mouse. In addition, port cover doors retract out of harm's way when open and snap securely back in place when closed. Finally, this handsome black unit's overall fit and finish is excellent.

The online documentation is so clear and complete, you'll probably never crack the manual. Readers responding to our monthly reliability and service fax-back poll give Dell a solid endorsement. Responsive tech support is available 24 hours a day, seven days a week. And the XP line comes with a great three-year warranty. This is a great little business notebook, and even in this exalted company it falls just shy of a Best Buy. With all its features and fine points, it places high among the power units on our Top 20 Notebooks chart.



4 Compaq LTE Elite

REVIEWED: October 1994

PROS: Solid DX4-75 performance; first-rate design and screen, 6.5-hour battery life, PCMCIA hot-swapping, Plug and Play compatible, 7.2-pound weight, great support

CONS: Innovative trackball placed in screen panel was inconsistently responsive

5 Dell Latitude XP 4100CX

NEW THIS MONTH

PROS: Outstanding design, great battery life, lithium-ion battery, good reliability and service

CONS: Readers report long waits on hold on sales lines

In the last few years, we saw Dell stumble and temporarily abandon its notebook marketing. The company returned with AST-manufactured notebooks while it retooled its own manufacturing efforts almost

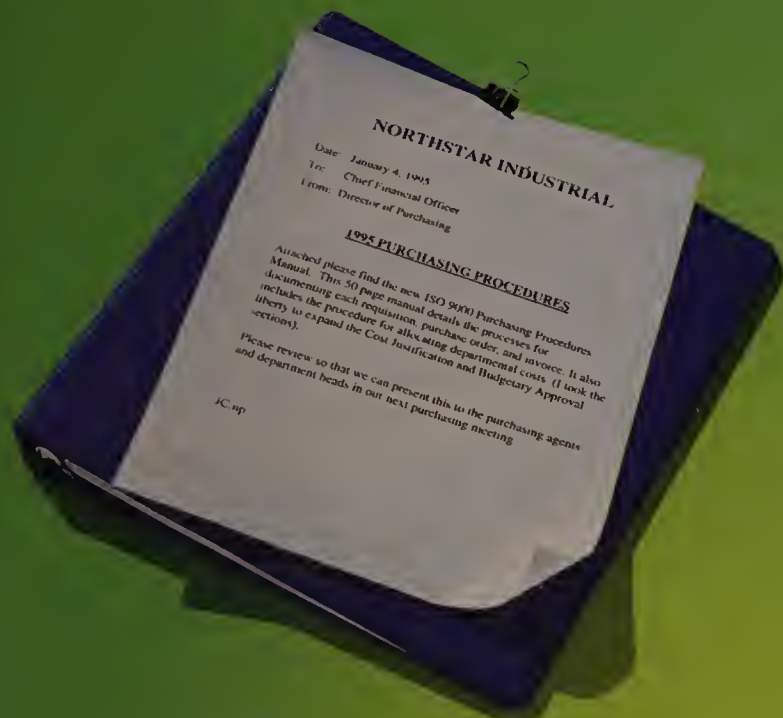


6 Toshiba T4850CT

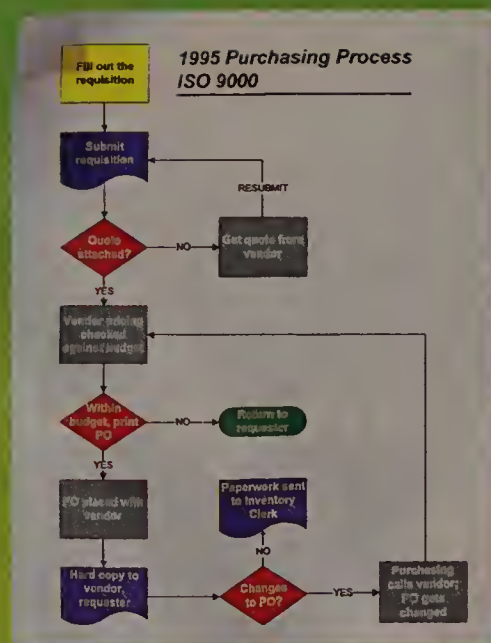
REVIEWED: March 1995

PROS: Good DX4-75 performance, fine color-active display, 4.3-hour battery, super support

CONS: Relatively high price for a DX4-75, 8.4-pound traveling weight quite heavy



or



(Sort through a fifty page plan to get to the point.)

(Get to the point with a single Visio diagram.)

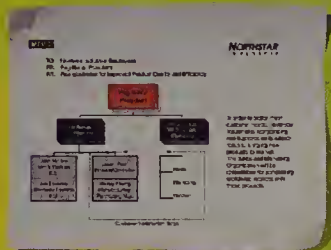
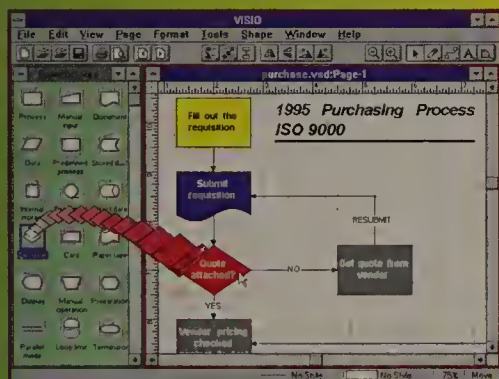
AND NOW A FEW WORDS ON WHY *WORDS ALONE* ARE NOT THE MOST EFFECTIVE WAY TO CONDUCT DAY TO DAY BUSINESS.

With over 20,000 words in the English language at our disposal, why do we have such a hard time expressing ourselves? Some things are just better seen than described. Try explaining how the purchasing process works in your company in a

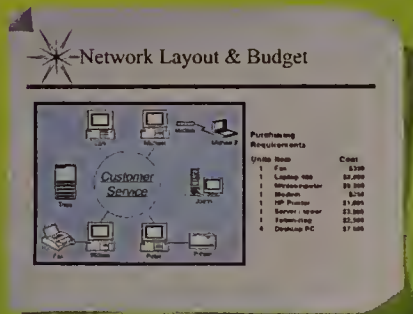
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7 MidWest Micro Elite Pentium SoundBook Plus

NEW THIS MONTH

PROS: Fastest portable we've ever tested, a fine desktop replacement

CONS: Unpredictable vertical control with TrackPoint-style pointing device

If typical notebooks aren't quick enough for you, check out the MidWest Micro Elite Pentium SoundBook Plus. This \$5599 laptop workstation is the fastest notebook we've ever tested. With a 90-MHz Pentium processor, 16MB of RAM expandable to 40MB, and a 256K secondary cache, the Elite Pentium blazed through our benchmark tests about a third faster than a typical DX4-100 system. In fact, its performance is comparable to what you'd expect from a Pentium-



MidWest Micro

66 desktop, making it a great choice for those who do heavy statistical and graphics work on the move. In our tests, this unit managed over 3 hours of battery life using its power management—not half bad for a notebook that has a power-chomping Pentium CPU and a secondary cache.

Equipped with a large 720MB hard drive and a brilliant 10.4-inch active-matrix color screen, the Elite Pentium also includes a PCMCIA Type III slot, which alternatively accepts two Type II cards. Furthermore, the system comes equipped with built-in audio and an infrared I/O port that lets you share data with similarly equipped units.

The Elite Pentium is well constructed, with a sturdy keyboard, and hinges and covers that resist breaking. Our only complaint: Vertical cursor control was frustratingly unpredictable with the TrackPoint-like pointing device. You get a terrific three-year warranty with toll-free tech support six days a week. If you demand raw power, the MidWest Micro Elite Pentium SoundBook Plus delivers. No wonder this gutsy unit is a shoo-in for power honors on our Notebooks Top 20.

8 IBM ThinkPad 755CE

NEW THIS MONTH

PROS: Superior support, 24MB of RAM, excellent color screen, lots of extras

CONS: Highest price on Notebooks Top 20

Any student of recent PC history knows that IBM has helped define notebook state of the art. The new IBM ThinkPad 755CE is no exception. This unit's large, crisp 10.4-inch active-matrix color screen with Black Matrix technology provides viewability under very bright conditions, and it's driven by a 1MB VL bus graphics controller that delivers 65,536 simultaneous colors. In addition, IBM provides a software-upgradable 14.4-kbps voice fax-modem, as well as infrared communications for wireless data exchange with similarly equipped units.

This classy little 7.4-pound note is configured to the limit: It comes with an impressive 24MB of RAM and a generous 540MB hard drive. A PCMCIA Type III slot alternatively accepts two type II devices. The keyboard design is as good as you'll find, and IBM's TrackPoint is



IBM 755CE

the pointing device par excellence. Battery life is reasonably good at 3.5 hours, and the Windows power management utility makes for easy adjustments. You get a ton of preinstalled utilities and online introductory offers.

You'll have to go a long way to beat IBM's three-year warranty, round-the-clock tech support, and 1-day turnaround on factory repairs. The 30-day IBM money-back guarantee comes only when you buy direct (otherwise talk to your dealer), and IBM will sell you an on-site service policy for the first year for a mere \$40. At a heady \$7624 (\$975 less if you buy it with only 8MB of RAM), you pay plenty to catch this ThinkPad's act. Its presence on our Top 20 Notebooks chart attests to how good a show you get for your money.

9 Austin Business Audio 4/100

REVIEWED: December 1994

PROS: Fast DX4-100 performance, 16MB of RAM, 525MB hard drive, built-in sound

CONS: So-so 3-hour battery life, muted color active screen

10 IBM ThinkPad 755CD

NEW THIS MONTH

PROS: Strong performance, built-in CD-ROM drive, color-rich screen, lots of extras

CONS: Price among the highest on Notebooks Top 20

If you want the latest features in a notebook with quick DX4-100 performance, check out IBM's ThinkPad 755CD. This unit comes ready to put on a show, with 8MB of RAM and a full complement of multimedia peripherals, including an easy-access CD-ROM drive positioned unobtrusively below the left side of the keyboard. In addition, IBM integrates 16-bit sound, speakers, and a microphone. You also get a large, crisp 10.4-inch active-matrix color screen (with Black Matrix technology) driven by a 1MB VL bus graphics controller delivering 65,536 colors. IBM provides a software-upgradable 14.4-kbps voice fax-modem, as well as infrared communications hardware and software that enables wireless data exchange with similarly equipped units.

Portability is very good, considering the extra hardware a multimedia notebook requires. Ready to travel with CD-ROM drive, floppy drive, and power supply, the ThinkPad 755CD weighs a reasonable 8.6 pounds. This expandable unit is replete with fine design touches. You can swap the internal CD-ROM drive for a floppy drive or an additional PCMCIA Type III slot. The unit comes standard with an integrated Type III slot that alternatively accepts two Type II cards. You can also upgrade the removable 540MB hard drive to an 810MB model. Video ports and software enable you to capture video from your television or video camera and play it back. A docking station and television tuner are available for extra cost, in case you have any loot left after paying the stiff \$7599 this beauty of a notebook costs.

Like other ThinkPads, the 755CD uses IBM's comfortable keyboard design and TrackPoint pointing device. Battery life is an acceptably solid 3.25 hours, and you can conveniently access all power management settings in Windows. The 21 preinstalled utilities and intro-



IBM 755CD

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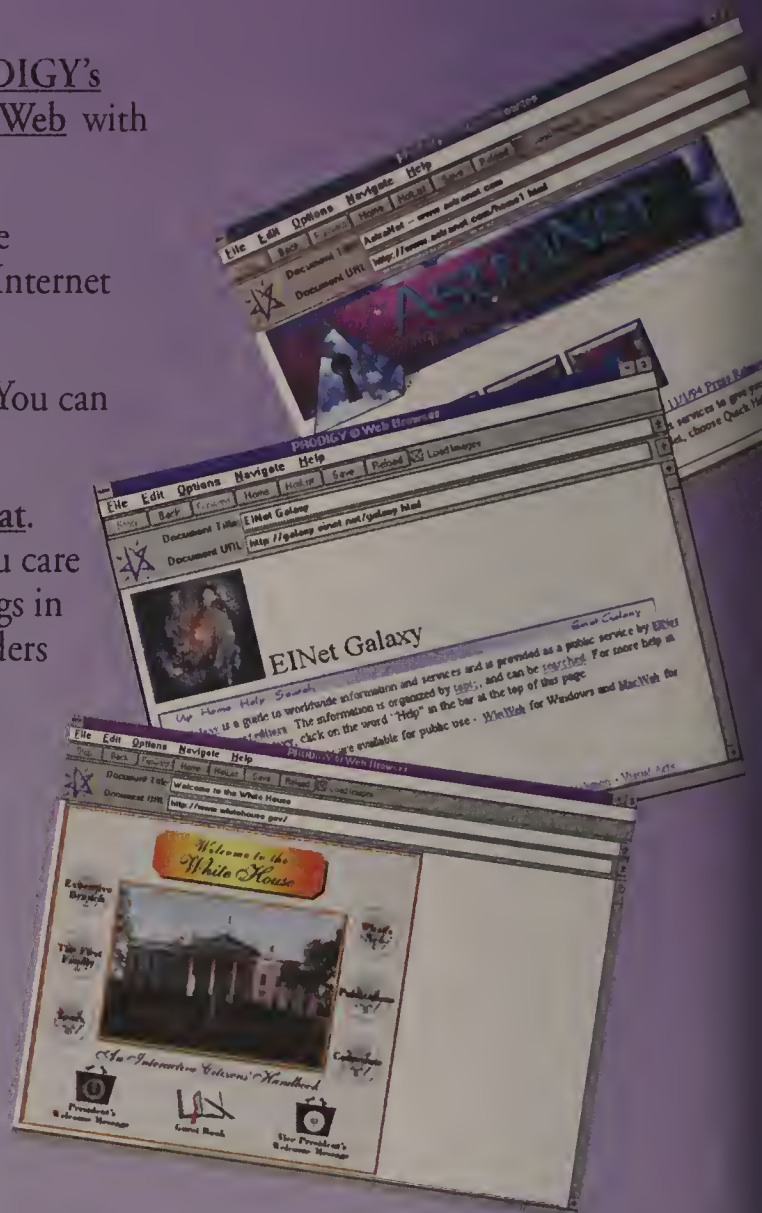
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ductory offers from online services include the Compel PE presentation program, FaxWorks Voice communications package, Lotus Organizer, Taxi mapping software, Reuters Money Network online investment software, and CoSession Host remote access package.

IBM's three-year warranty, 24-hour toll-free technical support, and 1-day turnaround on factory repairs are tops. If you buy direct, you get a 30-day money-back guarantee and can obtain a year of on-site service for \$40. Considering its price, this unit will have to stay on the wish list for bargain hunters. If you can afford it, however, the ThinkPad 755CD stands as a unique and impressive value.

Budget Notebooks

1



WinBook XP DX2/50

REVIEWED: February 1995

PROS: Exceptional battery life, trim dimensions, light weight, low price, modular design

CONS: Can't hot-swap battery, ordinary one-year warranty could be better

Monochrome screen helps keep \$1999 DX2-50 notebook's power consumption low—the battery runs for 6.75 hours. Decent performer with 14.4-kbps fax-modem, 255MB hard drive, and 8MB of RAM.

2



Dell Latitude 450C

REVIEWED: January 1995

PROS: Fast for a DX2-50 notebook, high-speed fax-modem, great documentation

CONS: Battery life only so-so, one-year warranty doesn't compare well with other top vendors' Lightweight 7-pound DX2-50 costs just \$2668 with dual-scan color screen, 525MB hard drive, 14.4-kbps PCMCIA fax-modem, and 8MB of RAM. Recent addition to Dell's notebooks shows elegant design.

3

Acom Patriot 4000

REVIEWED: March 1995

PROS: Great DX2-66 performance, integrated audio, 10.3-inch color screen

CONS: Dull screen colors, 8.4 pounds, no set turnaround policy on repairs

4

Austin Business Audio 4/75

REVIEWED: February 1995

PROS: Fast DX4-75, audio features, 4-hour battery, 24-hour tech support

CONS: One-year warranty, 8.2 pounds, limited power management

5

WinBook XP DX4/75

REVIEWED: February 1995

PROS: Quick DX4-75 performance, low price, 7 pounds, 5.6-hour battery

CONS: Undersize 125MB hard drive, can't hot-swap battery, one-year warranty

6

CTX EzBook

REVIEWED: March 1995

PROS: Excellent price, decent DX2-50 performance, 7.2 pounds, 340MB hard drive

CONS: Nonstandard monitor connector, no weekend tech support

7

BSI GN8549D

REVIEWED: January 1995

PROS: Outstanding price for fairly lightweight 7.6-pound DX4-100 notebook with respectable 4-hour battery life and integrated audio features

CONS: Slow for a DX4-100, ordinary one-year warranty, no weekend tech support

8

Arm ArmNote TS30M

REVIEWED: March 1995

PROS: Low price for a DX2-50 with a good monochrome screen, light 7.2-pound weight, 4-hour battery, integrated audio, three-year labor warranty

CONS: One-year warranty on parts falls short of three-year labor coverage

9

ZDS Z-Star EX

REVIEWED: February 1995

PROS: Good DX2-50 performance, modular design, 6.8 pounds, three-year warranty

CONS: Top hard drive option is just 340MB, no weekend technical support, 3-hour battery life just so-so, 200MB standard hard drive minimal for Windows computing

10

AT&T Globalyst 200 (486SX-33)

REVIEWED: December 1994

PROS: Good 486SX-33 performance, wonderful design qualities, easy-to-adjust power management features, better-than-average budget color dual-scan display, solid 4.75-hour battery life, three-year warranty with one year of on-site service

CONS: 170MB hard drive quite small even for bargain-priced notebook

TEST REPORT Battery Life



AST Ascentia 910N

7:55

Dell Latitude XP 4100CX

6:46

AT&T Globalyst 250

3:49

IBM ThinkPad 755CE

3:33

MidWest Micro Elite Pentium SoundBook Plus

3:28

IBM ThinkPad 755CD

3:11




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 workloads. We report the time elapsed until the notebook shuts itself off.

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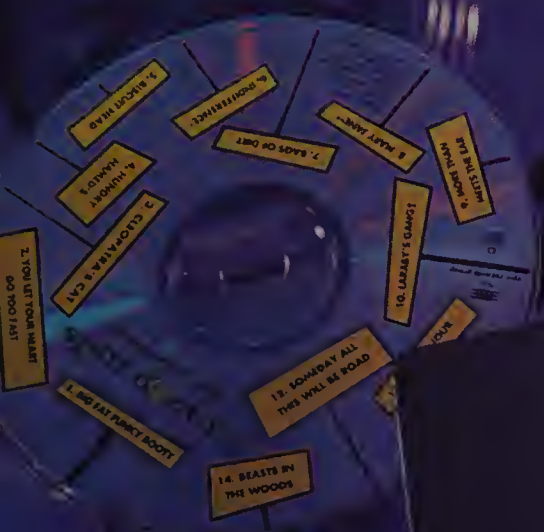
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FEATURES COMPARISON This Month's Contenders—Desktops

● = Yes ○ = No

n/a = not applicable

Standard features	Blackship P90 Neptune	DTK Quin-35	USA Flex PT-90 Power System
Street price as of 1/6/95 ¹	\$2960	\$2200	\$4114
CPU	Pentium-90	Pentium-90	Pentium-90
CPU or upgrade socket	320-pin ZIF	320-pin ZIF	320-pin ZIF
BIOS	AMI 1.00.10.AX1 8/23/94	Award 4.50G 10/18/94	AMI 1.00.10.AX1 8/23/94
Installed/maximum RAM (MB)	16/128	8/128	16/128
30-pin or 72-pin SIMMs	72-pin	72-pin	72-pin
SIMM sockets/number free	4/2	4/2	4/2
Secondary RAM cache installed/ maximum (K)	256/256	256/1024	256/256
Case style	compact	tower	tower
Free externally accessible 3½-inch/5¼-inch drive bays	1/0	1/3	0/3
Free internal 3½-inch/5¼-inch drive bays	0/1	3/0	0/0
Free 32-bit EISA/16-bit ISA/8-bit ISA expansion slots	0/3/0 ²	0/4/0 ²	0/3/0 ²
PCI or VL bus slots/number free	3 PCI/2 ²	4 PCI/3 ²	3 PCI/2 ²
Hard disk	Quantum Maverick 540A	IBM DSAA	Western Digital Caviar 31000
Size (MB)	540	545	1080
Adapter	integrated	integrated	integrated
Floppy drives (MB)	combo	1.44	1.44
Graphics adapter	Spider 64 PCI	Cirrus Logic OEM	Stealth 64 PCI
Installed VRAM/DRAM (MB)	0/2	0/2	2/0
Monitor	ADI MicroScan 4GP	ADI/Craftika	Mag MX17F
Screen diagonal (inches)/ dot pitch (mm)	15/.28	14/.28	17/.26
Modem speed for fax/data (kbps)	14.4/14.4	n/a	14.4/14.4
Sound board	Sound Blaster	○	Sound Blaster 16
CD-ROM drive	Teac CD 55A	○	Teac CD 55A
Data transfer rate (K/sec)	600	n/a	600
Parallel/serial/mouse/SCSI ports	1/2/0/0	1/2/0/0	1/2/0/0

Service and support

Warranty (years)	1	2	3
30-day money-back guarantee	●	○ ³	●
On-site service first-year price	free	free	\$49
Repair turnaround policy (days)	2	2	3
Daily toll-free phone support (hours)	10	9	24
Weekend support	○	○	●
BBS	●	●	●
Fax	●	●	●

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

² One less 16-bit slot available when all PCI slots are filled, and vice versa.

³ System replacement only.

System Snapshots

These desktops and notebooks were tested and reviewed along with the others, but didn't score high enough to reach the Top 20 charts.

Alaris EnergySmartPC BL3X100

PROS: Three-year warranty, multimedia configuration

CONS: Performance is slow for the price

IBM Blue Lightning III-100 minitower, math coprocessor, 8MB RAM, 540MB hard drive. \$2697; Alaris, 800/317-2348, 510/770-5700 Reader service no. 704

Alaris Nx586 P80

PROS: Solid performance, three-year warranty

CONS: Small hard drive, spartan configuration

NexGen 586 P80-based compact performs like Pentium-66; 8MB RAM, small 280MB hard drive. \$2300; Alaris, 800/317-2348, 510/770-5700 Reader service no. 705

Aspen Portalite

PROS: Good performance, large hard drive

CONS: Hefty 8.2-pound traveling weight

DX4-100 power notebook, 8MB RAM, 540MB hard drive, so-so 3-hour battery life, solid color active display. \$4505; Aspen Computer, 800/472-3273, 716/626-0315

Reader service no. 706

AST Advantage Adventure 8066d

PROS: Software bundle, three-year warranty

CONS: Fairly slow

Cyrix 486DX2-66 minitower, 8MB RAM, 540MB hard drive, tons of software, 14.4-kbps fax-modem, top support. \$2219; AST Research, 800/876-4278, 714/727-4141

Reader service no. 708

AT&T Globalyst 525

PROS: Quick, great design, excellent three-year warranty

CONS: Somewhat pricey for a 486DX2-66

Expandable 486DX2-66 minitower model, 8MB RAM, 340MB hard drive, CD-ROM drive, superior design qualities, outstanding service rating from readers, three-year warranty. \$2322; AT&T Global Information Solutions, 800/225-5627, 513/445-5000

Reader service no. 709

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AT&T Globalyst 580

PROS: Quick performance, great design, three-year warranty
CONS: Pricy for a Pentium-60, no free drive bays
 Pentium-60 minitower, 8MB RAM, 540MB hard drive, CD-ROM drive, great design qualities and fit and finish, super service rating from readers, three-year warranty, just one free full-length slot. \$2868; *AT&T Global Information Solutions*, 800/225-5627, 513/445-5000 **Reader service no. 830**

Axik Ace Power 90 MPC

PROS: Fast performance, 32MB RAM, 1030MB hard drive, high-quality multimedia components
CONS: Ordinary one-year warranty
 Pentium-90 tower model has power users' configuration, with amazing 32MB RAM, robust 1030MB SCSI hard drive, and quality 4MB PCI graphics controller. \$4200; *Axik Computers*, 800/234-2945, 408/735-1234 **Reader service no. 710**

BSI NP3700 CD-Sound Notebook

PROS: Integrated CD-ROM drive, speakers, microphone
CONS: 9.2-pound traveling weight heavy even for a CD-ROM-equipped notebook, deficient support package
 DX4-100 multimedia notebook, 8MB RAM, 345MB hard drive, sound, speakers, less than 3 hours of battery life, good color passive screen with support for 65,536 colors, no toll-free technical support. \$3110; *Broadax Systems*, 800/872-4547, 818/442-0020 **Reader service no. 711**

Dell OptiPlex XMT575

PROS: Multimedia configuration, fine design
CONS: A bit pricey, slow for a Pentium-75
 Nicely put together Pentium-75 tower PC, 16MB RAM, 540MB hard drive, CD-ROM drive, 14.4-kbps fax-modem. \$3195; *Dell Computer*, 800/613-3355, 512/338-4400 **Reader service no. 712**

Digital Venturis 560

PROS: Excellent support, three-year warranty
CONS: Poor expandability, small monitor
 Pentium-60 compact, 8MB RAM, 540MB hard drive, robust design with good fit and finish, small 14-inch monitor. \$2598; *Digital Equipment*, 800/722-9332, 603/884-4304 **Reader service no. 713**

DTK DTN-4T100P

PROS: Attractive price
CONS: Heavy, one-year warranty, no weekend tech support
 DX4-100 notebook with 8MB RAM, 340MB hard drive, dual-scan color screen, battery life under 3 hours, relatively heavy 8.8-pound weight; almost managed a Top 20 ranking. \$2600; *DTK Computer*, 800/289-2385, 818/810-0098 **Reader service no. 714**

FutureTech FutureMate FM366T

PROS: Strong Pentium-66 performance, one-day turnaround policy on service center repairs
CONS: 10.6-pound traveling weight, short, 2.25-hour battery life, no weekend technical support
 Powerful Pentium-66 notebook, 16MB RAM, 330MB hard drive, active-matrix screen, 16-bit sound, speaker, microphone. \$4249; *FutureTech Systems*, 800/275-4414, 201/488-4414 **Reader service no. 715**

Hewlett-Packard OmniBook 600C

PROS: Quick, 5.6 pounds, three-year warranty
CONS: Cramped keyboard, small hard drive
 DX4-75 subnote, 8MB RAM, 170MB hard drive, 8.5-inch color passive display, 65,536 colors, infrared comm port for wireless data transfer with similarly equipped systems. \$3300; *Hewlett-Packard*, 800/443-1254, 503/715-2004 **Reader service no. 716**

IBM Personal Computer 330 DX2-66

PROS: Speedy for DX2-66, three-year warranty
CONS: Pricy for modest configuration, 14-inch monitor
 486DX2-66 compact, 8MB RAM, 365MB hard drive, small 14-inch monitor, just one free drive bay, super reliability rating, outstanding three-year warranty. \$2191; *IBM*, 800/426-2968, 914/766-1900

Insight PCI P90 MM

PROS: Quadruple-speed Plextor SCSI CD-ROM drive, 28.8-kbps fax-modem, high-quality multimedia components
CONS: Pricy, shaky service ratings
 High-performance Pentium-90 tower with loads of expandability, 16MB RAM, 1080MB hard drive, 4MB VRAM, 17-inch monitor, and a quad-speed Plextor SCSI CD-ROM drive that's one of the best such drives you can buy, bar none. \$4499; *Insight Direct*, 800/998-8011, 602/902-1176 **Reader service no. 717**

Micro Express MicroFlex-PCI/P901

PROS: Quick Pentium-90 performance, eight free drive bays
CONS: Piecemeal documentation, low service scores
 Reasonably expandable Pentium-90 tower, 8MB RAM, 540MB hard drive; Micro Express hardware rates well, but readers tend to give the company below-average service scores. \$2598; *Micro Express*, 800/989-9900, 714/852-1400 **Reader service no. 718**

MidWest Micro Elite P5-90 Home PC

PROS: Hot performer, software bundle, three-year warranty, would make a solid home-office machine or deluxe home PC
CONS: Some internal cable clutter
 Pentium-90 minitower, reasonably expandable, 16MB RAM, generous 780MB hard drive, quality array of multimedia components, 15-inch monitor, 14.4-kbps fax-modem. \$3075; *MidWest Micro*, 800/728-8582, 513/368-2309 **Reader service no. 719**

Mitsuba Premier System-90

PROS: Multimedia configuration, 17-inch monitor
CONS: Subpar performance, no toll-free tech support
 Pentium-90 compact, 16MB RAM, 730MB hard drive, 14.4-kbps fax-modem, jumbo 17-inch monitor, solid two-year warranty; quad-speed Teac CD-ROM drive performed more like fast double-speed drive in *PC World* tests. \$3300; *Mitsuba*, 800/648-7822, 909/392-2000 **Reader service no. 720**

NEC Versa M/75HC

PROS: Quick, 800 by 600 screen, three-year warranty
CONS: High price, no weekend tech support
 Quick DX4-75 notebook didn't miss our Top 20 by much. It features 8MB RAM, a 540MB hard drive, a color active screen, and the quality design typical of NEC. This unit has the first 800 by 600 screen we've ever seen on a notebook computer. \$5399; *NEC Technologies*, 800/632-4636, 508/264-8000 **Reader service no. 721**

Netis N590

PROS: Good performance and expandability
CONS: Ordinary one-year warranty
 No-frills Pentium-90 tower, 8MB RAM, 730MB hard drive, difficult access to RAM. \$2340; *Netis Technology*, 800/577-7526, 408/263-0368 **Reader service no. 722**



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FEATURES COMPARISON This Month's Contenders—Notebooks



● = Yes ○ = No

n/a = not applicable

Standard features

	AST Ascentia 910N	AT&T Globalyst 250	Dell Latitude XP 4100CX	IBM ThinkPad 755CD	IBM ThinkPad 755CE	MidWest Micro Elite Pentium SoundBook Plus
Street price as of 1/6/95 ¹	\$5349	\$5154	\$4799	\$7599	\$7624	\$5599
CPU	DX4-75	DX4-75	DX4-100	DX4-100	DX4-100	Pentium-90
Traveling weight (pounds) ²	7	8.6	7.4	8.6	7.4	8.2
Width x depth x height (inches)	11.5 x 8.5 x 2	11.6 x 9.5 x 2.3	11 x 8.8 x 2	11.6 x 8.4 x 2.3	11.8 x 8.4 x 2	11 x 8.6 x 2.1
Installed/maximum RAM (MB)	8/32	8/40	8/36	8/40	24/40	16/40
Secondary RAM cache installed/maximum (K)	0/0	0/0	0/0	0/0	0/0	256/256
Installed/maximum hard disk (MB)	510/720	540/810	340/810	540/810	540/810	720/720
Removable hard disk	●	●	●	●	●	○
Display type	color active	color active	color active	color active	color active	color active
Screen diagonal (inches)	10.4	9.5	9.5	10.4	10.4	10.4
Maximum colors or gray shades of LCD	256	256	65,536	65,536	65,636	256
Simultaneous LCD and external monitor	●	●	●	●	●	●
Highest resolution of external monitor	1024 x 768	1024 x 768	1024 x 768	1024 x 768	1024 x 768	1024 x 768
Mouse/keyboard ports	1/1	1/0 ³	1/0 ³	1/0 ³	1/0 ³	1/0 ³
Cursor keys In Inverted T	●	●	●	●	●	●
Dedicated page-control keys	●	●	●	●	●	●
All 12 function keys dedicated	○	●	●	●	●	●
Standard <Ctrl> and <Alt> layout	○	○	○	●	●	○
Built-in pointing device	●	●	●	●	●	●
Modem speed for fax/data (kilobits per second)	n/a	n/a	n/a	14.4/14.4	14.4/14.4	n/a
Docking station available	●	●	●	●	●	●
PCMCIA slot Type II/III	0/1 ⁴	0/1 ⁴	0/1 ⁴	0/1 ⁴	0/1 ⁴	0/1 ⁴

Power management

Supports APM	●	●	●	●	●	●
Type of battery	lithium ion	NiMH	lithium ion	NiMH	NiMH	NiMH
Suspend button	●	●	●	●	●	●
Suspends when case closed	●	●	●	●	●	○

Service and support

Warranty (years)	1	3	3	3	3	3
30-day money-back guarantee	○	●	●	●	●	●
On-site/replacement service first-year price	○	free	free	\$40	\$40	○
Repair turnaround policy (days)	2	2	2	1	1	○
Daily toll-free phone support (hours)	24	24	24	24	24	11
Weekend support	●	●	●	●	●	● ⁵
BBS	●	●	●	●	●	●
Fax	●	●	●	●	●	●



¹ All notebooks priced as configured with DOS 6.0 or later version, Windows 3.1, VGA monochrome or better display, and mouse or other pointing device. Price is direct or based on vendor estimate.

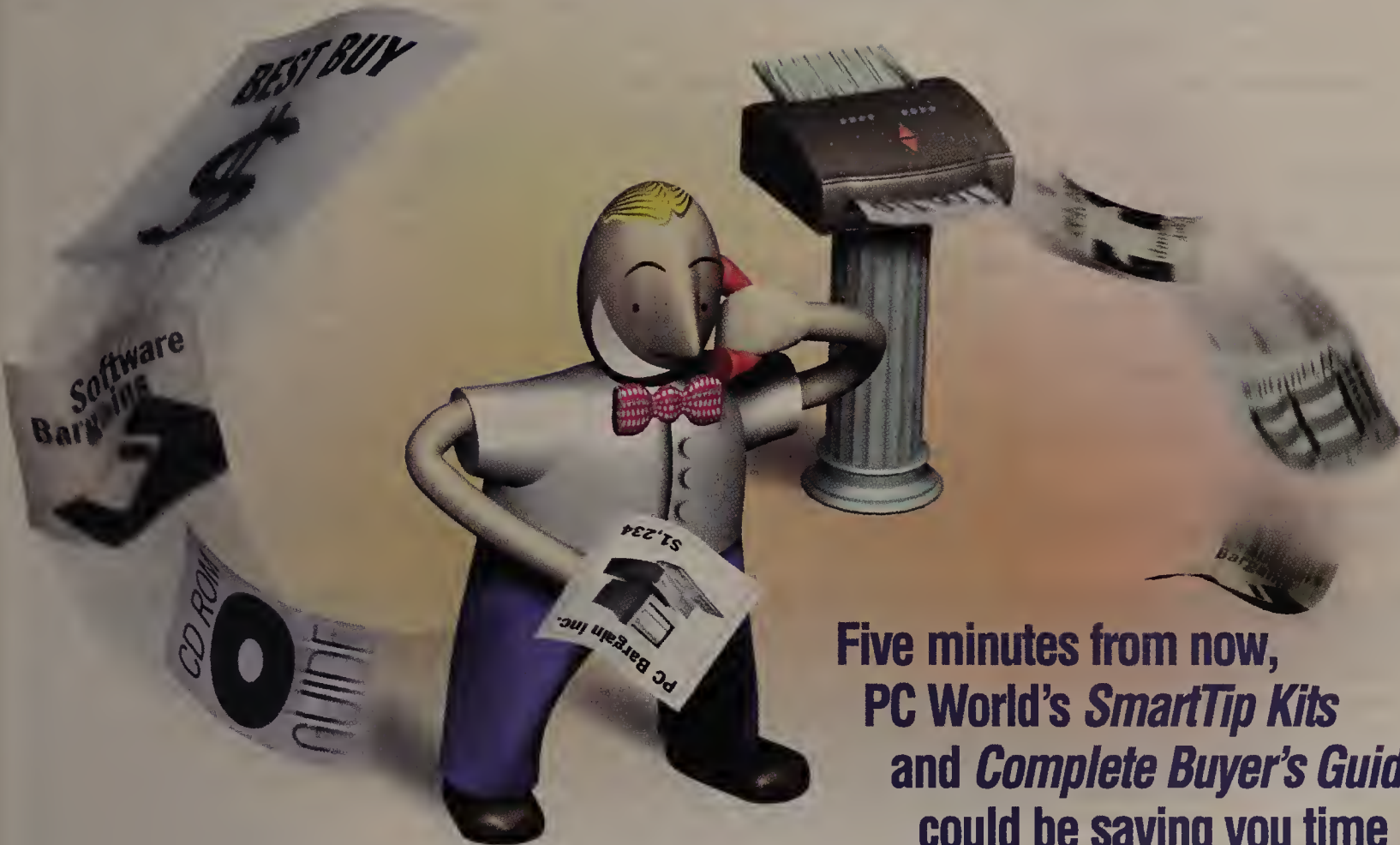
² Includes computer, adapter, power cord, and external floppy drive if notebook has one.

³ Mouse port doubles as keyboard port.

⁴ Type III slot alternatively holds two Type II devices.

⁵ Saturdays only.

Tips by Fax!



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and money!**

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Product Spotlight

The PC World Top 20—it's the most authoritative monthly PC systems review and ranking. Now you can receive it by fax a month ahead of publication. Order one of the PC World Top 20 Flash Reports and you'll immediately receive the inside information on the hottest new systems. The May Top 20 Flash Reports become available on March 22.

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If you subscribe to all three reports for 6 or 12 months, you'll receive a FREE Microsoft Sound System, complete with 16-bit sound board, microphone, and headphones (\$179 retail value).

PC WORLD
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1-800-434-4495

Packard Bell CD TV

PROS: Nice multimedia bundle, TV card

CONS: Weak performance, pricey for a 486DX2-66, fairly low service rating, one-year warranty

DX2-66 compact, 8MB RAM, 540MB hard drive, big CD-ROM bundle, basic 2400/9600 fax-modem. \$2400; *Packard Bell Electronics*, 800/733-5858 **Reader service no. 723**

Polywell Poly DX4-100

PROS: Good DX4-100 performance, multimedia configuration

CONS: Some internal cable clutter

DX4-100 minitower, 15 CD-ROMs, good warranty. \$2415; *Polywell Computers*, 800/999-1278, 415/583-7222 **Reader service no. 724**

Texas Instruments TravelMate 4000M/100

PROS: Multimedia capabilities, 7.2-pound traveling weight

CONS: One-year warranty, no weekend tech support

DX4-100, 8MB RAM, 540MB hard drive, color active screen, sound, 2.75-hour battery, optional \$849 docking station with SCSI CD-ROM drive. \$6499; *Texas Instruments*, 800/848-3927, 817/771-5856 **Reader service no. 725**

Twinhead Slimnote 5100T

PROS: Fast DX4-100 notebook, Touchpad pointing device

CONS: One-year warranty, no weekend support, 8.2 pounds

16MB RAM, 500MB hard disk, color screen, sound, speakers. \$4860; *Twinhead*, 800/995-8946, 408/945-0808 **Reader service no. 726**

ZDS Z-Select 100 XE

PROS: Quality design, nonstop technical support

CONS: Slow for a 486DX2-66, small screen, poor expandability Compact 486DX2-66, 8MB RAM, 270MB hard drive, 14-inch monitor. \$2084; *Zenith Data Systems*, 800/553-0331, 708/808-5000

Reader service no. 727

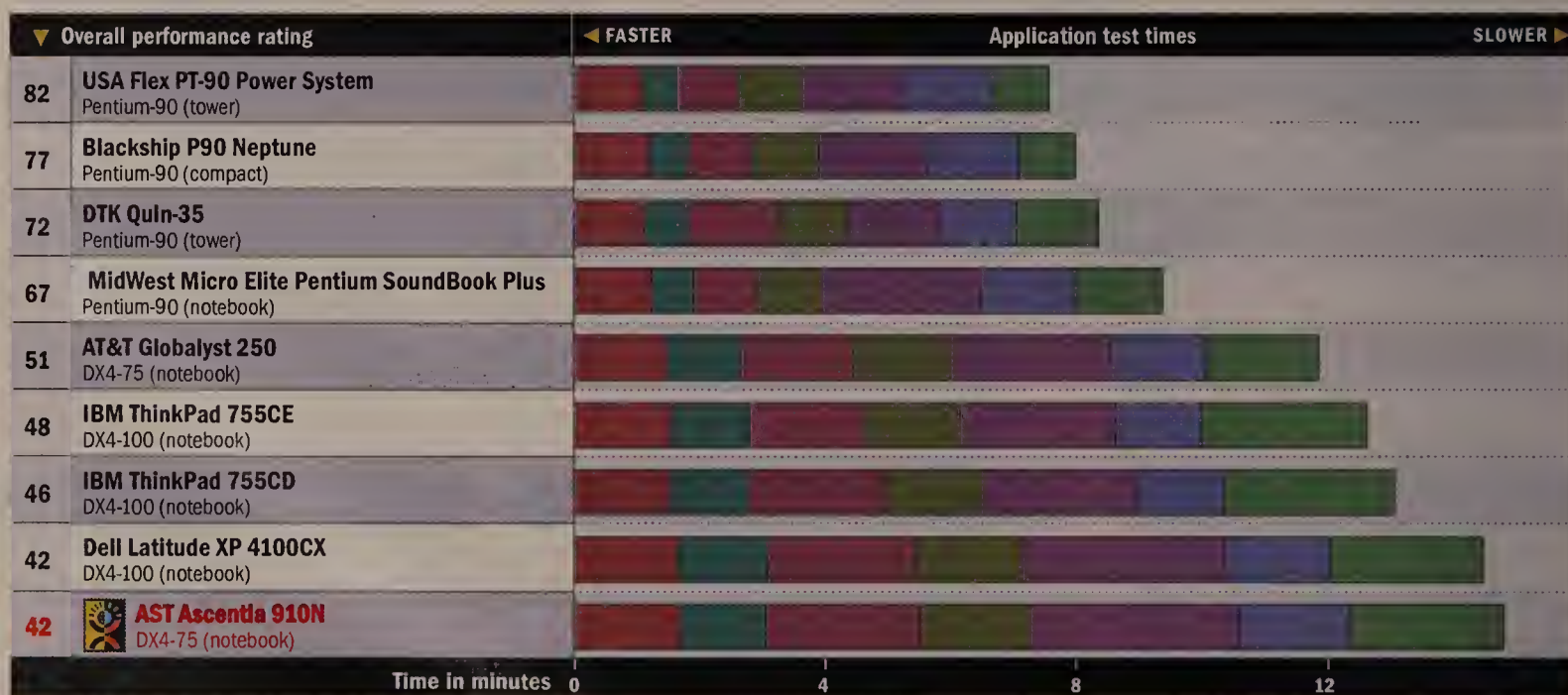
Zeos Meridian 800C

PROS: 10.3-inch color passive screen, comfortable design

CONS: Ordinary one-year warranty

DX2-50 notebook, 8MB RAM, 350MB hard disk, 4.25-hour battery, 7.6 pounds, 24-hour support. \$2895; *Zeos Int'l*, 800/554-5220, 612/362-1234 **Reader service no. 728**

TEST REPORT This Month's Contenders



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

Methodology

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

Word 2.0 for Windows

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

Excel 4.0

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

Paradox 1.0 for Windows

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

Freelance 1.0 for Windows

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

WordPerfect 6.0 for DOS

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

1-2-3 release 3.4 for DOS

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

Paradox 3.5 for DOS

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

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

COREL DRAW! 5

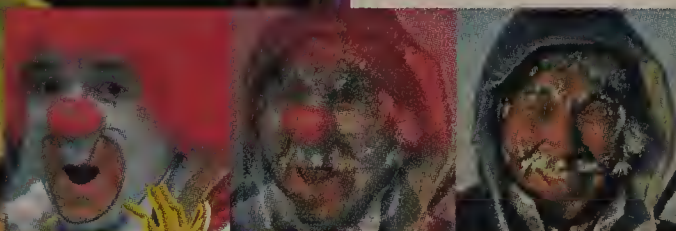
The Best in Graphics and Publishing



With the new lenses in CorelDRAW 5 users can create incredible photographic effects such as transparency, magnify, grayscale, brighten, invert, heat maps, and more. Dynamic special effects can also be created using morphing, artistic filters, and masking. With 60 new additional fractal textures, CorelDRAW 5 allows for unlimited design variations.



Exciting New Filters



Amazing Morphing

CorelDRAW 5 combines the graphics power of CorelDRAW and the advanced publishing capabilities of Corel VENTURA 5 within an integrated user interface. With a revolutionary color management system, major performance gains and hundreds of improvements, CorelDRAW 5 retains the ease of use for which Corel is renowned. CorelDRAW 5 is the most exciting value-packed graphics and publishing software available.

INCLUDES

- CorelDRAW 5
- Corel VENTURA 5
- Corel PHOTO-PAINT 5
- CorelCHART 5
- CorelMOVE 5
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- 825 fonts
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CorelDRAW 5—"the best has gotten better!"

InfoWorld, August 1994-USA

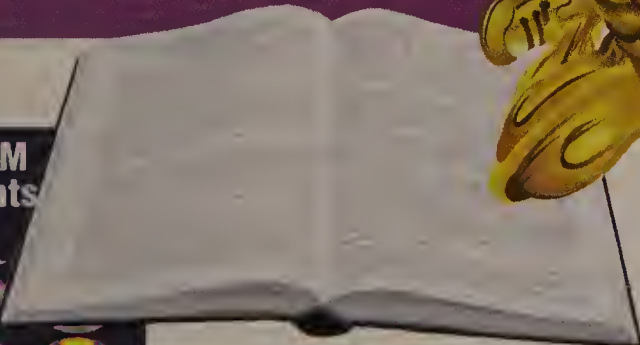
*"OUTSTANDING!
CorelDRAW 5 really is the best
graphics package ever!"*

PC Answers, June 1994-U.K.

Versatile Charting



Power Publishing



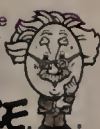
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CorelDRAW 5
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CD-ROM version

*US\$ plus applicable taxes

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A LIFETIME
WARRANTY.**

**WE GOT A
HOT PRICE:
\$199*.**



**THEY GOT
COOL 64-BIT
GRAPHICS.**

**THEY GOT
A PART-TIME
WARRANTY.**

**THEY GOT A
PROBLEM.**

STB: We've Taken The Lead.

STB is the world's largest manufacturer of DRAM video accelerators. So it should come as no surprise that we make the fastest video boards on the planet. But here's the surprising part: our POWERGRAPH 64 DRAM card actually outperforms their VRAM*. Of course, STB boards offer full virtual screen capabilities. Astronomical

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JUST THE FACTS.

STB VELOCITY 64V - \$299 84.3***

STB POWERGRAPH 64 - \$199 78.2***

DIAMOND Stealth 64 VRAM - \$399 77.1***

ATI Graphics Expression - \$249 75.1***

*Overall performance scores (measured in WITS) as published in the February issue of PC World.

**Performance scores for VELOCITY 64V obtained by STB using a comparably equipped system and test.



#1 February 1995

*Get the POWERGRAPH 64 with 2MB DRAM for just \$199, or the VELOCITY 64V with 2MB VRAM for just \$299.

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Win a Dell Dimension XPS P90

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The hard drives of America are littered with the unused remains of worthless personal organizer software. • Well, erase it. And install Espresso software from Berkeley Systems.

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boxes. Just a calendar, address book and to-do list that work the way your

brain works. Click and type to make new entries. Drag and drop to

reschedule. Laugh and sing when you see how easy it all is. • Espresso's always right on your desktop, instantly accessible from any application.

And with a wide choice of graphical backgrounds, you can match its personality to your own. • Don't take our word for how cool it is.

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<input checked="" type="checkbox"/>	Finkle	Carl	555-4123
<input checked="" type="checkbox"/>	Fitz	Debra and Brian	555-5678
<input checked="" type="checkbox"/>	Frank	Jay	555-6785
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8 items in list



Top 10 Windows Accelerators: Video Comes Alive

The latest graphics accelerators are on the move—moving pictures, that is. CD-ROM-based titles use demanding full-motion video, yet traditional graphics boards do little to help. A new class of boards enhances playback by accelerating video functions—just as they've accelerated graphics for years. Meanwhile, price cuts have once again shaken up our list, while the STB Nitro 64 gets renewed life thanks to new driver software.

One of the first video-aware boards is the MiroVideo 20TD from Miro Computer. The 20TD's separate video coprocessor enhances digital video playback by converting color data into standard graphics format. The chip also expands video windows by averaging pixel colors for smooth playback at 640 by 480 and higher resolutions. An integrated TV tuner even lets you watch programs in a window. On the graphics side, the 20TD's ET4000/W32p chip helped drive the PCI version to an impressive 77.3 overall Windows Integrated Test Suite (WITS) score. The VL version posted a 72.7 score. The 2MB DRAM MiroVideo 20TD is intriguing, but at \$499 it's too pricey for our Top 10.

The MiroVideo's separate coprocessor enhances digital video playback.

For high-end graphics, you can't beat the Number Nine Imagine 128—its 80.7 overall WITS score is the fastest we've ever seen. The PCI board uses Number Nine's own Imagine 128 chip and 4MB of fast VRAM to offer blazing performance and 100-Hz refresh rates at 1280 by 1024 resolution. It also features the same impressive graphics software that's found on the company's #9GXE64 line. But the \$849 street price makes this a board for professionals.

Finally, we tested the PCI version of two boards for mainstream users. The Winner 1000 Pro is based on S3's Vision864 chip and has 2MB of DRAM—similar to the PraeTek FastMax P20 and other Top 10 contenders—but it suffers from a high \$265 street price and disappointing 67.6 WITS score. The \$424 Winner 2000 Pro uses S3's Vision964 chip and 2MB of fast VRAM to handle heavy-duty graphics. The board supports impressive 100-Hz refresh rates at 1280 by 1024 resolution, but its 72.6 WITS score is unexceptional.

WITS was developed by Jon Peddie Associates, a PC graphics consulting firm. Jon Peddie and Fred Dunn are the firm's principal officers.

TOP 10 ACCELERATORS

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

	Overall value	Estimated street price	Windows Integrated Test Suite scores							Overall WITS score	Bus type	RAM (MB/type) ¹	Chip Driver date	Reader service number
			Windows	Word 2.0 for	Excel 4.0	CorelDraw 3.0	PhotoStyler 1.1	QuarkXPress 3.11	Graphics 2.01					
1	▲	STB Powergraph 64 800/234-4334	99	\$180	13.6	16.5	13.7	11.7	16.7	6.1	78.2	2 / D PCI	Trio64 7/11/94	610
2	▲	ATI Graphics Xpression 905/882-2600	95	\$215	13.4	16.6	13.2	11.6	15.6	4.8	75.1	2 / D PCI	88800CX 4/11/94	611
3	▲	PraeTek FastMax P20 800/752-8033	94	\$189	13.1	16.2	13.4	11.5	15.3	6.6	76.1	2 / D PCI	Vision864 6/1/94	612
4	▲	Paradise Bahamas 64 800/568-9272	94	\$179	13.7	16.4	13.3	11.3	16.6	6.3	77.4	2 / D PCI	Vision864 7/11/94	613
5	▼	STB Powergraph Pro 800/234-4334	93	\$219	12.8	15.6	12.2	11.7	14.6	6.6	73.4	2 / D PCI	Vision864 5/9/94	610
6	▲	STB LightSpeed 800/234-4334	93	\$179	12.5	14.5	12.6	11.4	14.7	5.9	71.5	2 / D VL	ET4000/W32p 4/10/94	610
7	▼	Hercules Stingray 64 800/532-0600	92	\$179	13.8	16	13.7	11.8	16	3.8	75	2 / D PCI	Ark2000PV 10/27/94	614
8	▲	Hercules Dynamite Power PCI ² 800/532-0600	91	\$199	13.2	15.2	13.3	12.8	15.3	5.7	75.5	2 / D PCI	ET4000/W32p 5/11/94	614
9	▲	Genoa Phantom 64 ² 800/934-3662	91	\$210	14	16.9	13.4	11.5	16.9	6.3	79	2 / D PCI	Vision864 8/2/94	615
10	▲	STB Nitro 64 800/234-4334	90	\$189	12.2	13.4	13.1	12.6	14.7	4.1	70.2	2 / D PCI	GD5434 2/18/94	610

Methodology Boards were tested at 1024 by 768 resolution at 256 colors and a minimum 70-Hz refresh rate on a 486DX2-66 with 16MB of RAM and 256K of secondary cache. Application scores are the factor by which a board exceeds our baseline system, an unaccelerated ET4000-based VGA adapter on a 386DX-25 with 16MB of RAM. The overall value score balances performance, estimated street price, and features. The overall WITS score is the aggregate of the application scores. For all scores, higher is better.

¹ D = DRAM, V = VRAM.

² Comparable value offered by other bus versions tested.

For more information about all products in this table, circle reader service no. 902.

HP quality in
value-priced PCs.

HP Vectra VL2



from
\$1,119[†]

- Intel 50-MHz 486SX2, 50- and 66-MHz 486DX2, 100-MHz DX4, upgradeable to Pentium™ Overdrive™ processor; Intel 60-MHz Pentium processor
- Chip upgrades to higher performance
- On-board accelerated local-bus video
- 210-MB hard drive¹
- 4-MB RAM, expandable to 64-MB
- 512 KB or 1 MB of Video RAM standard
- ISA Plug-n-Play compliant
- Desktop Power Management
- EPA Energy Star certified
- Local bus Fast-IDE hard disk interface**
- 1280 x 1024 video resolution**
- Optional 128- or 256-KB cache memory**
- Free three-year limited warranty for parts and labor²

High-performance
network-ready PCs
in a slimline package.

HP Vectra N2



from
\$1,459[†]

- Intel 50-MHz 486SX2, 50- and 66-MHz 486DX2, upgradeable to Pentium Overdrive processor
- Optional 128- or 256-KB second level cache
- 270-MB, 14-ms Fast-IDE hard drive¹
- 32-bit Fast-IDE local-bus hard disk interface
- 8-MB RAM, expandable to 96-MB
- Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution
- 1 MB of video RAM standard, expandable to 2 MB
- Slimline package with two mass storage shelves and three ISA slots
- Optional integrated 10Base-T networking
- Multilevel security
- EPA Energy Star certified
- ISA Autoconfiguration utility (Plug-n-Play)
- Integrated Desktop Management Interface (DMI)³
- Free three-year limited warranty for parts and labor²

High-performance
PCs for the
connected office.

HP Vectra M2



from
\$1,509[†]

- Intel 50-MHz 486SX2; 50- and 66-MHz 486DX2, 100-MHz DX4, upgradeable to Pentium Overdrive processor
- Optional 128- or 256-KB second level cache
- Four mass storage shelves; four expansion slots
- One available 32-bit VL-bus slot
- 270-MB, 14-ms Fast-IDE hard drive¹
- 32-bit Fast-IDE local-bus hard disk interface
- 8-MB RAM, expandable to 96-MB
- Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution
- Optional integrated 10Base-T networking
- Systems Diagnostics Utility
- EPA Energy Star certified
- ISA Autoconfiguration utility (Plug-n-Play)
- Integrated Desktop Management Interface (DMI)³
- Free three-year limited warranty for parts and labor²

Exceptional 486 performance
advanced business use

HP Vectra XM2



from
\$1,779[†]

- Intel 50- and 66-MHz 486SX2; 50- and 66-MHz 486DX2, 100-MHz DX4, upgradeable to Pentium Overdrive processor
- PCI architecture
- Standard 256-KB second level write-back cache
- Four mass storage shelves; four expansion slots
- Two available 32-bit PCI expansion slots
- 210-MB, 14-ms Fast-IDE hard drive¹
- 32-bit PCI IDE hard disk interface
- 8-MB RAM, expandable to 96-MB
- PCI Integrated 64-bit S3 Vision-864 graphics accelerator supporting up to 1280 x 1024 resolution
- Optional PCI Integrated 32-bit 10Base-T networking
- Integrated Desktop Management Interface (DMI)³
- EPA Energy Star certified
- Free three-year limited warranty for parts and labor²



[†]Source: 1994 J.D. Power and Associates Desktop PC Customer Satisfaction Study.SM Study conducted among business users and based on 1,528 user responses.
^{**}Feature included with some models. All HP Vectra PCs come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed; HP mouse and keyboard included.
[†]U.S. list price, dealer prices may vary. Monitor not included. ¹Other capacities available. ²First year on-site, 24-hour service. Second and third year return to dealer for repair.
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applications.

HP Vectra XU



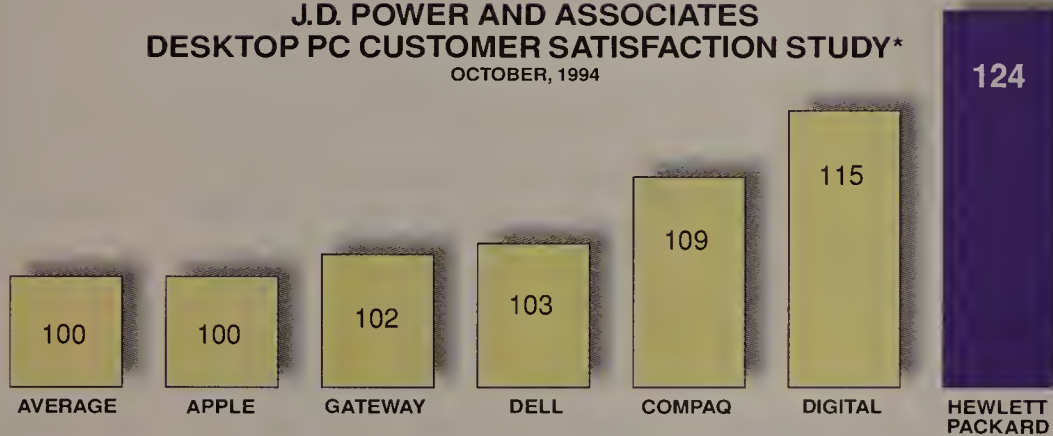
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OCTOBER, 1994



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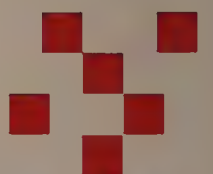
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Order now and we'll even give you FREE activation too. So call us today. It just doesn't get any easier than this.



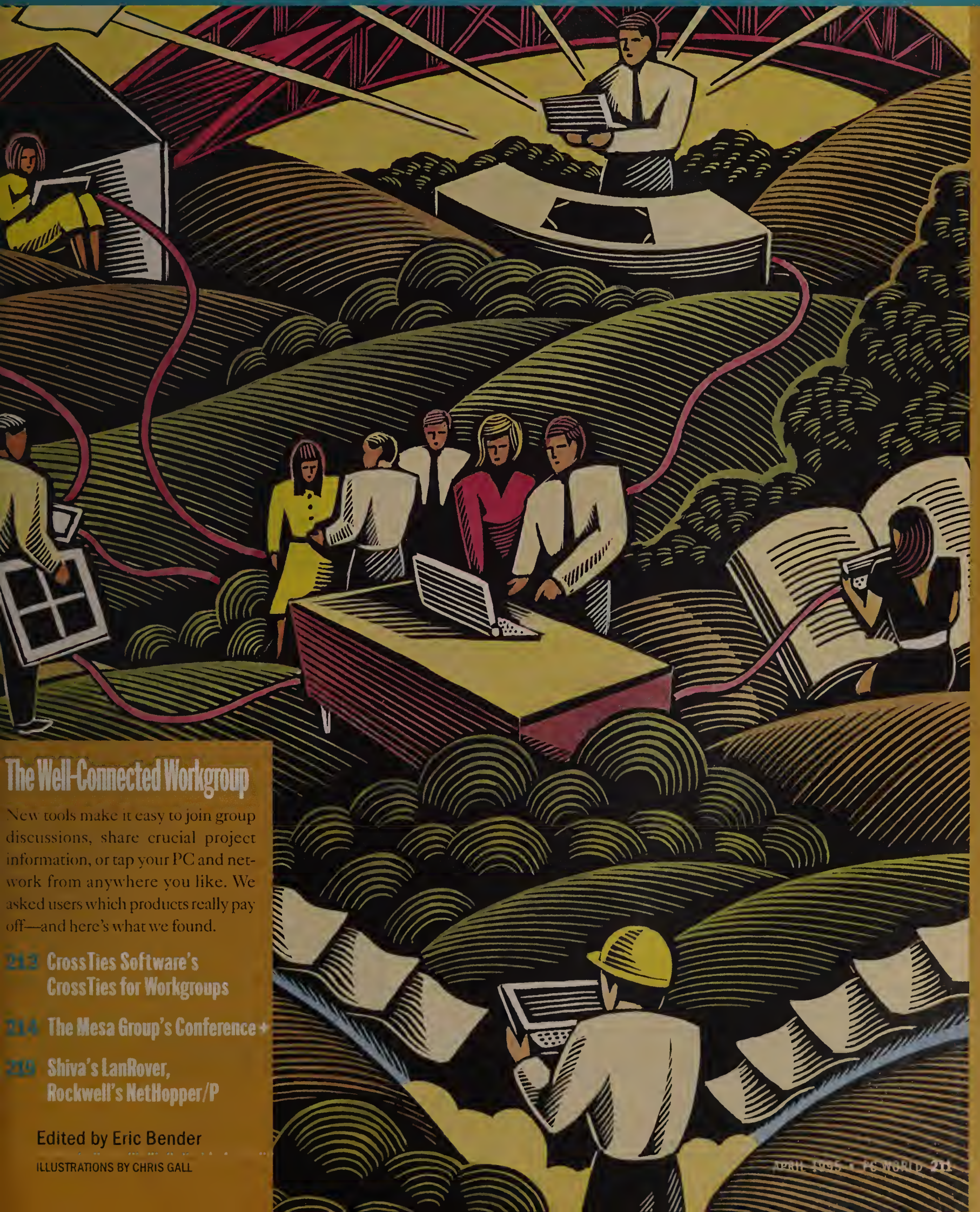
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The Well-Connected Workgroup

New tools make it easy to join group discussions, share crucial project information, or tap your PC and network from anywhere you like. We asked users which products really pay off—and here's what we found.

- 213** CrossTies Software's CrossTies for Workgroups
- 214** The Mesa Group's Conference +
- 219** Shiva's LanRover, Rockwell's NetHopper/P

Edited by Eric Bender

ILLUSTRATIONS BY CHRIS GALL

April 1995 • PC WORLD 21

IF YOU THINK REMOTE COMPUTING IS A HASSLE, YOU'RE PROBABLY NOT ONE OF THE MILLIONS OF PEOPLE USING pcANYWHERE.



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

THE BEST GETS BETTER.

Norton pcANYWHERE is the most advanced implementation of remote computing technology available, made easy. But don't take our word for it. Millions of people have already expanded their growing work environment with Norton pcANYWHERE.

And why wouldn't they? Norton pcANYWHERE doesn't require TSRs, freeing up memory for other applications you may need. Moreover,

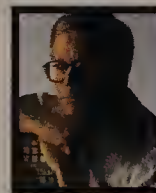
**NEW
VERSION
2.0**

pcANYWHERE doesn't replace any system .INI drivers, so you don't have to change your Windows environment to use it. pcANYWHERE is actually the only remote access software available today that offers this unique feature set combination.

Of course, to make sure you're always working with the most recent version of your file, our new file manager saves you time by allowing you to synchronize your files and directories on remote and office PCs.

LEAVE YOUR HASSLES AT THE OFFICE.

But the real beauty of Norton pcANYWHERE is it's easy to use. And to make it even easier, we've included Smart Set-Up™ and Norton Assistant to help you get up and running right out of the box. And a graphical user interface with long file name support



The Peter Norton Group has made remote computing easier for everyone with Norton pcANYWHERE.

already built in to help you in the transition to Windows 95. So stop by your local software store today. After all, millions of people can't be wrong.

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Circle 167 on reader service card

Get Your Group Organized

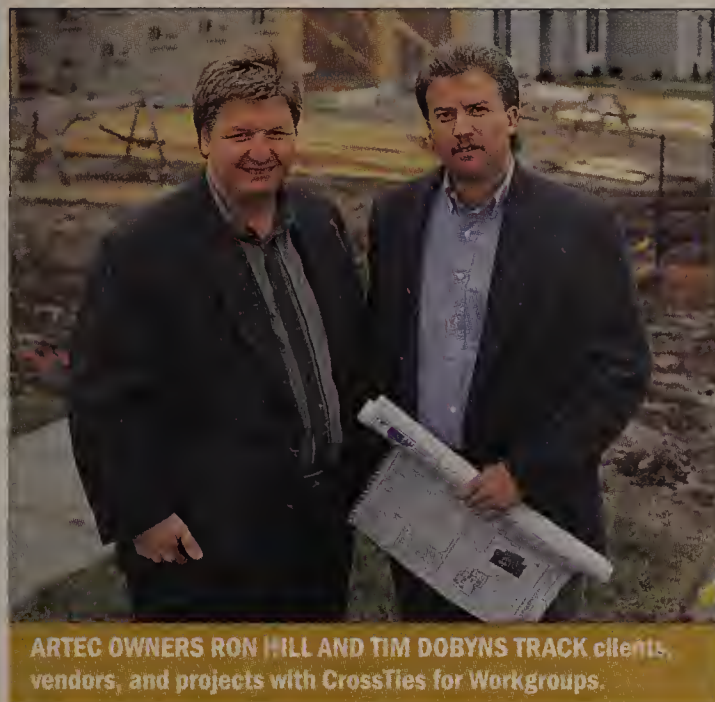
CrossTies for Workgroups
lets you share all your
information with other
employees.

PEOPLE WERE THE TROUBLEMAKERS at Artec Elegant Designs, a small millwork manufacturer and graphic design company in Springfield, Missouri. Or rather, difficulties in keeping tabs on the hundreds of architects, designers, contractors, manufacturers, distributors, and vendors assigned to client projects prevented the business from reaching peak efficiency.

"We needed a way to track not only people but also the key pieces of information on projects," says co-owner Tim Dobyns. CrossTies for Workgroups, a personal information manager extended for group use, provides the necessary tools for doing just that.

At Artec, all employees worked with the same client base and the same paper-based project files, and each department tracked its own project-related information. Not surprisingly, this often produced duplicate information and miscommunications.

CrossTies for Workgroups has changed all that. "Anyone can access project files, link information to that project, then link all proj-



ARTEC OWNERS RON HILL AND TIM DOBYNS TRACK clients, vendors, and projects with CrossTies for Workgroups.

ect-related info to the client, and the information passes right through the company," explains Dobyns. "I can quickly access all of the information—faxes, letters, and spreadsheets—related to a project without going to a file cabinet or hunting for the project file."

All Data Is Related

Creating information and linking it together is easy in CrossTies, but figuring out what to create and what links make sense is tricky at first. The key concept, and the real beauty behind CrossTies for Workgroups, is that it treats *everything you create on your PC* as an object, whether it's a word processing document, a spreadsheet, a fax, a

phone call, or an E-mail message. And CrossTies doesn't care which application created the object.

Objects are categorized by type, such as project, activity, person, or file, which makes it easy to prioritize and manage day-to-day activities. You can also link objects any way you like. You can, for example, link every telephone call, fax, and memo to the person or project to which they relate. Every time you view an object, all of

the objects linked to it are instantly accessible.

Since everything is an object, CrossTies doesn't need to separate information into distinct sections that each work somewhat differently. To enter a new contact or client, for instance, you don't need to move to a separate address section; instead, you select the Person object from the list of object types.

CrossTies provides four views of your data. The Shelf view lists frequently used objects. The Trail view displays a chronological list of the last 100 objects

you've worked with. The Inbox lists all the information you've received. The Calendar shows your activities in a daily, weekly, or monthly view.

These features extend across the network. For example, you can define a workgroup for a particular project and share all related objects (such as documents and comments) with the other workgroup members. When any of the objects are modified or if new objects are added, every member is notified. You can also perform group scheduling and participate in discussion forums. And mobile users can synchronize data between their laptop and office PCs. In addition, CrossTies for Workgroups comes with its own E-mail package and supports most of the common E-mail programs.

—Anne Fischer Lent

Anne Fischer Lent is a freelance writer in Peterborough, New Hampshire.

CROSSTIES FOR WORKGROUPS 1.0

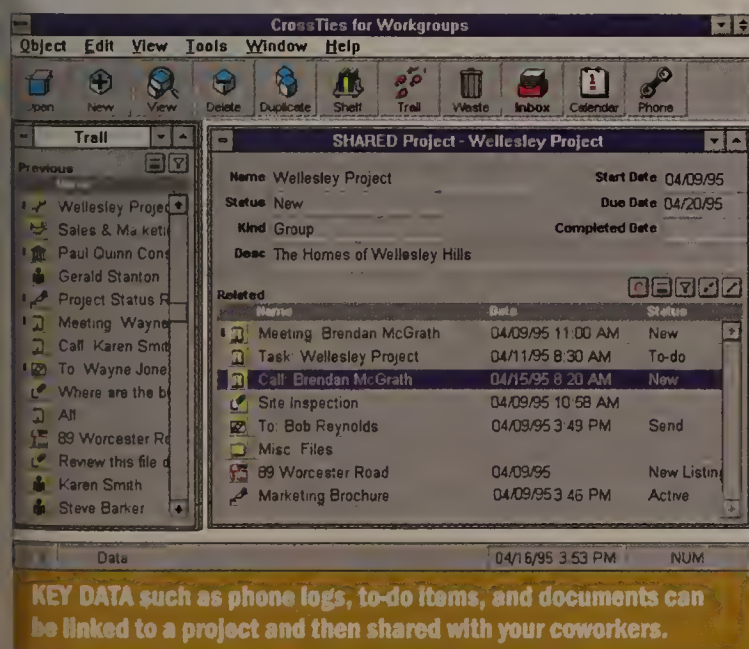
Workgroup information manager stores all your key business information as objects and makes it easy to share that information with your coworkers.

List price: \$299, 10 users \$1800

CrossTies Software Corp.

214/407-9996

Reader service no. 768



KEY DATA such as phone logs, to-do items, and documents can be linked to a project and then shared with your coworkers.

ONLINE DISCUSSIONS

Collaborate via Mail

Conference+ lets you share solutions and discussions—right within Microsoft Mail.

GEORGE NOLTE IS AN EXPERT ON infrastructure, so he knew when his civil engineering design firm needed to concentrate on its own infrastructure. Whenever new projects started, he wanted to be able to move the mountain of relevant data to employees, rather than making employees travel to a different office to retrieve it.

With 300 employees scattered across two states and nine offices, making information accessible was no simple problem, and E-mail alone couldn't solve it. Nolte wanted to distribute information quickly, without a blizzard of mail messages. "Whenever we needed to send files, update project data, or even change a meeting time, we had to send a message to everyone in the project group, which was a pain," explains Nolte.

To combat this, Nolte added The Mesa Group's Conference+ to his company's Microsoft Mail system. His staff now uses electronic *conferences*—online discussion areas—to distribute information, requests for help, and solutions. Surveyors use one con-



GEORGE NOLTE SLASHED EMPLOYEE TRAVEL TIME at his civil engineering firm by installing Conference+.

ference to schedule equipment and to discuss problems with their application software. A marketing group, spread across four offices in Northern California, uses another conference to share sales leads. Yet another conference offers a forum for branch administrators. And both project managers and design engineers use Conference+ to cut down on telephone tag when coordinating schedule changes.

Open Conferences Inside Your Mail

Electronic conferencing and electronic mail should go together like peanut butter and jelly. But usually you must run one application for E-mail and another for conferencing.

Not so with Conference+. The package consolidates and centralizes access to elec-

tronic bulletin boards and conferences within Microsoft Mail. You don't need to learn yet another application, remember yet another password and user ID, and repeatedly check yet another application while you work. Select Conference+ from Microsoft Mail's File menu, and you're in business.

Conferences are structured like Mail's private folders. Conference messages look just like E-mail messages except that they can be nest-

ed—each reply is indented below the previous message, which allows you to tell at a glance who said what to whom.

Both individual users and mail administrators can create and maintain conferences, assigning reading, writing, and editing privileges to individuals, groups, and default "guest" users.

Connecting to a conference is simple—even if it's on a distant network rather than your local mail server. Just choose *Select Conference* from the File menu,

then highlight the desired conference on the resulting list and click the *Add* button. Reading and responding to conference messages is equally straightforward. If you're working remotely, you can still access Conference+ directly through Microsoft Mail, without a special remote client.

Conference+ installs on your mail server painlessly, as long as you have properly installed Microsoft Mail (or the upcoming Microsoft Exchange). Mesa's nomenclature can get slightly confusing, though; and the rather slim Administrator's Guide offers sufficient help to get going, but not enough for troubleshooting. Macintosh users will have to wait a few more months before they can buy a client version.

Despite a few omissions and rough edges, Conference+ provides an inexpensive way to add powerful discussion and collaboration features to Microsoft Mail. —Peter Loshin

Peter Loshin is a freelance writer and networking expert in the Boston area.

CONFERENCE+ 1.1

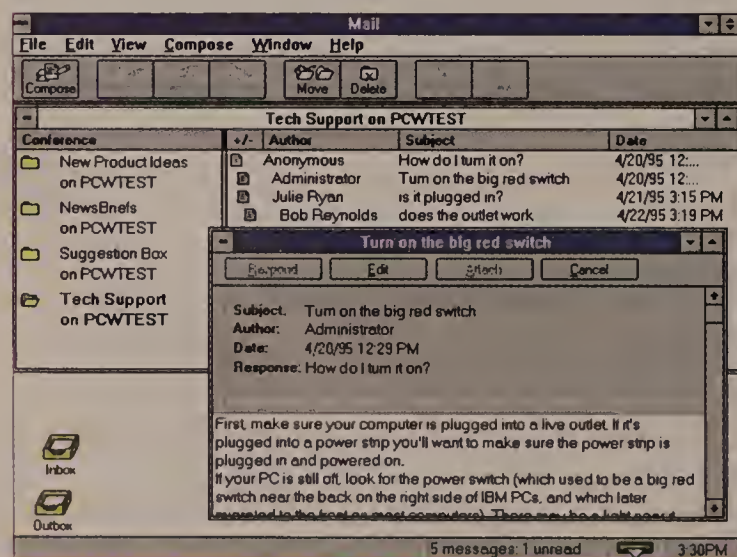
Collaborate and take part in group discussions from within Microsoft Mail.

List price: 25 users \$1750, 100 users \$6000

The Mesa Group

617/964-7400, 617/964-4240 (fax)

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CONFERENCE+ RUNS AS A MENU OPTION within Microsoft Mail, giving you a consistent interface for handling all your messages.

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Dual Pentium™ 75/90/100Mhz Processor
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Pentium 60/66Mhz Processor
8MB RAM, Up to 192MB
256K/512K Cache
PCI/ISA Architecture
3 PCI + 3 ISA + 1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
Built-in PCI IDE

Value For the Buck

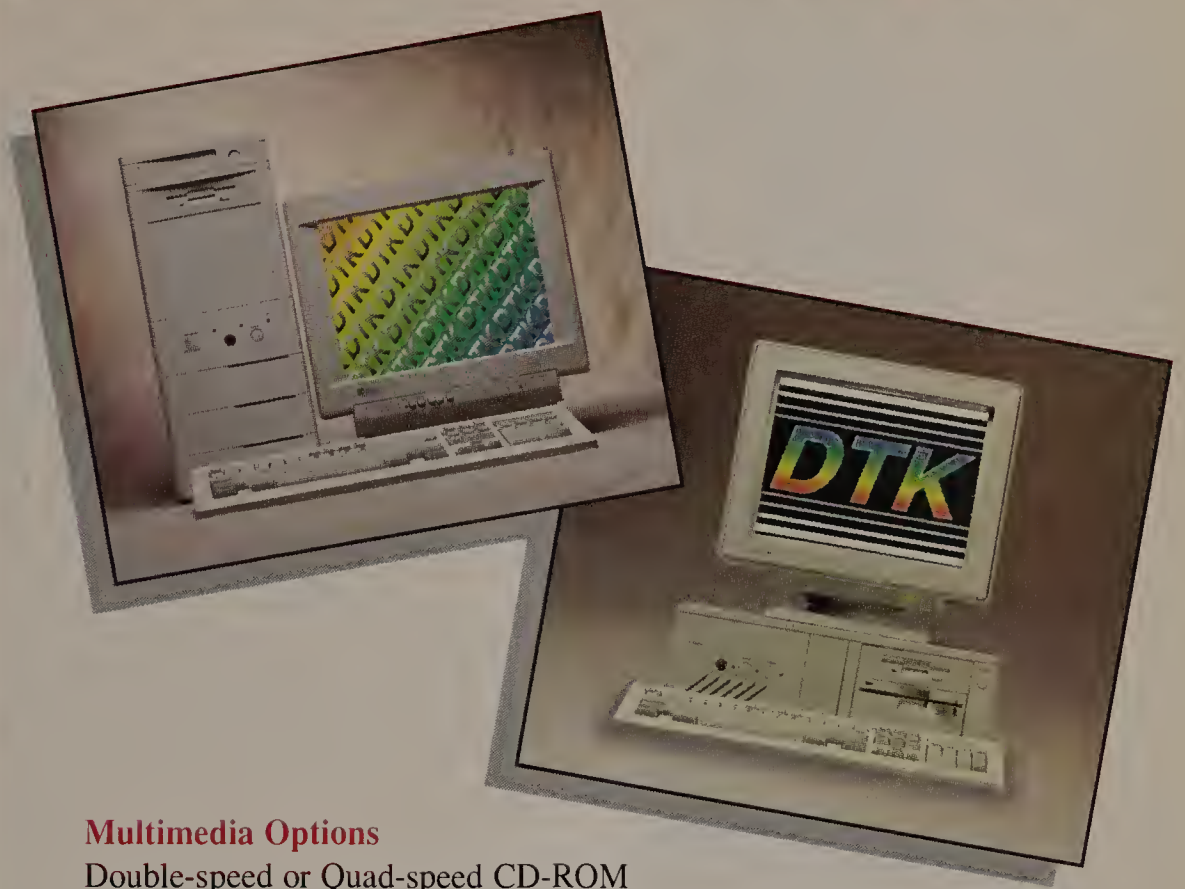
SIS Chipset

Quin-34

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256K/512K/1MB Cache
PCI/ISA Architecture
3 PCI + 3 ISA + 1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
Built-in 2 Enhanced PCI IDE Interface

Quin-35

Pentium 75/90/100Mhz Processor
8MB RAM, Up to 128MB
256K/512K/1MB Cache
PCI/ISA Architecture
3 PCI + 3 ISA + 1 PCI/ISA slots
PCI Local Bus Graphics-1MB or 2MB
Built-in 2 Enhanced PCI IDE Interface,
2 Serial (16550), 1 Game, 1 parallel port



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MS-Windows for WorkGroups, Windows, & DOS
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All systems are available with your choice of
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WHAT HAPPENS

WHEN YOU ADD **SIZE**

TO AN ALREADY

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At 7 feet 2 inches tall, Kareem Abdul-Jabbar has got some serious size. But that's only half the story. The fact that he added superior basketball skills to an already imposing frame is what made him a dominant force in the NBA for two solid decades.

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So pick one up at a MAG InnoVision dealer near you. Their larger size and imposing features are liable to dominate the market for years to come and they cost a lot less than, say, an NBA draft pick these days.

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The days when only FORTUNE 500® companies could afford IBM are most definitely over. Because now, for about the price of other brands, any business can choose the IBM PC Server 300 and enjoy what IBM customers have come to expect.

Namely, servers that are easy to upgrade and work perfectly with other computers and peripherals you might already have. Precision IBM reliability. And HelpWare®, a comprehensive service and support package that includes telephone help 24 hours a day, 7 days a week.

What's more, if making your life easier is high on your list of options, you can choose an option of ours—NetFinity™ 2.01 software—which makes managing your network a lot simpler.

For details on how to get the most out of your PC budget by getting the most PC Server, see the IBM Authorized Business Partner near you. Or, for product info by fax, call 1 800 IBM-4FAX and key in ID# 3078 or 3079.



IBM PC Server 300:

486 DX2/66MHz; 728MB hard drive; 8MB parity memory expandable to 128MB; 9 Bays; 8 Open Slots; 30-day money-back guarantee; 3-year, next-day, on-site warranty; EISA/PCI architecture.

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Take Your Net With You



BAXTER EXPORT'S TAMMY CHOI CAN WORK AT HOME without a problem, via the company's Shiva LanRover remote access system.

Wherever you are, remote access systems like Shiva's LanRover and Rockwell's NetHopper/P let you pick up anything you need from your net.

LIKE MOST OF US, TAMMY CHOI WORKS longer than nine to five. An international distribution coordinator for Baxter Export, a medical products exporter in Chicago, Choi often works late and on the weekends. And when she does, she needs to run not just her standard desktop applications but also network-based software such as Baxter's order-handling system (did that shipment *really* arrive in Bangladesh?).

Unlike most of us, however, Choi can do all of this from home.

She borrows a laptop that's stocked with her applications and is set up to dial into a Shiva LanRover remote access system on the office net. That way, she can get E-mail, up-to-date ordering information, and any of the other crucial business data that lives on the net rather than on an individual PC. "The Shiva system really helps me," Choi says. "I can work at home without a problem."

Dialing for Data, From Anywhere

Today's office networks are vital information pipelines, and the more important the net becomes, the less effective you are when you're cut off from it.

But once your group installs a remote access system, you don't have to work without a net when you're at home or on the road. Such a system is basically a black box with a network adapter, modems, and special hard-

ware and software designed to trick the net into thinking that your remote PC is present and accounted for. The system comes with client software for your remote PC, and administrative software that your net manager can run on any net PC.

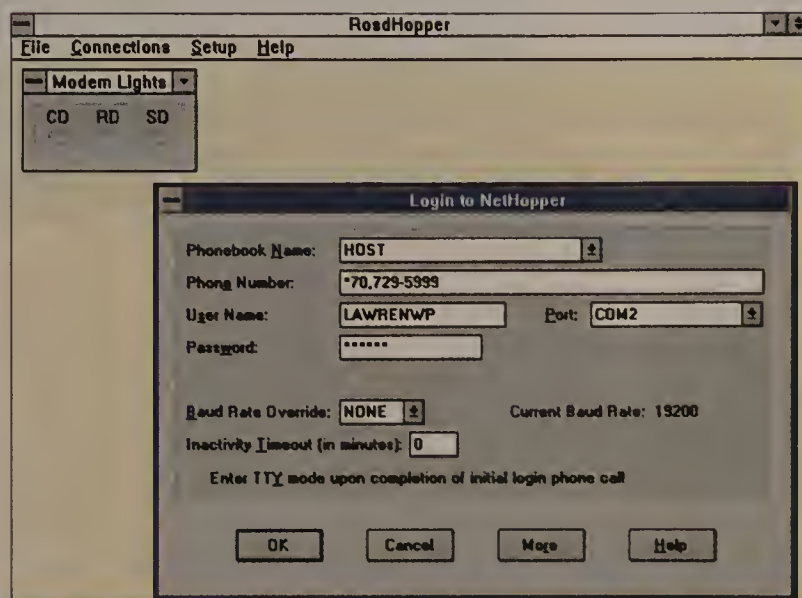
Once your net manager connects the system to your net, you install the client software on any PC with a modem. Dial in, and that remote PC acts just as if it were on the net, with the phone line behaving like an extended (but very slow) network cable. You install your applications on your remote PC, and retrieve only the data you need from the net.

How tolerable is the performance? We

tested both LanRover and Rockwell Network Systems' NetHopper/P with V.32 modems connecting at 19.2 kilobits per second. On a well-tuned ethernet or token-ring network, data moves from a server to PCs at speeds measured in megabytes per minute. We clocked both these remote access products at a fraction of that rate (about 100K per minute at best). That's slow, but still plenty workable when you have no other choice.

Performance improves with V.34 modems and connection speeds of 28.8 kbps, and you can connect ISDN or synchronous modems to get speeds up to 64 kbps.

By the way, this kind of remote access (dubbed *remote node*) differs from the remote control approach offered by packages such as Stac Electronics' ReachOut. remote control packages let you dial up and take over an individual computer, either directly or via the network. With remote control, you don't need to buy special hardware, and performance may be quicker running DOS applications or database packages than it is with LanRover or NetHopper. But performance running Windows applications with the remote control packages is far worse—often unworkably so. However, the line between these two approaches is rapidly blurring; now remote control software is often bundled with remote node systems.



NETHOPPER'S CLIENT SOFTWARE, called RoadHopper, lets you store frequently used network connections in an address book.

LanRover, LanRover, All Users Come Over

Shiva's LanRover covers all the communications bases. Remote PC users can dial in to nets running NetWare, Windows for Workgroups, or TCP/IP (the communications protocol preferred by UNIX workstations and mandatory on the Internet). UNIX and Macintosh stations can dial in as well. And net users can make outbound calls through

LanRover's pool of modems. Additionally, some customers buy LanRover to connect small nets at remote offices with the net at corporate headquarters.

As a remote PC user, you can choose either Windows or DOS software to launch your call to the network, and this remote software is easy to learn. If you connect to multiple destinations, you can create a Windows icon or DOS batch file to automate each connection. The remote software has no address book; you store each destination network's phone number as a separate configuration file.

To both boost security and minimize the long-distance charges billed to your home or hotel phone, you can tap LanRover's dial-back feature. Just place an incoming call, and LanRover answers, identifies you, and calls you back. When you dial in you must enter a password to gain access, and your net administrator can filter your access to include only the appropriate parts of the net.

LanRover also keeps you from overusing the phone line in another way: You can run an optional Guardian utility that warns you if you mistakenly try to execute a program that will take unbearably long to load over your connection.

This kind of virtuosity comes at a price. LanRover includes either four or eight modem ports and can be configured to connect to an ethernet or token-ring network directly. Prices run from \$4899 to \$9899, depending on the number of ports and the number of bundled modems, if any. A lower-priced unit, LanRover 2/E, includes one built-in V.34 modem, a serial port for an external modem, and an ethernet port for \$2799.

How many ports do you need? That depends on how many inbound or outbound calls you want to handle at the same time. If employees are simply checking E-mail after-hours or from the road, you'll be surprised how many folks one modem will cover. If you're providing inbound access for more heavy-duty purposes, such as for sales reps who dial in frequently to look up prices and

The more important your net becomes, the less effective you are when you're away. remote access systems can solve that problem.

inventory levels, you'll need more breadth.

Your network manager will probably be pleased with LanRover's ease of administration. It can be configured, managed, and monitored from any PC on the network.

Hopping Onto the Net

Rockwell's entry-level NetHopper/P isn't a communications jack-of-all-trades like LanRover, but at \$1695 it doesn't have to be. NetHopper includes a single built-in V.32 or V.34 modem and comes ready to connect to your ethernet network. The unit allows PCs to dial in to NetWare or TCP/IP networks. UNIX workstations can also dial in to NetHopper if they are equipped to communicate via TCP/IP using a modem.

Though some of the frills available with LanRover, such as outbound modem sharing

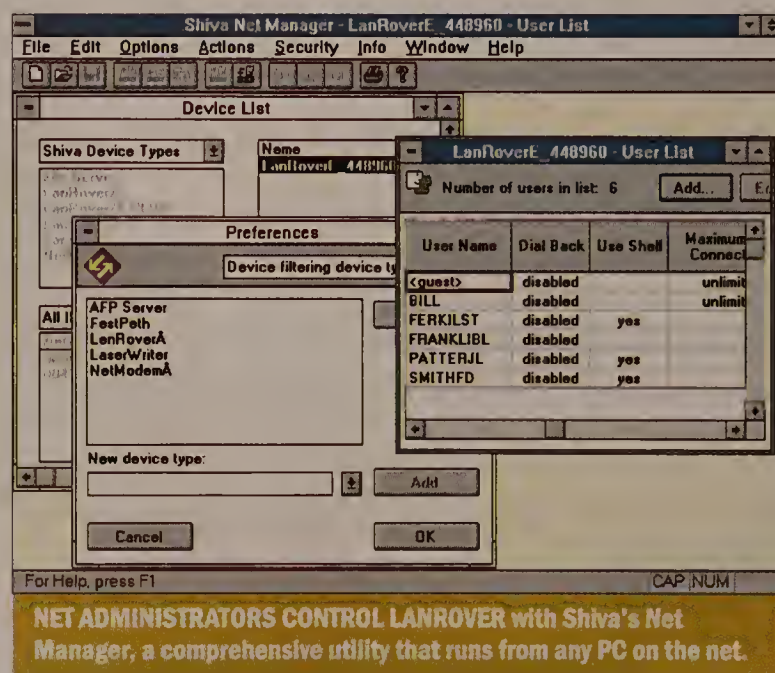
back after you place a call into the net.

Your network administrator may chafe a little at the awkwardness of NetHopper's management and configuration interface. To set up and monitor NetHopper on a NetWare net, for example, your administrator must connect a terminal to NetHopper or run a special cable from the unit to his or her PC. There is also no way to create a user list from the net server automatically.

NetHopper provides the same main security capabilities as LanRover: enforced password use and the ability to restrict incoming callers to certain parts of the network. If you need more modems, you can buy versions with as many as five modem ports, at prices up to \$4495.

Both of these systems have their strong points—and offer a lot of power for the price of an office PC. You can get started with remote access for under \$2000. If you need more ports, you can deploy LanRover (with both inbound and outbound modem sharing) for around a grand per line, or a five-port NetHopper for about \$900 per line. Your dial-up link will be slow compared with the speed of your local net connection, but isn't that better than no connection at all? —Bill Lawrence

Bill Lawrence helps manage a 3000-workstation network for a large public utility in California.



or dial-in support for Macintoshes, are lacking, NetHopper does double duty in one respect. You can establish both net-to-net links and user-to-net links if you need to connect a small remote site to the corporate net.

NetHopper comes with remote software, called RoadHopper, in both Windows and DOS versions. RoadHopper doesn't create a separate icon for each network you call, but it does include an address book for listing nets. Like LanRover, NetHopper can dial you

SHIVA'S LANROVER, ROCKWELL'S NETHOPPER/P

Connect your PC to your office network with these remote access systems.

List prices: LanRover \$2799 and up, NetHopper \$1695 and up

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HELP LINE Q & A



Tip of the Month

PREPARING TO PLUG AND PLAY: Be careful when looking for a PC ready for Plug and Play (PnP), the industry specification meant to simplify installation and removal of devices in PCs. "Plug and play" doesn't mean a PC meets the spec.

A true PnP PC uses devices, a BIOS, and an operating system that all support PnP. If a vendor claims a PC lets you plug and play, ask if the PC has a PnP BIOS and, if possible, start up the PC and watch the screen to see if it identifies a PnP BIOS. If a PC has an updatable flash BIOS that doesn't support PnP, make sure the vendor plans to offer an update for PnP.

Until Windows 95 arrives, no operating system integrates PnP support. Some vendors whose PCs have a PnP BIOS advertise their systems as "PnP-ready," but that may mean you must wait for Windows 95. Others bundle utilities with Windows 3.1 that enable PnP capability now. If a vendor claims its PC has such a utility, ask about a configuration manager or look for a Windows program icon identifying it.

Finally, devices that come with such a PC may not be PnP-ready themselves. An included graphics card, for example, may lack the circuitry or drivers for PnP.

Shane Rau, Technical Editor

DriveSpace versus DoubleSpace

Q I just upgraded from MS-DOS 6.0 to 6.22 and noticed that Microsoft has replaced the DoubleSpace disk-compression utility with a new one called DriveSpace. I've seen very little analysis of this change in computer circles. Have any problems been reported? How does the program work? Is it as good (or bad) as DoubleSpace?

Charles Burrows, CompuServe

A There's been little talk of the differences between DoubleSpace and DriveSpace—the lawsuit-inspired replacement for DoubleSpace—because the differences are few. DoubleSpace isn't perfect; many people, including me, have had serious problems even with the supposedly improved version of DoubleSpace that shipped with MS-DOS 6.2. MS-DOS 6.22's DriveSpace uses different file names and a slightly different compression algorithm but otherwise works about the same as DoubleSpace. There's no benefit I'm aware of in converting from one utility

to the other; DriveSpace may even expose you to potential data loss in the same ways DoubleSpace does (see *Consumer Watch's Bug Watch* in the March issue for an example of a compressed volume file bug that afflicts both DriveSpace and DoubleSpace).

I advise that you avoid disk compression for two reasons. First, since hard disk prices continue to drop dramatically, capacious disk storage gets more affordable all the time. Second, disk-compression utilities, even when they function perfectly, add a sometimes frustrating layer of complexity to configuring and troubleshooting your PC.

If you still want to use MS-DOS's disk compression, here's what you need to know: If you try to use any DoubleSpace-compatible third-party disk utilities with DriveSpace, they may not work, because the compressed volume files have different names and different internal formats. Fortunately, if you've upgraded from DOS 6.0 or 6.2 to 6.22, you can still use DoubleSpace, which the DOS 6.22 installation

program doesn't delete. If you don't own a licensed copy of DOS 6.2 (if, say, you are moving up from version 5.0, or you just purchased a system with version 6.22 installed), you'll have to live with DriveSpace and hope that the manufacturers of any disk utilities you use will soon release DriveSpace-compatible updates.

One-Dimensional Mouse Fix

Q When I try to use my serial mouse, the pointer moves up and down only—it won't go left and right. I've tried everything, from installing new drivers to shaking around the 9-pin connector to troubleshooting COM port and IRQ conflicts. Nothing seems to help. What else is left to check?

Gordon Lee Shyy, Cupertino, California

A Well, you've checked everything but the mouse's innards. Even on a tidy desk, your mouse ball still picks up dust and oil from your hand and transfers it to the rollers inside, impairing smooth mouse movement.

Since it appears that one of your rollers isn't moving at all, it probably has a bunch of fuzz wound around it. Turn the mouse over, slide or twist off the ball cover, pop out the ball, and see if you can pull out the fibers with a pair of tweezers; while you're in there, gently scrape any goo off the rollers using a wooden toothpick or a similarly firm but nonabrasive implement. (Don't use a pen, pencil, or eraser, since they can leave more stuff inside the mouse than was there to start with.)

Remove whatever remaining detritus you can by just putting your lips together and blowing it out. Also, give the ball a quick bath in warm water and dry it with a lint-free towel.

If after all this deep-cleaning your mouse still doesn't work right, try using it on a different computer. If it works fine, check again for hardware or driver conflicts. If the mouse still doesn't work, don't waste another minute on it (unless you can return it under warranty). You can find a brand-new generic mouse at computer stores or office supply emporiums for as little as \$10; top-of-the-line models cost less than \$60.

Mute the Boot

When I start my computer, the various drivers and programs launched from CONFIG.SYS and AUTOEXEC.BAT display almost two screens' worth of information I could live without. The Norton Utilities Disk Doctor and Image programs are particularly drawn out. Is there any way I can avoid having all that text on screen?

Ian Anderson, Brossard, Quebec, Canada

While most device driver and TSR messages are simple copyright notices, they sometimes contain important troubleshooting information. And programs run by AUTOEXEC.BAT usually test the integrity of the system (for example, Disk Doctor checks the hard disk) or prepare for problems

(Image saves information to aid the recovery of lost or damaged files).

Certainly, you want to know if a program finds a problem or fails to complete its safeguarding errands. Therefore, I suggest you choose prudently which messages to eliminate; don't silence those that may someday save your system. With that caveat in mind, here are some techniques to reduce that torrent of text to a single screenful or so. (You can apply these tips to any batch file as well.)

The first step is to suppress the display of AUTOEXEC.BAT commands (CONFIG.SYS commands don't show on screen). Just add @ to the beginning of any batch file command to prevent it—and the DOS prompt—from displaying. Alternatively, place @ECHO OFF at the beginning of the batch file to suppress the display of its commands (that is, until it encounters an ECHO ON command or the end of the file). But if your AUTOEXEC.BAT contains ANSI Escape commands (which are often incorporated in PROMPT statements) to do, say, something fancy to the screen, make sure they're preceded with ECHO ON. Use @ECHO OFF again after the ANSI commands to keep any subsequent lines in the batch file from appearing on screen.

The second step is to turn off the messages that device drivers, TSRs, and programs issue when they first load. Use any available device-driver or command-line switches that prevent on-screen display. Also, avoid switches, such as HIMEM.SYS's /VERBOSE, that increase message size. Another technique (which doesn't work for CONFIG.SYS or for output written directly to the screen) is to send the messages into the digital void by adding >NUL to the end of each command.

Works Works With 2MB

I have a 25-MHz 386-based laptop with 2MB of RAM and run Windows 3.1 in Standard mode. When I try

USER GROUP OF THE MONTH

Tampa Bay Computer Society

The April user group tips come from the Tampa Bay Computer Society. The Florida group is all volunteer and meets on the third Tuesday of each month at 5:30 p.m. at Clearwater Catholic High School on Haines Bayshore Road near U.S. Highway 19. The group offers many special interest groups including ones for DOS, Windows, OS/2, databases, the Internet, modems, hardware, and small businesses. Its BBS contains more than 1GB of shareware and public domain programs and has a large message base. Bytes & Bytes, a 48-page newsletter, is included with membership and features hardware and software reviews, product discounts, and Member's Help Line, a listing of volunteers available to answer questions.

For more information, write Dick Kellerman, president, at 1510 Barry St., Unit J2, Clearwater, FL 34616-4427; call the group's 24-hour information line at 813/443-4433; or leave a message at 813/443-6525. The group's BBS number is 813/733-8693. Membership costs \$25 a year.

Reader service no. 644

UNDOING MEMMAKER: To undo the last changes that DOS 6.x's MemMaker made to your CONFIG.SYS and AUTOEXEC.BAT, type MEMMAKER /UNDO at the DOS prompt. Your original CONFIG.SYS and AUTOEXEC.BAT will be restored.

Dick Kellerman
Tampa Bay Computer Society



to print documents of five pages or more using Microsoft Works for Windows, I get an error message telling me I can't print due to insufficient memory to run Print Manager. Can I do anything to solve this problem, short of buying more RAM, which is difficult to obtain for my computer?

*Gustin Burke Johnson,
Calgary, Alberta, Canada*

A Two megabytes is a pretty slim amount of RAM for running Windows; that's what causes it (by default) to run in Standard rather than in Enhanced mode. As a result, you lose out on virtual memory, a technique that Windows uses to run more programs than can fit into your system's available RAM.

You can try forcing Windows to run in Enhanced mode by starting Windows with the command **WIN/3**, which may give Print Manager some breathing room. But it's probably better simply to turn off Print Manager. Just uncheck the *Use Print Manager* box in Control Panel's Printers applet, and Windows will output directly to the printer port instead of first spooling documents to an intermediate file.

If you absolutely must use a print spooler, almost any commercial replacement for Print Manager will give you significantly better performance and features. My favorite is Zenographics' SuperPrint 3.1, a program that is faster than Print Manager, is fully compatible with Windows for Workgroups (not all print spoolers are), and provides various dithering options for improving image quality.

- **SuperPrint 3.1** \$49.95; Zenographics, Inc.; 800/366-7494, 714/851-6352
Reader service no. 645

COM Port Cooperation

Q I run WinFax Pro 3.0 with auto-answer enabled at all times. However, I occasionally dial in to America Online, which requires me to manually exit WinFax Pro, run the AOL software, and then relaunch WinFax after I finish with AOL. Is there some way

that I can automate all these steps with a batch file or a macro?

David Jacks, PC World Online

A You could probably write a program in Visual Basic that does exactly what you want—but why bother when someone has already done it for you? The wickedly named Voodoo/Assassin, a \$20 shareware utility by Wayne Erffling and Rich Johnston, does the dirty work for you. Voodoo/Assassin is a Windows program that you insert into the command line of an application (America Online, for example) when you want the app to usurp COM-port control from another program. Subsequently, double-clicking the Voodoo/Assassin-equipped icon closes the first program (which relinquishes the COM port) and starts the second. When you exit the second program, Voodoo/Assassin automatically restarts the first one. You can find this utility and its documentation on PC World Online in the file ASSA04.ZIP.

Erffling reports that you may have difficulty using Voodoo/Assassin with some versions of WinFax Pro 4.0 and with Prodigy for Windows' Autologon feature. If you use one of these programs—or don't want to use a software kludge to keep your fax-modem in auto-answer mode reliably—do what I do: Employ two COM ports, each with its own fax-modem or data-only modem. On the system I use every day, COM1 hosts an old 9600/2400-bps fax-modem that remains in auto-answer mode at all times. On COM2 is a newer, faster modem I use 10 or 20 times daily to connect to online services, the Internet, and *PC World's* LAN. Both modems are connected to the same data/fax phone line, but since they use different COM ports they never have a conflict.

POWER to the People

Q Could someone please tell me of what use DOS 6.x's POWER command is? Does it conserve electricity, reduce computer wear and tear, or what? Likewise, does pressing the

<Pause> key do anything to save power or to spare hardware?
anonymous, America Online

A The short answer is that the POWER command (which requires you to first load the POWER.EXE device driver) won't do much for you unless your computer conforms to the Advanced Power Management API, a specification devised by Microsoft to provide a standard way for applications to interact with your computer's power-saving features. Using POWER.EXE on an APM-aware system can cut power consumption—and, more important, extend portable systems' battery life—by as much as 25 percent, according to Microsoft. Surprisingly, the driver can also reduce power consumption by about 5 percent on non-APM systems by shutting down the CPU during periods of inactivity. Unfortunately, the utility can also slow down your system.

It would be nice if pressing <Pause> put your computer into sleep mode, but it doesn't. In fact, most applications ignore the <Pause> key—so most of us use it simply to freeze the execution of DOS commands, such as DIR, TYPE, and TREE, when the text is about to scroll off screen. But you're better off paging multiple-screen text output using **DIR /P, MORE<document.txt**, and **TREE|MORE**; pressing almost any key resumes execution.

You can also use the <Pause> key to stop execution of CONFIG.SYS temporarily—especially useful when trying to spot fleeting error messages. But since CONFIG.SYS messages fly by so quickly, I recommend that, instead of <Pause>, you press <F8> when you see the 'Starting MS-DOS' prompt. That way, you can step through CONFIG.SYS one line at a time.

By Scott Spanbauer

Scott Spanbauer is a contributing editor for PC World. Help Line welcomes your questions; PC World pays \$50 for published items. See page 12 for contact information.

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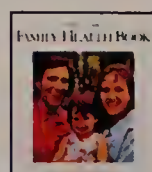
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SPREADSHEETS Q & A

Setting Up Data for 3-D Charts in Excel

Q I'm trying to set up some 3-D surface charts in Excel 5.0 to analyze human resources data. After a lot of hair-pulling, I figured out that I must take the three sets of variables that come to me in a conventional list layout and arrange them in a matrix before building my chart. But performing this task by hand is very time-consuming. Can I use a macro to speed up the process?

Steve Haack, Minneapolis

A Yes, Steve, you could, but why go to all that trouble when you can use a formula and a couple of sorts instead?

I've whipped up a simplified example of your worksheet, shown in **FIGURE 1**. The data for variables *x*, *y*, and *z* arrives on your desk arranged as shown in range A2:C8.

What you need in order to create the graph is the arrangement shown in H13:N19. Figure 1 provides step-by-step instructions for creating the 3-D surface chart.

The formula in step 5, `=IF(I$2=$G4, INDEX(A3:C8, $G4, 3), "")`, uses the index numbers in G4:G9 and I2:N2 to arrange the *z*-axis values in their proper positions in the table. The formula compares the index numbers in row 2 and column G. If these numbers are equal, INDEX displays the *z*-axis value from the corresponding row in the data table; otherwise, INDEX shows an empty label ("").

The copy procedure in step 6 duplicates the table of transformed data, but it converts the formulas to numbers so you can sort them. In step 8, you select **Data • Sort**, click **Options**, click **Sort Left to Right** in the Orientation box, and click **OK**. Then choose **Row 13** in the Sort By box.

Use the Chart Wizard to create the 3-D surface chart. In step 4, be sure to designate one row for the *x*-axis labels and one column for the *y*-axis labels.

What's It Worth? Present Value in Any Spreadsheet

Q I want to answer questions such as how much I would have to invest at, say, 7 percent to have \$100 after four years. I need a table that calculates the present value of an investment at the end of each of several years, using various interest rates. I've looked at the @NPV, @PV, and @PVAL functions, but they're oriented toward a stream of payments, not individual amounts.

Steven J. Evans, Internet

B3		+B\$1/(1+B\$2)^\$A3			
	A	B	C	D	E
1	AMT	\$100.00			
2		6.0%	6.5%	7.0%	7.5%
3	1	\$94.340	\$93.897	\$93.458	\$93.023
4	2	\$89.000	\$88.166	\$87.344	\$86.533
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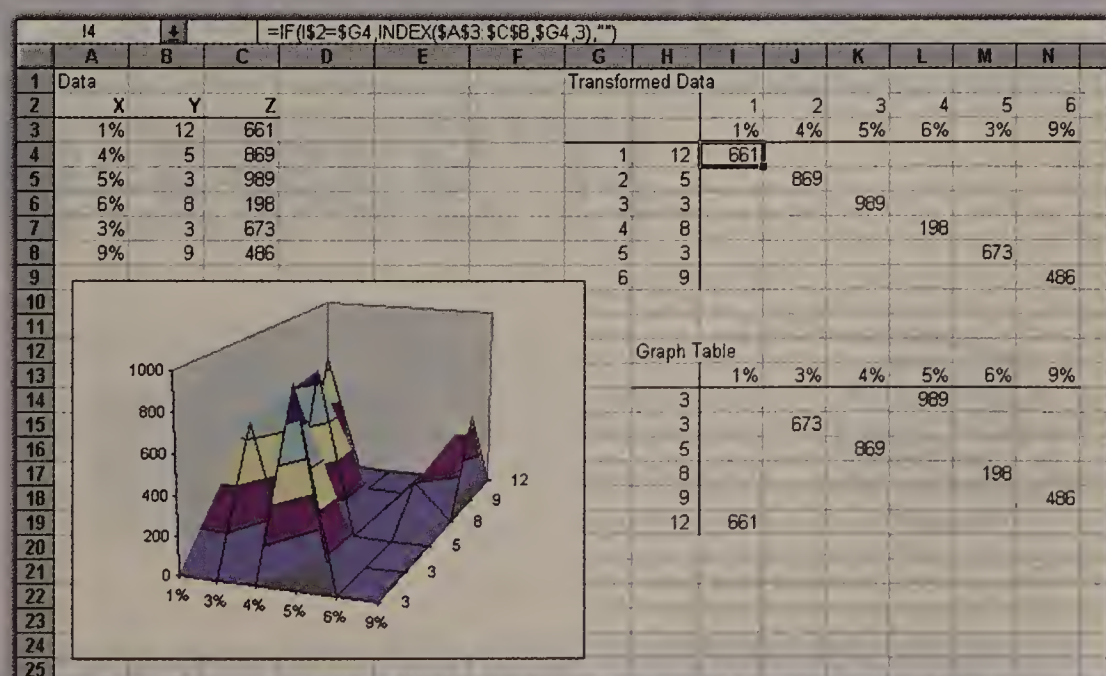
A You're right; the present-value functions aren't what you want. Try setting up your table as shown above,

with the investment's present value in cell B1, the interest rates in row 2, and the number of years in column A.

Then enter the following formula in cell B3 and copy it into the rest of the table: `+B$1/(1+B$2)^$A3`. In this formula, which is a simple inversion of the familiar compound interest calculation, B\$1 represents the future value of the investment, B\$2 the yearly interest rate, and \$A3 the number of years.

Copying Formulas in Quattro Pro

Q I use Quattro Pro for Windows' multipage worksheets to project income from my rental properties. The calculations for each property appear on a separate notebook page. I spent a lot of time setting up the formulas for the first property on sheet A, using absolute cell addresses to copy the formulas correctly. When I tried to duplicate the model on other sheets, be-



- 1 Enter the data as shown in A1:C8.
- 2 Enter the index numbers in G4:G9 and I2:N2.
- 3 Copy the y-values (B3:B8) to H4.
- 4 Copy the x-values (A3:A8) to I3 using **Edit • Paste Special • Transpose**.
- 5 Enter the formula shown in the formula bar for I4 and copy it to I4:N9.
- 6 Using **Edit • Paste Special • Values**, copy H3:N9 to H13.
- 7 Sort H14:N19 by column H, with **No Header Row** selected.
- 8 Sort I13:N19 columnwise by row 13.
- 9 Select H13:N19 and use the **Chart Wizard** button to create the graph.

FIGURE 1: CREATE A 3-D GRAPH in Excel that plots three sets of variables, shown in range A2:C8.

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- 520 Million Bytes (=500MB) or 340 Million Bytes (=320MB) HDD
- 8MB RAM expandable to 32MB
- 6.6 lbs.

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- 340 Million Bytes (=320MB) or 260 Million Bytes (=250MB) HDD
- 8MB RAM expandable to 24MB
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Circle 228 on reader service card

Master Class: Quick DDE Links

Say you're trying to print a spreadsheet that consists of a list of information one page wide and several pages long. You want to format it with title information on the first page and column headings, page numbers, the date, and so forth, on all the pages. That was the case for reader Milton J. Minneman of Potomac, Maryland, whose letter prompted this Master Class.

You can't create such a report with a spreadsheet alone. But you can use your spreadsheet to set up the report and, by means of a simple DDE link, use your word processor to print it. I've illustrated the technique with 1-2-3 release 4.0 and WordPerfect 6.0, but it also works with most Windows spreadsheets and word processors. Note that step 7 tells WordPerfect to repeat the column headings in the table's top row. In Word 6.0 or Ami Pro, use the command *Table • Headings*.

Next time you want to print the report, the DDE link makes it easy. First open the spreadsheet file and make any changes you wish, then launch your word processor and open the report document. Select *Edit Links*, click *Update Now*, and you're ready to go. Using a manual link instead of an automatic one ensures that your spreadsheet won't slow down.

1 In 1-2-3, set up the table. Apply fonts, lines, and other formatting.

2 Select the entire table and assign it the range name **TABLE**. Select *Edit • Copy*.

3 Switch to WordPerfect; type the title text; format it, if desired; then press **<Enter>**.

4 Select *Edit • Paste Special*, choose **Rich Text Format**, and click *Paste Link*.

5 Select *Edit • Links* and click **Manual** under *Link Options*. Click *Change Link*.

6 Enter the range name **TABLE** in the *Item* field, then click **OK** and **OK** again.

7 Select the column headings, then select *Table • Format*. Click *Row* and check the *Header Row* box.

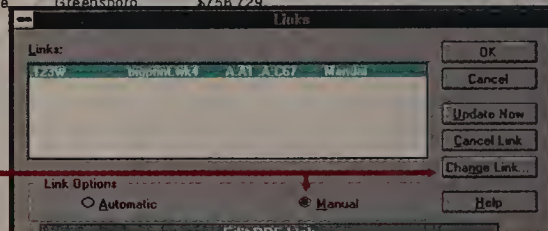
8 Use formatting commands to adjust margins and set up page headers.

9 Save the file and select *File • Print*.

	A	B	C
1	Name	Location	Salary
2	Newbranch	Wilmington	\$350,000
3	O'Brien	Sanford	\$450,726
4	Allen White	Greensboro	\$756,729
5	Buxton	Elizabeth City	\$758,210
6	Lathan	Chapel Hill	\$641,767

North Carolina All Stars Dream Team

Name	Location	Salary
Newbranch	Wilmington	\$350,000
O'Brien	Sanford	\$450,726
Allen White	Greensboro	\$756,729



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cause of the absolute cell addresses many formulas ended up referring to cells on sheet A, not to the corresponding cells on the destination sheet. What's the secret for making this work? *Chester Fillmore, Saratoga Springs, New York*

A You've identified a common difficulty for users of 3-D worksheets. Fortunately, Quattro Pro's Model Copy feature lets you copy cells with the formulas and cells they refer to, adjusting the absolutes accordingly.

The worksheet at right represents a fragment of the complex model you sent. The formula in A:C6—namely, $+B6*(1+\$A:\$B\$3)$ —calculates project-

ed rent for 1996 based on a 5 percent increase. In building the formula, you selected cell A:B3, then pressed **<F4>** to make the cell reference absolute (as the dollar signs indicate). When you

A:C6	+B6*(1+\$A:\$B\$3)			
	A	B	C	D
1	Unit	15 Webster St.		
2	Rent	\$650		
3	Increase	5.0%		
4				
5		1995	1996	1997
6	Total Rent	\$7,800	\$8,190	\$8,600

copied the formula into the other cells in row 6 to calculate rent for 1997 and beyond, each copy referred to A:B3.

If you just select range A:A1..A:D6, copy it to the clipboard, and paste it to B:A1, the formula in B:C6 refers to cell

A:B3 rather than B:B3. Instead, select the entire section that you want to copy—in this case, A1:D6—then select *Block • Copy*. In the *To* field, enter **B:A1**, click the *Model Copy* check box, and click **OK**. Check the formula in B:C6, and you'll find it refers to cell B:B3 for the projected increase. You can change the values in sheet B as you wish.

By Richard Scoville

Richard Scoville is a PC World contributing editor and a software training consultant based in Chapel Hill, North Carolina. Spreadsheets welcomes your questions and pays \$50 for published items. (See page 12 for contact information.)

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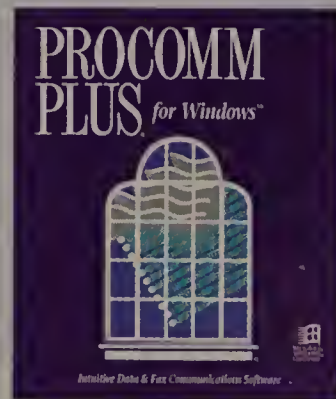
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WORD PROCESSING Q & A

Custom Label Sizes in Ami Pro 3.1

Q I recently bought some custom labels, preprinted with my company's name and address. Sadly, they don't match any of the standard label sizes that Ami Pro supports. Is there any way that I can add my custom label sizes to the list in Ami Pro's _LABEL.STY style sheet?

Angela Jackson, Dubuque, Iowa

A Sure, you can add custom label sizes to Ami's already extensive list of Avery label formats, but it's not a simple job. Here's how to do it:

1. First, you'll need to exit Ami Pro and load AMILABEL.INI into Windows' Notepad. Switch to Program Manager, press <Alt>-FR (or select *File • Run*), type *notepad amilabel.ini* in the Command Line box, and press <Enter>.

2. In Notepad, scroll down about 15 lines until you find a line that reads 'NextCustomLabelKey=Labelxxx' (the x characters indicate the number of label formats in the file). Edit the value following the equal sign to indicate the number of label formats you want to add; for example, if you're adding one new format and the default value is 118, change the last word to read *Label119*.

3. Press <Ctrl>-<End> to jump to the end of the file. Now you need to add an additional line of information for

each new label style. Remember to start this line with a number that's one higher than the last line in the file (such as *Label120*). Use a decimal ruler to measure the labels, or use measurements supplied by the manufacturer; then enter this data in the format shown in **FIGURE 1**.

This format is very precise, so make sure each line contains the correct information in exactly the right order, with all entries on a single line of text and no spaces following the commas. Make certain the last field entry (for page type) matches the kind of paper your printer can use, since Ami displays only those labels suitable for your printer settings.

After typing the new entry, check it carefully, then save AMILABEL.INI and exit Notepad. Load Ami Pro, select *File • New*, and choose the _LABEL.STY style sheet. Your new label format should appear in the list that pops up when the style sheet loads. Select it, then print a sheet of test labels to make sure everything is correct before printing a batch of new labels.

Reading WinWord 6.0 Documents in Ami Pro

Q I switched to Ami Pro 3.01 a few months ago, even though most of the people in my office use Word for Windows. Everything was just fine

until the others installed WinWord 6.0. Now when my coworkers send me their documents, I can't import them. Is there an Ami Pro import filter that can handle WinWord 6.0 documents?

Patricia Everson, Chicago

A I'm sorry to report there is no WinWord 6.0 import filter available for Ami Pro 3.01. However, Ami Pro 3.1 handles both WinWord 6.0 and WordPerfect 6.0 files easily. Upgrading from 3.01 to 3.1 isn't free, but at a cost of \$19.95, it's pretty cheap. To order the updated version directly from Lotus, call 800/872-3387.

No Background Printing for the DeskJet Set

Q I use a Hewlett-Packard DeskJet 550c with Word 6.0a for Windows. The printouts look just fine, but no matter what settings I choose in the Print Options dialog box, I can't get Windows to print my pages in the background. So instead of working on other documents, I stare at the DeskJet's Printing dialog box for minutes on end. What gives?

Derek Ryter, PC World Online

A Blame Windows' DeskJet printer driver. The driver you have doesn't use the Windows Print Manager properly to spool the print job in the background while you work. Fortunately, Hewlett-Packard recently released version 5.0 of its DeskJet driver, which solves this and some other problems. You can obtain a copy of the new driver from the company's support BBS (208/344-1691), from the HP Peripherals forum on CompuServe (type *GO HPPER* at any prompt), or from PC World Online. The file to download is *D5W3-US.EXE*. You can also call Hewlett-Packard's printer driver support line at 303/353-7650 to have the new driver sent to you on a floppy disk for a nominal shipping charge.

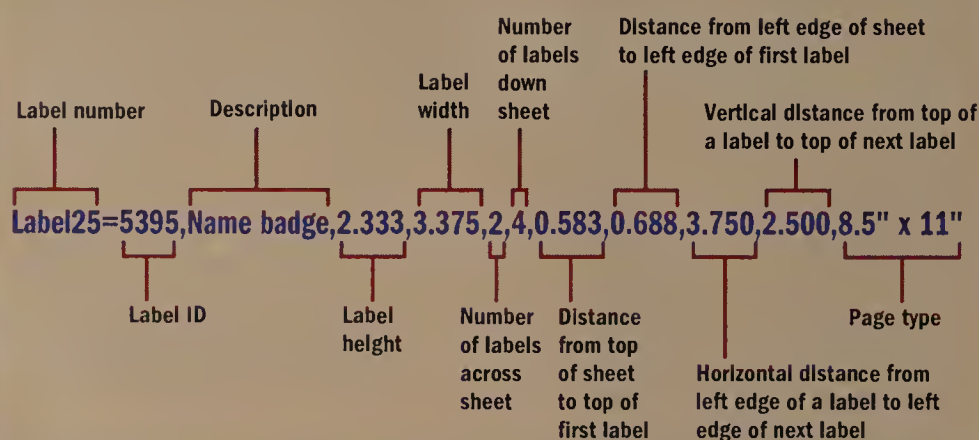


FIGURE 1: TO MAKE AMI PRO PRINT on custom-size labels, add lines like this to your AMILABEL.INI file. Unless otherwise indicated, all measurements are in inches.

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Circle 74 on reader service card

Marginal Characters in WinWord 6.0

Q I use Word 6.0a for Windows to edit tariff documents for a public utility. Each time a document changes, I need to identify the change by inserting a letter code in the right margin. When I used WordPerfect 5.1 for DOS, I was able to change the right margin for a single line, then insert the code; this method doesn't work in WinWord. Can you tell me how to do this seemingly simple task?

Chris Clark, Dubuque, Iowa

A As you've discovered, WinWord 6.0a lets you set margins only by paragraph, not by line. But you can still insert your codes easily, using the Text Box button on WinWord's Drawing toolbar. This handy little tool works like a Post-it note, letting you insert text anywhere in a document.

Start by displaying the Drawing toolbar: Right-click on any WinWord toolbar, then select *Drawing* from the drop-down list. The toolbar should appear at the bottom of the screen. If you're not already in Page Layout mode, switch to it by clicking the *Page Layout*



View button or selecting *View • Page Layout*. Now click the Drawing toolbar's *Text Box* button. Click on the page where you want to insert the code letter, hold down the mouse button, size the box by dragging with the mouse, then release the mouse button. To insert the letter, simply type it in the box, then click anywhere outside the box to return to your document.

The box may be surrounded by a thin border. To get rid of the border lines, right-click the border and select *Format Drawing Object*. In the dialog box that appears, click the *Line* tab, select *None*, then click *OK*. This formatting becomes WinWord's new default; all subsequent text boxes that you insert will also appear without borders.

You can use this technique to insert text anywhere on the page, not just in the margins, and move or resize the box to your heart's content.

Easy Math in WordPerfect 6.0a for Windows

Q I often need to do math while working in WordPerfect 6.0a for Windows. I was thinking of adding a button to the standard button bar that pops up the Windows Calculator. Is there a way I can do this without too much trouble?

Jacob Ninan, Bangalore, India

A It's really no trouble at all. Start with the button bar that you want to modify on the screen. Right-click the button bar and select *Edit* from the pop-up menu. In the Button Bar Editor dialog box, click the *Launch a Program* radio button, followed by the *Select File* button. You'll see a standard file selection dialog box. Change to your main Windows directory, then scroll down to *CALC.EXE* in the Filename list and double-click it. Click *OK* in the Button Bar Editor dialog box, and you're done. A new button that launches Windows' Calculator will appear on one end of the bar.

If the toolbar is already crowded, the calculator button may not immediately be visible on screen. To view the new icon, you'll need to click the scrolling arrow at the right side of the button bar. You could also move the Calculator button to a more accessible spot on the toolbar. Just right-click the button bar, select *Edit* from the pop-up menu, and drag the button to its new location.

WordPerfect Quotes Get Smart

Q In your April 1994 column, you discussed how to make WordPerfect 5.2 substitute typographically correct quotation marks automatically for those ugly keyboard equivalents the program normally inserts. Try as I might, I can't seem to enable this feature in WordPerfect 6.0a for Windows. Am I missing something?

Doug Candler, PC World Online

A Not really. Like version 5.2, WordPerfect 6.0a lets you create so-called smart quotes, which look like the quotation marks you see in typeset materi-

als (" ") instead of a set of inch marks ("). However, the steps are a little different in 6.0a. Here's the process:

First, select *Tools • QuickCorrect*. If this command doesn't appear in your Tools menu, you'll need to add it.

Fortunately, WordPerfect supplies a macro that adds the command automatically. To run the macro, select *Tools • Macro • Play*, then press **<F4>** to pop up the Select File dialog box. Choose *QCSETUP.WCM* from the Filename list, and click *OK*. (*QCSETUP.WCM* is normally found in WordPerfect's *MACROS* subdirectory; if you can't find this file, you'll need to run the WordPerfect setup program to install the macros.) Click *Play* in the Play Macro dialog box. As the macro runs, it adds the QuickCorrect menu item to the Tools dialog box. You'll then need to restart WordPerfect to enable the feature.

Once you've selected *Tools • QuickCorrect*, mark the *Enable SmartQuotes* check box. Click the *SmartQuotes* button to open the Configure SmartQuotes dialog box. The cursor will be in the Single field of the Open Quotes frame. Press **<Ctrl>-W** to call up the WordPerfect Characters dialog box. Choose *Typographic Symbols* in the Character Set list, then select the single open quote from the display, click *Insert*, and then select *Close*. You'll now have to tab to each of the remaining SmartQuotes frames, press **<Ctrl>-W**, and repeat the above steps to insert the correct characters. When you're through, click *OK* and then *Close* to return to your documents.

From this point on, every keyboard quotation mark you type will be replaced automatically by the correct typographical symbol.

By George Campbell

George Campbell is a contributing editor for PC World and a contributor to The PC Bible (Peachpit Press, Berkeley, California, 1995). Word Processing welcomes your questions and pays \$50 for published items. See page 12 for contact information.



The success of AutoCAD has inspired dozens of cheap imitations.

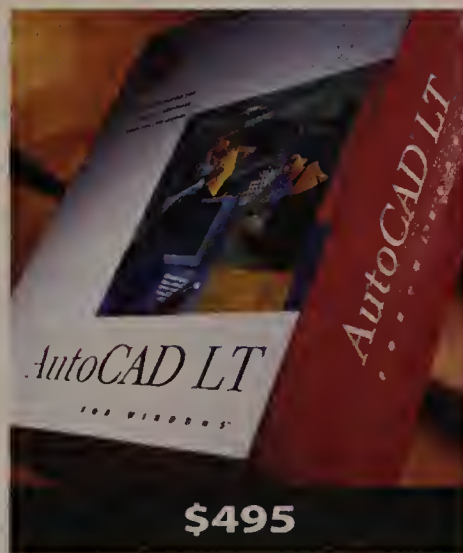
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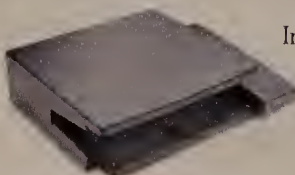
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WINDOWS Q & A

Easy Access to Groups

Q I use Program Manager's Window menu to switch among program groups. The menu lists nine groups, then offers an option for 'More Windows'. Unfortunately, the first nine groups are ones I don't use often, so I have to hassle with the More Windows dialog box. How can I get my favorite groups into the nine prime spots?

James W. Pearson, Aurora, Colorado

A Program Manager gets the order for this menu from the PROGMAN.INI file. By editing this text file, you can customize the Window menu, giving

you quick access to your most frequently used Program Manager groups.

Here's what you should do: First, if Options•Save Settings on Exit is checked, uncheck it for the time being (you can check it again later after you've finished). Choose *File•Run*, type **PROGMAN.INI**, and press **<Enter>**. Under the [Settings] heading, you should see a line that begins 'Order=' followed by several numbers separated by spaces. The numbers in this line correspond to the group numbers listed, appropriately enough, under the [Groups] heading later in the file.

To determine the first eight groups on the Window menu, you must rearrange the first eight numbers in the 'Order=' line to correspond with the eight groups you want easy access to. For example, if you want your Accessories group to be first, and you see a line under [Groups] that says **Group5=C:\WINDOWS\ACCESSORIES.GRP**, edit the order line to begin **Order=5**.

Make sure that no numbers are repeated on the line, or Program Manager may simply ignore your work and do things its own way. Don't bother customizing the ninth number in the order list; the ninth group on the menu always changes to show the currently selected group if it's not one of the first eight that you specified, or the previously selected group if the current group is one of your first eight. Finally, save

the PROGMAN.INI file and restart Windows. Your Window menu should now show the group files you want.

Cache Value, Part I

Q I recently upgraded to Windows for Workgroups 3.11, which comes with a 32-bit file access cache. How is this cache different from DOS's and Windows' SmartDrive cache? Is it a waste of memory to use both? Which one should I disable? I have 8MB of RAM.

Raymond Chi, Berkeley, California

A Both SmartDrive and 32-bit file access speed up Windows by providing a cache for disk information—a storage area in RAM in which the most recently used information is held. This way, your computer doesn't have to access your hard drive as often. The 32-bit file access feature of Windows for Workgroups 3.11 is much faster than the 16-bit SmartDrive, though when running many disk repair and maintenance utilities you'll have to turn it off (or simply exit Windows and run DOS versions of these programs). However, 32-bit file access doesn't cache information from floppy or CD-ROM drives, whereas SmartDrive does. So what should you do? That depends on your needs. Here are some scenarios; pick the one that best describes your situation:

• **You don't care about caching floppy or CD-ROM drives, and you rarely work outside of Windows.**

In this case, you can save some memory by removing the SmartDrive line from your AUTOEXEC.BAT file (or simply disabling it by typing **REM** at the beginning of the line).

• **You want the performance benefit of a disk cache while working in DOS, but you don't care about caching your floppy or CD-ROM drives.**

Reduce to zero the amount of memory that SmartDrive uses for a cache in Windows. To do this, modify the

Windows Toolbox



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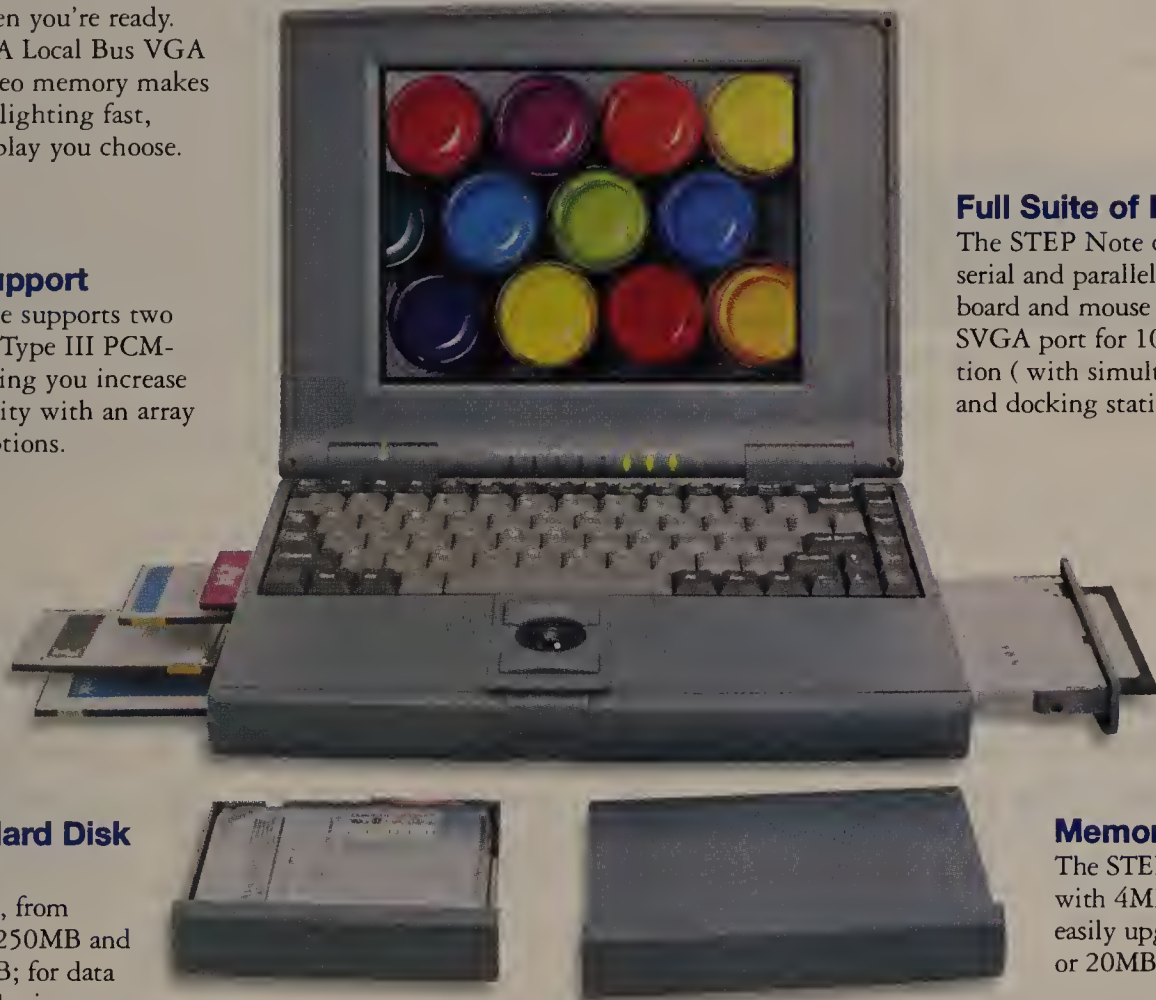
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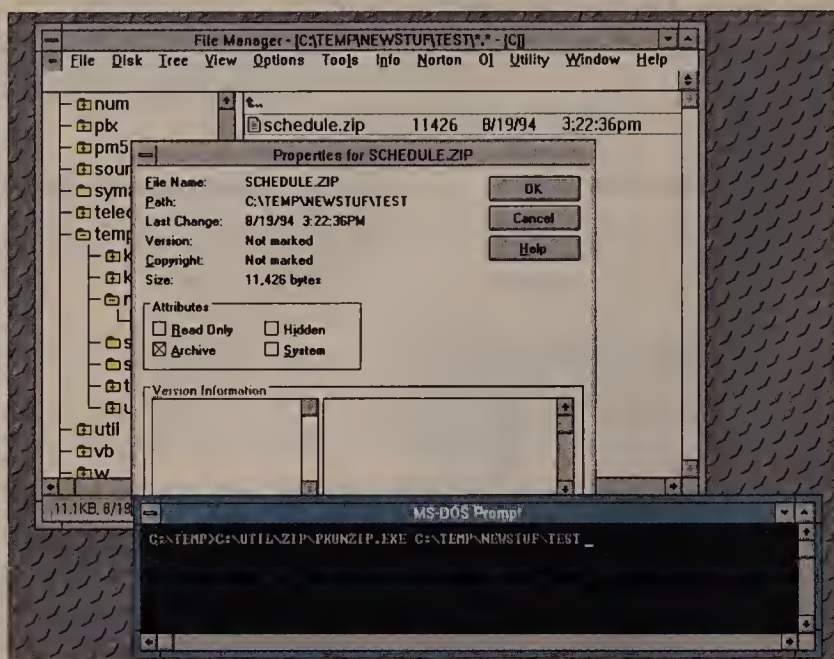
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AVOID TYPING A LENGTHY FILE PATH by copying it from the file's Properties dialog box in File Manager and pasting it where needed.

SMARTDRV command line in your AUTOEXEC.BAT file, changing the second of the two numbers to 0. For example, if you change your SmartDrive command to read **C:\WINDOWS\SMARTDRV 6144 0**, you'll have a 6MB cache in DOS and no SmartDrive cache in Windows. For more details on SmartDrive command line parameters, see your Windows user manual, or type **SMARTDRV /?** or **HELP SMARTDRV** at the DOS prompt.

• **You want your floppy or CD-ROM drives cached for the speed advantage, but you don't use them all that often.**

Modify the SmartDrive command line to make the WinCacheSize smaller than the default (2MB on an 8MB machine) but still greater than zero. Experiment with WinCacheSizes of 128 or 512.

• **You use floppy disks and/or CD-ROMs extensively.**

Leave SmartDrive the way it is. If you're hurting for memory, consider turning off 32-bit file access and living with some loss of speed.

Cache Value, Part II

Now that I have Windows for Workgroups 3.11, I use 32-bit file access instead of SmartDrive. But one thing is missing. SmartDrive lets me manually flush its cache, from the DOS prompt, forcing it to write pending data

to the hard drive. But how can I flush the 32-bit file access cache?

*Donna Bancroft,
Shreveport, Louisiana*

A You normally don't need to flush the 32-bit file access disk cache; it gets flushed automatically when you exit Windows or when you reboot with **<Ctrl>-<Alt>-<Delete>**. Windows can't flush the cache if you switch off the power without exiting, but you shouldn't do that anyway.

However, if for some reason you really want to flush your 32-bit file access cache, do this: Start a DOS session inside Windows, and at the DOS prompt, press **<Ctrl>-C** or **<Ctrl>-<Break>**. The cache will then immediately write to disk any data in the write cache.

The Long and Winding Path

Q I'm still sometimes forced to use the old DOS command line. My hard disk is organized with lots of directories within directories, and typing full paths and file names can be a pain. Can Windows help with this chore?

Stuart Sorenson, Fort Wayne, Indiana

A Sure thing, Stu. You can easily paste long path information into a DOS window (or any window) by using File Manager's Properties dialog box. In File Manager, locate and select the file whose path you want, then open the Properties box by selecting **File•Properties** or pressing **<Alt>-<Enter>**. Select the path by using the mouse or pressing **<Alt>-P**. Then press **<Ctrl>-<Insert>** to copy the path to the Clipboard. Switch to your destination window (**<Alt>-<Tab>** is fastest) and paste the path where you need it. If it's a DOS window, bring up the control menu with **<Alt>-<Space>**, then select **Edit•Paste**. Not only is this faster than typing (for some folks), but it keeps you from making typos.

If you really, really hate typing and want the file name too, you can switch back to File Manager and select that as well by using the mouse or pressing **<Alt>-F**, then copying it again with **<Ctrl>-<Insert>**. However, it's probably less trouble just to type the name.

Another point: File Manager's **File•Run** command gives you a prompt you can use for many of the same purposes as the one in DOS. And this prompt will always default to the directory you're currently viewing.

Fast Escapes From Norton Desktop

Q I use Norton Desktop 3.0 as my shell. Whenever I quit, it prompts me before I can exit. Is there any way I can stop it from doing this?

Larry Chester, Tempe, Arizona

A No problem. Norton Desktop is nothing if not flexible. To turn off the exit confirmation message, select **Options•Customize**. In the Control Center dialog box, click the **Confirmations** button. Then uncheck the **Exit Norton Desktop** option near the top of the resulting dialog box and click **OK**. The next time you close Norton Desktop and Windows, you'll go right to DOS without the pushy prompt.

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 and pays \$50 for published items. See page 12 for contact information.

USER GROUP TIP

A Total Selection

To select every file and subdirectory in a Windows File Manager directory window, press <Ctrl>-/. To deselect all of them, press <Ctrl>-\.

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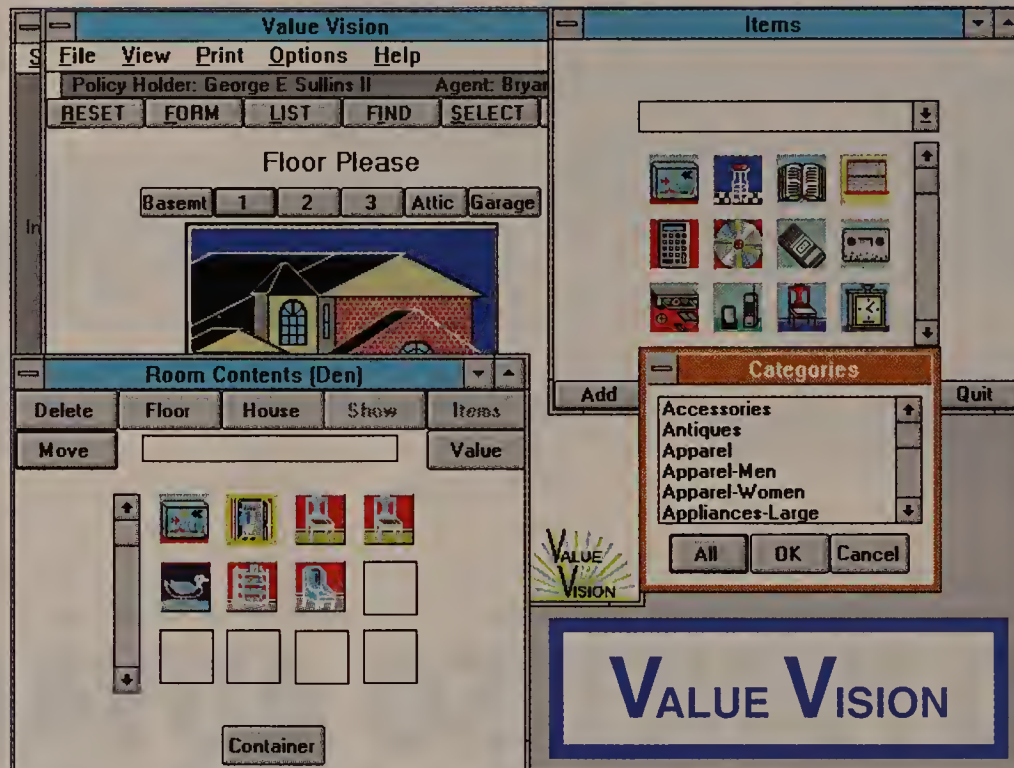
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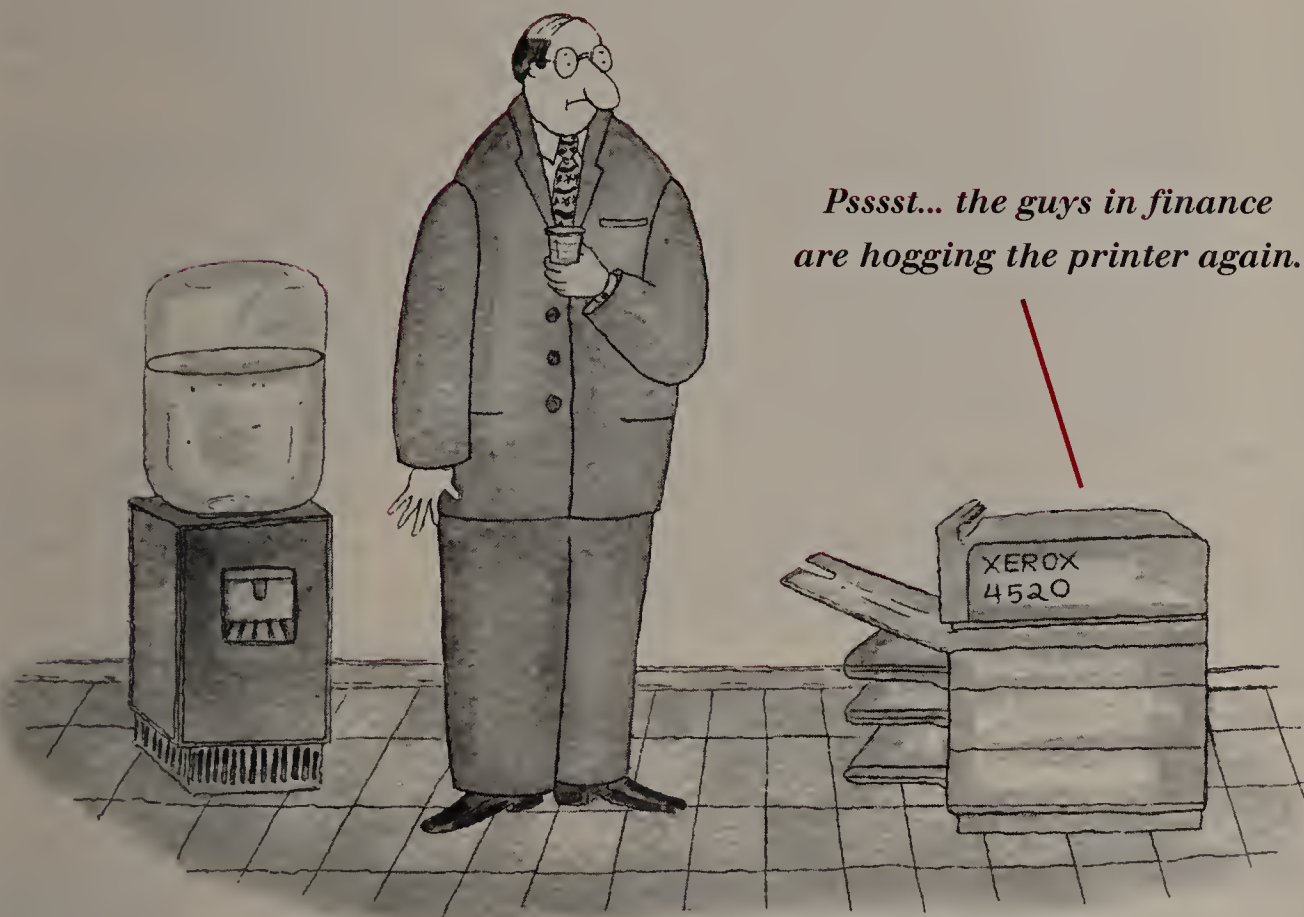
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DATA MANAGEMENT Q & A

Printing Approach 3.0 Records in Sets

Q I have an Approach 3.0 database with fields for Case Name, Date, and Amount. I want to print the database's records on labels sorted by Case Name, with four records—all from the same case—per label. Do I somehow need to turn every set of four records into a new record in a separate file? There has to be an easier way.

Ken Shapiro, Cedarhurst, New York

A There is. I suggest you design a report with two summary panels: one to sort your records by Case Name and another to sort them into groups of four. You can then adjust the margins and other sections of the report so each set of four records fits properly on your labels. (Since you're printing more than one record per label, you can't just use one of Approach's Avery label layouts.)

First, select *Create•Report* to open a new report design. In Step 1 of the resulting assistant, select the *Leading Grouped Summary* SmartMaster layout. In Step 2, select the fields you want printed on your labels. In Step 3, click *Case Name* under 'Select a field that groups the records', then click *Done*.

At this point, Approach displays your new report in Design mode. Select *View•Zoom In* if it's hard to read. Next you must add your second summary panel to show records in sets of four. Select *Create•Summary* and enter **4** for 'Every n record(s)'. Set Location to *Leading* and close the dialog box.

If you use *File•Preview* to check your design, you'll see the case name shown only before the first group of four records with that particular name. Since you want to show the case name on each label, return to Design mode and zoom in until you can see either part of an actual case name or the label 'Case Name' under the 'Leading summary by Case Name' label (depending on how you set the *View•Show Data* option). The name you see here is part of a field object that shows Case Name in the summary header. Click the name or Case Name label to select the box it appears in, then drag it down into the top panel for the four-record leading summary. When you preview your report, you'll see Case Name listed at the start of each set of records.

The last step, of course, is to adjust the sections of your report design to make sure the output fits your labels. To shrink or enlarge a summary panel, select it by clicking to the left or right of its text, then drag on the bottom border until the panel is the size you need. You can adjust the areas labeled Header, Body, and Footer in the same way. Don't forget to delete the default report title and column labels.

Saving a Value Calculated in an Access Form

Q My Access database includes an order entry form with a calculated field called Taxes. This field, which is calculated from the Total field, works

fine for displaying taxes on screen, but I need to save its value to my Orders table for reporting purposes. How do I calculate the taxes to show them on the form and at the same time save this amount to the Orders table?

*Rob Wardynski,
PC World Online*

A The secret is to attach a macro to the Total field that calculates the tax amount and assigns it to a field. It's not much more complicated than defining a calculated field, which you've already figured out how to do.

First, add a Taxes field to your table: In the Database window, click the *Table* tab, select your table, and click *Design*. In the resulting dialog box, go to the first blank line, type the field name **taxes**, and select the data type *Currency*. As you exit the dialog box, answer *Yes* when you're prompted to save the changes.

Next, change the Taxes field on your form into a regular rather than a calculated field: Open your Order Entry form in Design mode, select the *Taxes* field, right-click, and select *Properties* from the pop-up menu. In the Control Source text box, select *Taxes*.

Without closing the properties window, click the *Total* field on your form; Access now displays the Total field's properties. Scroll down the list in the Properties box until you find the option 'After Update'. Click the option's ellipsis (...), choose *Macro Builder*, and enter something like **Calc Taxes** for the new macro's name.

Access opens a window like the one shown in **FIGURE 1**. For the Action option select *SetValue*, and for the Item option type **[Forms]![Order Form]![Taxes]** (assuming Order Form is the name of your form and Taxes is the name of your tax field). The [Forms] statement writes the new value to the form, so it affects both the form itself and the underlying table. In the Expression text box, enter **[Total]*.05**, where Total is the name of your order total field and .05 is your tax rate.

Once your macro definition is complete, close the Macro window to return to the Properties sheet. You should see the name of the new macro in the After Update text box. Close the Properties sheet, select *View•Form*,

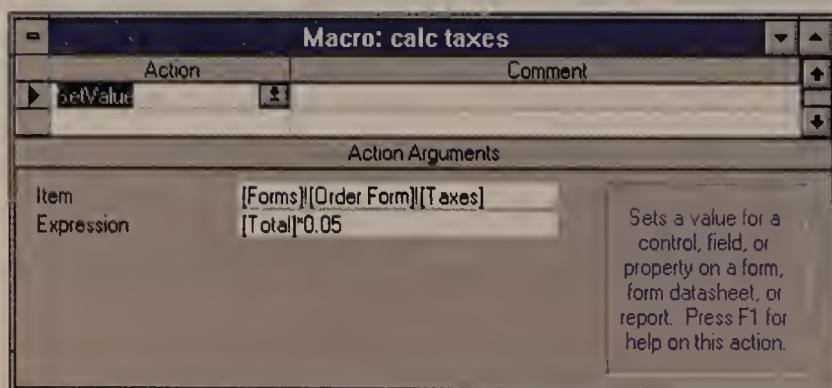


FIGURE 1: ACCESS'S MACRO WINDOW allows you to easily automate such tasks as placing a calculation into a field.

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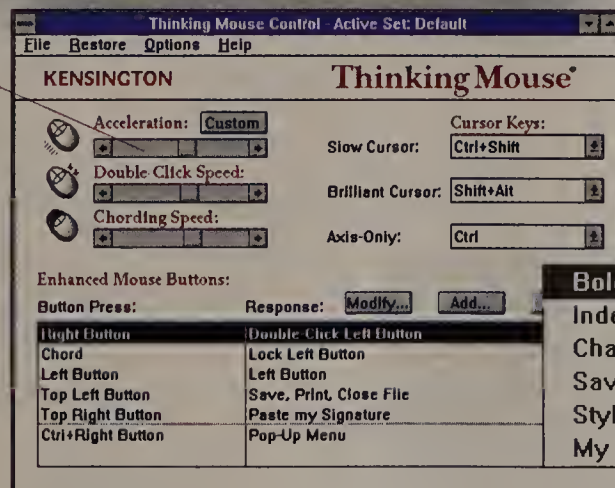
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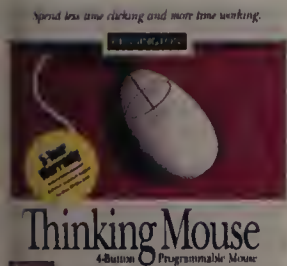


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and enter a value into the Total field to test your changes. Access should update the Taxes value automatically.

Editing Selected Records in Paradox 5.0 for Windows

Q I use Paradox for Windows to maintain a database of customer service information (mostly records of phone calls). I enter and update this data using a form that links two files, CUSTOMER.DB and CALLS.DB. My job would be much easier if I could filter out all but the calls from a particular place made in a given time frame, and edit just those records. When I got Paradox 5.0, I hoped the new live-query feature—which allows you to edit query results—would solve this problem, but I found it works only on single-table queries. Is there some other way to see and edit just part of my data?

Ann Marie Sommers, Evanston, Illinois

A In Paradox 5.0 for Windows, you can include a filter as part of a form design for working with selected records. The one

gotcha to such a solution is that if you want to set filters on fields from both of the tables, you need to link those tables in a one-to-many relationship.

Let's say you want to work with customers from Illinois who called during the month of December 1994. You'll need a form with CUSTOMER as your master table and CALLS as your detail table. If your existing form isn't set up this way, you'll have to make a new one: Select *File • New • Form • FormExpert* to bring up the Expert for creating new forms. In the Expert's first step, select the fifth option ('View one master record and multiple detail records...'). Follow the prompts through the rest of the Expert, and you'll have your form.

When you're in the finished form, select the *Form • Filter* command. In the resulting dialog box, go to the Table list on the left and select *CUSTOMER.DB*. The Filters on Fields list on the right side should now show the fields in CUSTOMER.DB. Type *IL* (or whatever text you use to indicate Illinois) in your state field. To limit the

calls to those occurring in December, select *CALLS.DB* on the Table list and enter *>=12/1/94,<1/1/95* in the date field. Then close the dialog box and either click the View Data icon or press **<F8>** to show the filtered records.



Why use *>=12/1/94,<1/1/95* when *12/./94* should do? Because the latter won't work. Paradox isn't as adept at reading expressions in form filters as it is at reading those in queries. The *'.'* wild card will work when it's placed at the end of a form filter expression, but not when it's in the middle of one. To find out about other filter limits, search the Help system for *Filters, Compared With Queries*, and go to the entry *Filters and Queries Compared*.

By Celeste Robinson

Celeste Robinson is a contributing editor for PC World and the author of The Paradox 5.0 for Windows Handbook (Random House Electronic Publishing, 1994). Data Management welcomes your questions and pays \$50 for published items. (See page 12 for contact information.) ■

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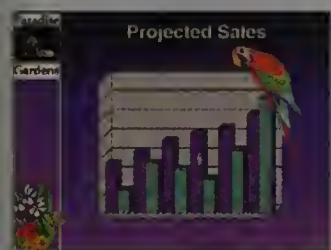
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PUBLISHING & PRESENTATIONS Q & A

Speedier Type Formatting in PageMaker

Q When I create documents in PageMaker 5.0, I usually use smaller type (such as 11-, 10-, and 9-point) rather than large (14-point and up). But when I use the Control palette to change type size, the larger choices show up first. As a result, I'm always scrolling through the list to get to the sizes I want. Is it possible to change the order of type sizes PageMaker displays so the ones I want are easier to find?

Paul Gellman, Merrick, New York

A No, PageMaker won't let you re-sort the Control palette's choices. But don't fret—there's a faster way to change the type size for selected text. Instead of scrolling in the palette's list box, simply use the keyboard instead.

First be sure you're in layout view with the Control palette activated. Double-click the type-size edit box to highlight the default setting (typically 12-point). Then type in your desired point size—for example, type **10**—and press **<Enter>**. PageMaker will change the size of the highlighted text.

While you're typing in your type-size choices, here's another shortcut: If you're not sure what type size you want, press **<Shift>-<Enter>** after typing

in the new point size. As before, PageMaker will change the highlighted text to the new point size, but it will also keep the Control palette active and the type-size edit box highlighted. This allows you to leave your hands on the keyboard, type in other sizes, and keep pressing **<Shift>-<Enter>** until you're satisfied with the results.

Changing PowerPoint Templates

Q Using Microsoft PowerPoint 4.0, is it possible to remove a template after applying it to a presentation? I'll often try out different templates on the same presentation: First I save the base presentation file with my text and graphics in it, then I apply the template. Then, if I don't like the way it looks, I retrieve the saved file and try another template. Is there a faster way to do this?

Paul de Klerk, CompuServe

A You bet there is. Although PowerPoint templates provide different master layouts and color schemes—some of which may give your presentation a thoroughly different look—they don't affect the content of your presentation at all. Both text and graphics remain intact no matter how many templates you apply.

If you don't like the looks of a template-based presentation and would like to change templates, simply select **Format•Presentation Template** or click the **Template** button on the lower-right edge of the status bar. Then, in the resulting dialog box, locate and select a new template file, and click **Apply**.

For the best results, don't forget to use the appropriate template

for the medium you intend to use. By default, the templates are stored in three subdirectories of the PowerPoint TEMPLATE directory: SLDSHOW holds a collection of templates for 35mm color slides and screen shows, BWOVRHD has templates for black-and-white overheads, and the CLR-OVRHD templates are designed for color overheads.

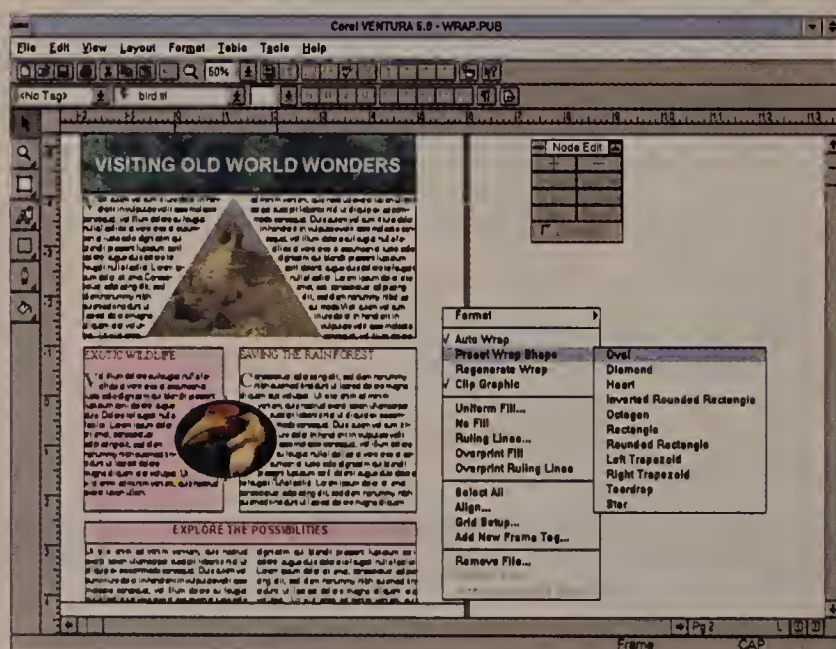
Fancy Text Wraps with Corel Ventura

Q I'm having trouble getting Corel Ventura 5.0 to wrap text around an embedded Windows Paintbrush graphic. I select the graphic and right-click it, but the Preset Wrap Shape options in the pop-up menu are grayed out. What gives? And what can I do about it?

Katie Canon, Hayward, California

A You've discovered one of the limitations of Ventura's otherwise much-improved text-wrapping abilities. Although the program comes with a bunch of new options—including auto-wrap (for wrapping text around irregularly shaped graphics) and preset wrap shapes (such as ovals, diamonds, and octagons)—these and other text wrap effects work only with graphics that you've imported into your document using Ventura's **File•Load Graphic** command. They will not work with graphics, such as those Paintbrush images, that you've linked or embedded using OLE (Object Linking and Embedding).

Your best solution is to save the graphic you've created in Paintbrush as either a BMP (bit-mapped) or PCX (raster graphic) file. Then, back in Ventura, create a frame with the **Frame** tool, select **File•Load Graphic**, type the name of your graphic's BMP or PCX file in the Load Graphic dialog box, and click **OK**. Now, when you select the frame and right-click it, the Preset Wrap Shape options should be available.



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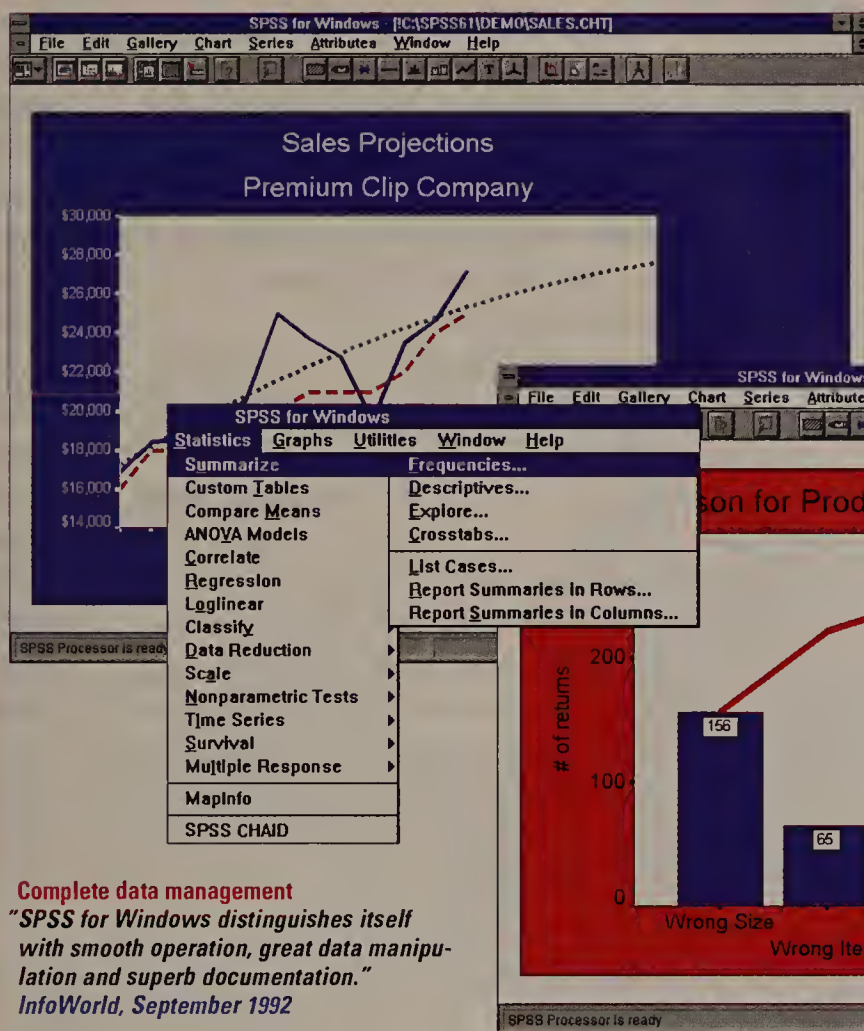
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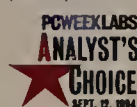
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Precision, Please

Q I need a graphics package to produce precise artwork for equipment labels and instrumentation panels, in some cases with text wrapped around circles for dials and switches. Can you suggest any software that costs less than a full-blown CAD or illustration program?

F. Kerner, Internet

A Check out Adobe's IntelliDraw 2.0 for Windows. It's an affordable and delightfully versatile graphics package that you can use to produce everything from common business illustrations to precise CAD-style diagrams.

For precise artwork, IntelliDraw's dimensioning tools automatically display an object's horizontal, vertical, and diagonal proportions, adjusting dynamically as you resize it. And IntelliDraw's curved-text feature lets you wrap text around any shape, including circles. The program also has loads of clip art, including a "knobs and controls" collection of equipment drawings you may be able to adapt to your needs.

Of course, there are other affordable draw packages—such as Shapeware's Visio 3.0, which features plenty of precision tools but makes you wrap text manually—as well as various low-end CAD programs that might be suitable for your graphics needs. But IntelliDraw's combination of dimensioning tools, automatic text wrap, excellent clip art, and low price is a tough act to beat.

• **IntelliDraw 2.0.1** \$99.99; Adobe Systems Inc.; 800/833-6687; 415/961-4400

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• **Visio 3.0** \$129; Shapeware Corp.; 800/446-3335, 206/521-4500, 206/521-4501 (fax)

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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. PC World pays \$50 for published questions and \$200 for redesigned items. See page 12 for contact information. ■

Publishing Toolbox

Readers frequently ask me how they can speed up their work in PageMaker 5.0. One of my favorite suggestions is to get SmartPad for PageMaker. SmartPad is a nifty utility that turns common PageMaker tasks into one-click operations. It does so by providing a bunch of new tool bars—Main Toolbar, ClickTools, Drawing, Formatting, Special Characters, Views, and Windows. The Main Toolbar, for example, provides a slew of buttons for quick access to common filing, printing, clipboard, and page-management tasks. You can float or embed SmartPad's tool bars wherever you like in PageMaker's window frame, customize them to your heart's content, and even create new ones. My only caveat: You'll need a high-resolution monitor for all these new on-screen goodies.

• **SmartPad for Pagemaker** \$79; Softbox, Inc.; 800/434-0202, 404/892-0202, 404/892-0891 (fax).

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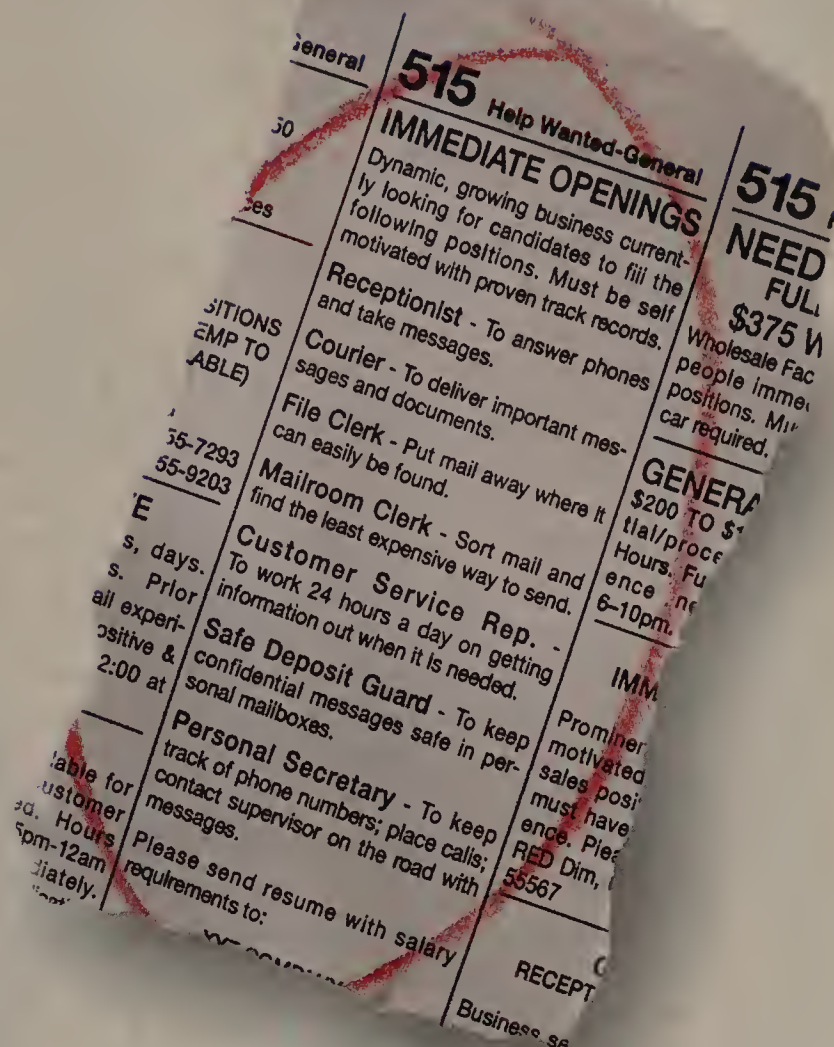
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ONLINE Q & A

Choosing an Online Service for Your Teen

Q Which online service would be best for my 13-year-old son—CompuServe, Prodigy, or America Online? And which would be the cheapest?

John Peakerston, Montgomery, Alabama

A I've got to be careful answering this: I'm still reeling from an E-mail assault by incensed teens over my suggestion that parents monitor their kids' online activities (see "Keeping Kids Safe on the Info Highway," *Communications*, October 1994). You'd think I'd suggested they all be grounded. That said, you need to consider several questions when choosing an online service for children or teenagers.

Which service is most likely to hold their interest? While a lot of kids like America Online—it offers MTV and DC Comics—CompuServe may hold their interest longer. It has forums that focus on bicycling, astronomy, dinosaurs, scuba diving, and science fiction, plus lots of gaming forums. Prodigy offers a variety of family and hobby forums, but most users I've heard from say they soon grow bored with its superficial content.

Which service is likely to be most useful? All the services brag about their educational features. AOL has *Smithsonian*, *National Geographic*, and *Scholastic* magazines online, plus parent-teacher forums; both AOL and CompuServe offer online encyclopedias and dictionaries. But are they better resources than your local library? In terms of reference materials, no. If you want your child to use the computer as a reference tool, dozens of reference CD-ROM titles are on the market. (Of course, you'll need a CD-ROM drive to use them.)

Where are my kids least likely to get into trouble? Unfortunately, both CompuServe and AOL have sexually oriented forums—as well as access to the Internet and its wellspring of porn—

and there's nothing to prevent your kids from getting at any of it. AOL does offer parents a "lock" to keep kids from accessing its sex-chat feature. Prodigy is relatively kid-safe. Parents can designate which forums and features household members can read and can even prevent kids from accessing the Internet.

Which service is cheapest? Price wars between the three services have been driving fees lower. Prodigy currently costs the least at \$9.95 per month for 5 hours of access plus \$2.95 for each additional hour. America Online is also \$9.95 per month for 5 hours, but it charges \$3.50 for each additional hour. CompuServe is the priciest at \$9.95 per month plus \$4.80 an hour.

Faxing on the Internet

Q Is there any way to send faxes via the Internet?

Arnon Milligan, Toronto

A The answer is a qualified yes. A service currently in development lets you send faxes via Internet E-mail. It relies on a network of fax servers: You send an E-mail message to one of these servers, which then sends your message out as a fax. The trick is to configure the Internet address like this:

remote-
printer.Roger_Smith/Acme@4.3.2.1.5.5.5.5.
1.4.1.tpc.int

Of course, you substitute your recipient's name for Roger_Smith, and type the appropriate company name in place of Acme (use an underline character to signify a space). After the @ sign, enter the fax number in reverse order: The number above is 1-415-555-1234. If the fax transmits successfully, you'll receive an E-mail confirmation.

So why do I qualify my yes? Because so far the service operates in only a few key areas. Currently you can reach addressees in Washington, D.C.; Manhattan; and California's Silicon Valley, as

well as some parts of Japan, Hong Kong, and the United Kingdom. And because this service is still in the experimental stage, coverage is patchy even in supposedly covered areas.

To get more information, send an E-mail message to the Internet address tpc-faq@town.hall.org with **help** as the only word in the body of the message. To obtain a list of areas you can fax to, send an E-mail message to tpc-coverage@town.hall.org, again with the word **help** as the body of the message.

Getting WinFax to Step Aside

Q I like WinFax Pro except for one thing: Unless I'm willing to miss incoming faxes, I have to leave the program on all the time, which means I can't use other communications programs. Is there any way to deactivate WinFax temporarily?

Angela Kirsch, Traverse City, Michigan

A When WinFax is in auto-receive fax mode, other programs can't use your system's COM ports. But several shareware Windows utilities let you use other comm programs in the middle of a WinFax session. My favorite is WFX-AUTO. This handy little program works invisibly. You add it to the command line for each communications program you use. Thereafter, WFXAUTO turns off WinFax's auto-receive mode whenever you use one of these apps, then relaunches it when you're done.

• **WFXAUTO** \$15; Logical Business Systems; CompuServe 76507,530; PC World Online WFXAUT.ZIP
Reader service no. 638

By Judy Heim

Judy Heim is a contributing editor for PC World and author of The Needle-crafter's Computer Companion (No Starch Press, Daly City, California, 1995). Online welcomes your questions and pays \$50 for published items. See page 12 for contact information.

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HARDWARE Q & A

Pentium Chips and Bad Math

Q Do all Pentiums have bugs in their floating-point units (FPUs)? How bad are they? How will Intel fix them?
Gustavo Ariel Van Den Dooren, Buenos Aires, Argentina

A If you bought a Pentium system last year, you *definitely* have an FPU that delivers wrong answers when dividing certain numbers by certain other numbers. Even if you bought your system this year, chances are it still has the problem, because Intel began shipping fixed chips only last January, in limited quantities, and may *still* be shipping some buggy chips as you read this. To find out whether your chip has the bug, perform the simple spreadsheet calculation shown in **FIGURE 1**.

How serious the problem is depends on what you're using your PC for. If you don't use spreadsheets, computer-aided design (CAD) programs, or financial applications, then you're probably not exercising your FPU at all, and you have nothing to worry about. For applications that employ the FPU, Intel claims a probabilistic error rate of one in 9 billion divisions. If you're a typical spreadsheet user, the company estimates that you would encounter—on average—an error once every 27,000

years. And the errors would probably be too small to do any damage.

At the other end of the spectrum, IBM has posited that a spreadsheet user of "typical" numbers who spends 15 minutes a day recalculating worksheets (for a total of 4.2 million floating-point divisions per day) could experience errors as frequently as once every 24 days. Everyone agrees, however, that this example represents only a tiny minority of spreadsheet users. And some analysts have questioned IBM's intentions, since the company sells its own line of CPUs.

Confused? Then here's a rule of thumb for spreadsheets: The more statistical and financial operations you perform, the greater the opportunity for a Pentium FPU error. If you need to leave a spreadsheet (or a high-end financial or statistical application) "cooking" for minutes or even hours, you may be performing hundreds of thousands of divisions per minute. At that rate, 9 billion calculations may happen sooner than you think—and you may never know if one of those calculations produced an error. If you have the usual mix of templates and database worksheets, however, the chances of experiencing an error are virtually nil.

CAD may be a different story. Although no one has yet attributed an error in a real-world CAD drawing to a Pentium FPU, no PC software crunches numbers harder than design and engineering software. According to Dr. Vaughn Pratt, a prominent Stanford University mathematician, "one would be out of one's mind to make a CAD drawing with a Pentium if it were critical that every single line be exactly in

place, as with an integrated circuit mask." Most CAD drawings don't require that kind of precision.

So what is Intel doing about all this? As of this writing, anyone can get a replacement chip from Intel by calling 800/628-8686 (916/356-3551 internationally) and providing a credit card number. When you return your original chip, the company will void the transaction. How long a replacement chip will take to arrive is another question, since none of the Intel reps I spoke with could provide even a ballpark estimate. If you're not comfortable replacing chips and you can afford to wait even longer, Intel is contracting with several third-party service providers who will swap chips for you. In addition, a number of major system vendors—including AST, Compaq, Dell, IBM, and Toshiba—have their own replacement programs, and most promise to send a technician in the bargain.

Why Waste a Perfectly Good CPU?

Q I recently added an Intel OverDrive chip. One thing bothers me: my old processor just sits on the motherboard gathering dust. Is there any way that I could make it work alongside the OverDrive chip and increase my computer's power?

Michael Makowski, Chicago

A Nice thought, but no dice. To get two processors to work together, you need both a PC and an operating system designed to run multiple CPUs simultaneously. Even then, the two processors would have to be identical—another reason why you can't buy a system that will run an original CPU and an upgrade CPU in tandem.

Multimedia Mayhem

Q I'd like to use my regular stereo speakers with my sound card, but I've heard that speakers that aren't magnetically shielded can damage

Result With Pentium FPU Error

	C2				
		↓			=(A1/A2)*A2
	A	B	C	D	
1	4,195,835				
2	3,145,727		4,195,579		

Correct Result

	C2				
		↓			=(A1/A2)*A2
	A	B	C	D	
1	4,195,835				
2	3,145,727		4,195,835		

FIGURE 1: TEST YOUR PENTIUM with any spreadsheet. If you get the result shown in cell C2 of the top picture, your Pentium has a flawed FPU.

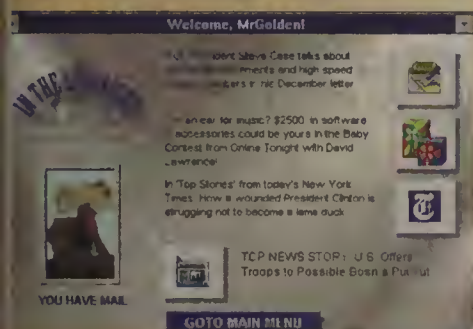
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*** Acceptable

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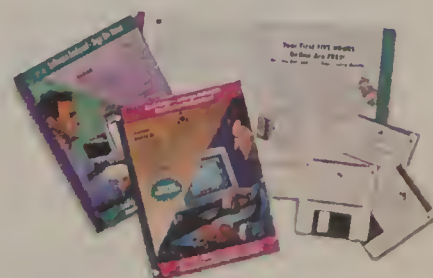
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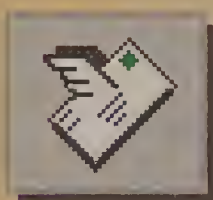
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monitors and other components. How far away from the rest of my system do my speakers have to be?

James Zha, Marietta, Georgia

A A magnetically shielded speaker is one encased to prevent its magnetic field from extending beyond the speaker housing, or one that produces a negligible magnetic field to begin with. But shielded or not, a speaker can't damage a monitor or other PC components. It can distort the image on your monitor, but when you move the speaker away—a few inches will probably do it—the image will right itself.

Note, however, that unshielded speakers *can* corrupt magnetic media. Make sure disks and backup tapes are at least 2 feet from unshielded speakers, or you risk losing data. The rear of the speakers, where the magnets are, is especially hazardous.

Are Cache Upgrades Worth It?

Q I enjoyed last November's "Upgrades: When They're Worth It, and When They're Not." One thing I missed was a discussion of secondary cache memory. Would it be worthwhile to upgrade my 486 system's 64K cache to 128K or 256K?

Carl Donsbach, Albuquerque, New Mexico

A The secondary memory cache, often called the external memory cache, is a block of fast memory on your motherboard that holds instructions and data most likely to be needed by the CPU (the *primary*, or internal, memory cache is in the chip itself). When the CPU can't find what it needs in the primary cache, it turns to the secondary cache instead of throttling down to access the slower main memory. In any system, the biggest performance difference is between *no* secondary cache and *any* secondary cache—you would lose as much as 17 percent of your current performance without that 64K you already have.

You'll probably obtain a small boost from moving up to 128K, but 256K is unlikely to get you much more. It depends on how you use your PC. If you multitask—say, run communications sessions in the background as you recalc a huge spreadsheet—you'll see some more improvement with 256K. Likewise if your PC is an applica-

tion server handling the processing needs of several users at once. But under normal circumstances (when only one app is actually *doing* something), 128K is enough.

Some secondary caches can't be upgraded, so check your system manual before you try anything. In some cases, you can get the cache memory only from the system manufacturer, which is always more

expensive than buying it at commodity prices (usually about \$8 for 64K).

By Eric Knorr

Contributing Editor Eric Knorr is editor and principal author of The PC Bible (Peachpit Press, 1995). Hardware welcomes your questions and pays \$50 for published items. See page 12 for contact information.

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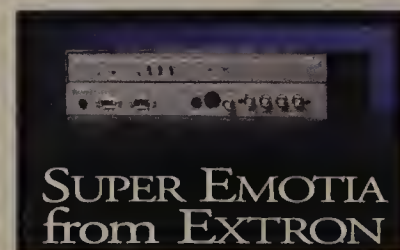


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STAR-DOT-STAR TIPS

WinWord Printer Power

Here's a way around one of Word for Windows' most annoying shortcomings: the inability to assign a true default printer. In case you've never noticed, the only way to change your printer in Word is to select File•Print, click the Printer button, and make a choice. But your selection remains the default until the next time you change printers. This can get really ugly if you change printers for a single print job, then forget to change back. Your confidential memo may come out at the other end of the building instead of from your desktop printer.

Alter the File•Print command so that it notes the current printer before bringing up the Print dialog box, and it returns to that printer when everything is done. That way, when you change printers, it's only temporary. You can then make the Print Dialog Box available separately for times when you really need to change the default printer.

First, choose *Tools•Macro*, enter the macro name **FilePrint**, and click *Create*. Word places the Sub MAIN and End Sub statements in the resulting macro editing window; just add the body of the macro code so it matches my FilePrint macro [shown in **FIGURE 1**]. Once saved, this macro runs whenever you select Word's File•Print command.

```
Sub MAIN
Dim Org As FilePrintSetup
GetCurValues Org
Dim dlg As FilePrint
GetCurValues dlg
If Dialog(dlg) Then
FilePrint dlg
FilePrintSetup .Printer = Org.Printer
End If
End Sub
```

FIGURE 1: SELECT A DIFFERENT PRINTER temporarily in Word for Windows by substituting this macro for WinWord's File • Print command.

Now you need a way to change your default printer. Select *Tools•Customize* and click the *Menus* tab. For Categories, select *File*, and for Commands, select *FilePrintSetup*. At the bottom of the dialog box, select where and how you want the command to appear, click *Add*, and then click *Close*.

Harry Lincoln, San Francisco

Editor's note: A few Windows apps display this same annoying trait: When you change printers (or printer setups), you never know if the changes will take effect for one print job, for all print jobs in the application, or for all Windows print jobs.

Most Windows programs (Cardfile, for example) use a generic printer setup dialog box that enables you to select an alternate printer without changing the Windows default printer—which means that other programs can continue using the default printer if you forget to switch back. However, you still have to select the default printer again to use it from within that program. These macros allow you to choose the behavior you'd like, if only in Word for Windows, without surprises. If you have a similar solution for another common Windows app, please send it in.

Instant ASCII From WinWord

When you want to upload a Word for Windows text file to a BBS or the Internet, you must first save it as an ASCII file that anyone can read. The same is true if you want to write a DOS batch file, a QBasic program, or input for any other application that requires plain ASCII text.

Unfortunately, Word for Windows makes it a pain in the neck to save files as ASCII text. You have to select File•Save As from the main menu, select Text Only as the type, and then type the name in the File Name field. In Word 2.0 this can be especially frustrating because you must go through this entire routine each time you save the

file. [Word 2.0 defaults to saving files as Word documents, but Word 6.0 remembers the format in which the document was last saved. —Ed.]

I therefore created a macro [shown in **FIGURE 2**] to automate the process of saving Word documents as ASCII text. It prompts for a file name—including the directory path but not an extension—then adds the TXT extension and saves the file. (To keep things simple, the macro doesn't check whether a file by the same name already exists.)

Keep the macro handy by adding it to the File menu or assigning it to a button, as I have.

Bill Warner, PC World Online

Editor's note: Internet users are often puzzled when they download what they think is a text file and it looks like gibberish. Usually this is because the author uploaded the file in a word processor's proprietary format rather than as ASCII text. To be a good Internet citizen, you should convert your text files to ASCII before uploading.

There are also many programs on your own system—including almost all the utilities that come with DOS—that work only with plain text files. This macro makes it easy to save files as text in Word 2.0; it also works in Word 6.0. Create it using the steps described in the previous tip.

Saving Stacker

If you use Stacker to compress your hard disk and you need to install a program that requires you to boot from the installation disk (such as an operating system upgrade), you'll probably run into a glitch. The program you're installing won't see your Stacker drives and therefore won't be able to install itself (or upgrade the files) on them.

This happened to me when I tried to upgrade from MS-DOS 6.0 to MS-DOS 6.22; I couldn't complete the upgrade until I finally discovered a workaround: Before installing the new soft-

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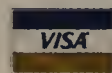


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```
Sub MAIN
FileSave
Name$ = InputBox("Enter new file name", \
"Save Text File", "TEXTFILE")
If InStr(Name$, ".") = 0 Then Name$ = Name$ + ".TXT"
FileSaveAs .Name = Name$, .Format = 2
End Sub
```

FIGURE 2: YOU CAN AUTOMATICALLY SAVE WORD FOR WINDOWS documents as ASCII text by using this simple macro.

ware, make a copy of the first installation floppy using DISKCOPY. Then copy the file DBLSPACE.BIN (which appears both in the root directory of every Stacker drive and in the root directory of each "host" drive) to the new floppy. To do this, you'll need to remove DBLSPACE.BIN's read-only, hidden, and system attributes using the command **ATTRIB -R -H -S DBLSPACE.BIN**. Once you've copied DBLSPACE.BIN, restore the file's attributes on both the hard drive and the floppy using the command **ATTRIB +R +H +S DBLSPACE.BIN**.

This trick works because, despite the name, the file DBLSPACE.BIN on a Stacker drive contains the Stacker program, *not* DoubleSpace. (The file names are the same for compatibility reasons.) Just placing this file on a bootable floppy installs Stacker when you start up the system, making your compressed drives available to all DOS software. The trick won't work with other operating systems, though, so it won't help you install OS/2 or Windows NT to a compressed drive.

Dirk Crush, San Jose, California

Editor's note: DOS upgrades aren't the only situation where this trick comes in handy. If you're making a boot floppy for a virus detection program (which will run best from a clean, write-protected floppy containing just the operating system and antivirus program), a rescue disk to use if your machine becomes unbootable, or any other floppy you expect to boot your PC with, be sure to put DBLSPACE.BIN on it so you can access your Stacker volumes after booting.

Normally you can do this by creating the floppy using the **FORMAT /S** command, or by transferring the operating system to it using the **SYS** command. (To make sure DBLSPACE.BIN is there, use the **ATTRIB** or **DIR /A** command.) But if a bootable floppy was created by any other command or program, or

if it was formatted on a PC that didn't have Stacker or *did* have DoubleSpace, you'll probably have to transfer DBLSPACE.BIN to the floppy using the steps Crush describes.

Two Buses Are Better Than One

SCSI, the Small Computer System Interface, is one of the best ways to hook up all kinds of peripherals, including hard disks, tape backup units, and CD-ROM drives. Unfortunately, if you have lots of SCSI devices, the total length of the SCSI bus (counting both the internal and external portions) may exceed the maximum 18 feet the standard allows. Also, a bus spanning many different connectors and segments of cable can be unreliable, and keeping track of the bus terminators (required at each end of the bus) is often not easy. Finally, because each SCSI device must have a unique ID number, and one of those is taken up by the host adapter itself, you may run out of IDs or forget which ones are in use.

One way around these difficulties is to use a SCSI board that contains two adapters—one for the internal devices and another for the external ones—for a total of 14 peripherals, twice the capacity of a single SCSI adapter. The software isn't any more complicated to install, and adding a new SCSI peripheral is much easier. Also, buying two adapters on one card costs much less than buying two separate cards.

Bruce Guerrero, Lynbrook, New York

Editor's note: Twin SCSI adapters have been common on high-end Macs for some time but are relatively new in

PCs. Besides simplifying SCSI setups, they increase performance because they can work simultaneously if you use an advanced multitasking operating system, such as OS/2. Adaptec and Dell offer dual SCSI interface cards for EISA machines, and Hewlett-Packard and Zenith Data Systems build dual SCSI hosts into some system boards. AST makes a dual SCSI adapter for the PCI bus, and Adaptec's PCI twin SCSI adapter should be available by the time you read this.

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By Brett Glass

Brett Glass is a contributing editor for PC World. Star-Dot-Star welcomes your tips, macros, batch files, and short programs and pays \$50 to \$200 for published items. See page 12 for contact information.

USER GROUP TIP

Troubleshoot DOS With <F8>

After you start up your computer, press **<F8>** when DOS 6.x displays the 'Starting MS-DOS' message, and DOS prompts you to confirm each line in your **CONFIG.SYS**. Then it prompts you to confirm each line in your **AUTOEXEC.BAT**. (MS-DOS 6.0 and PC DOS 6.1 just ask you whether to run **AUTOEXEC.BAT**.) At any point, you can press **<Esc>** to have DOS process all remaining lines or press **<F5>** to have it ignore them.

Neil Edwards

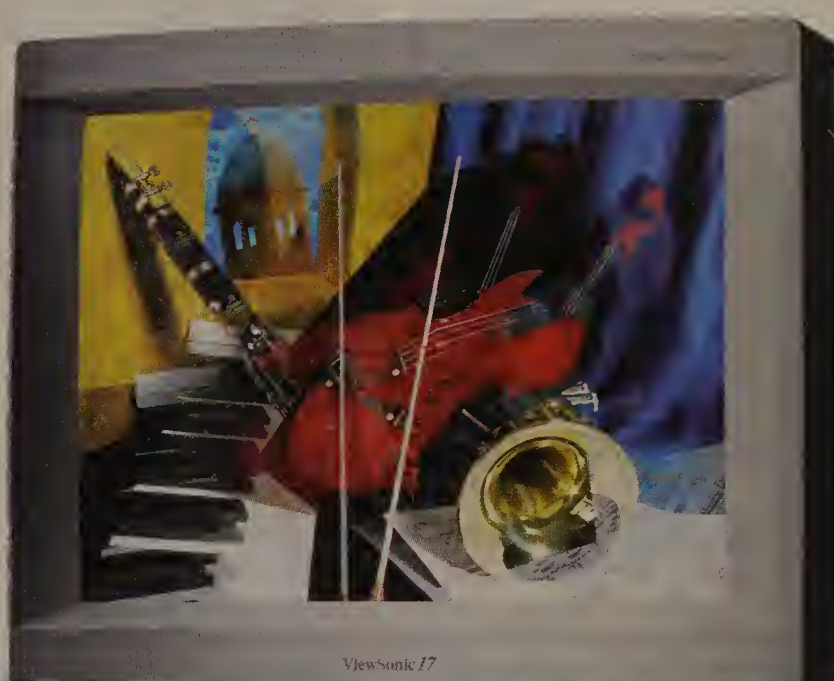
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ViewSonic's Super Contrast screen eliminates pixel crossover (top), providing distinct pixelization (bottom).

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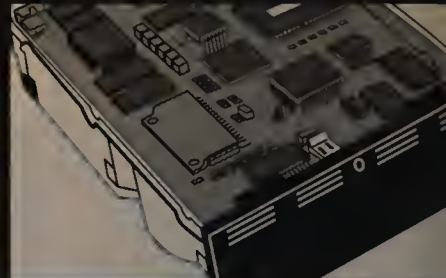
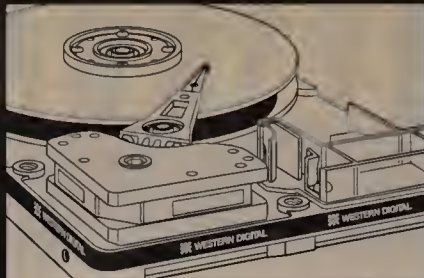
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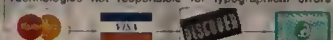
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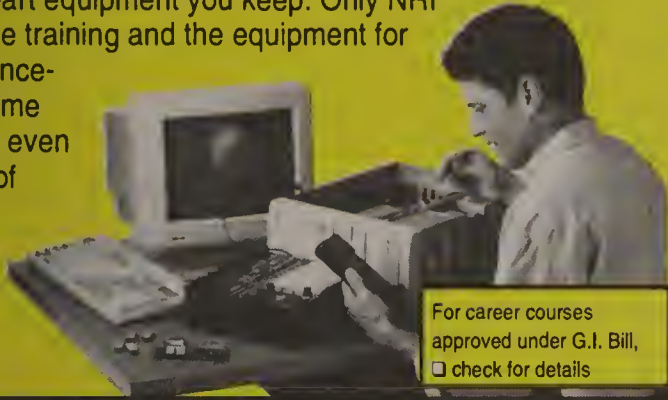


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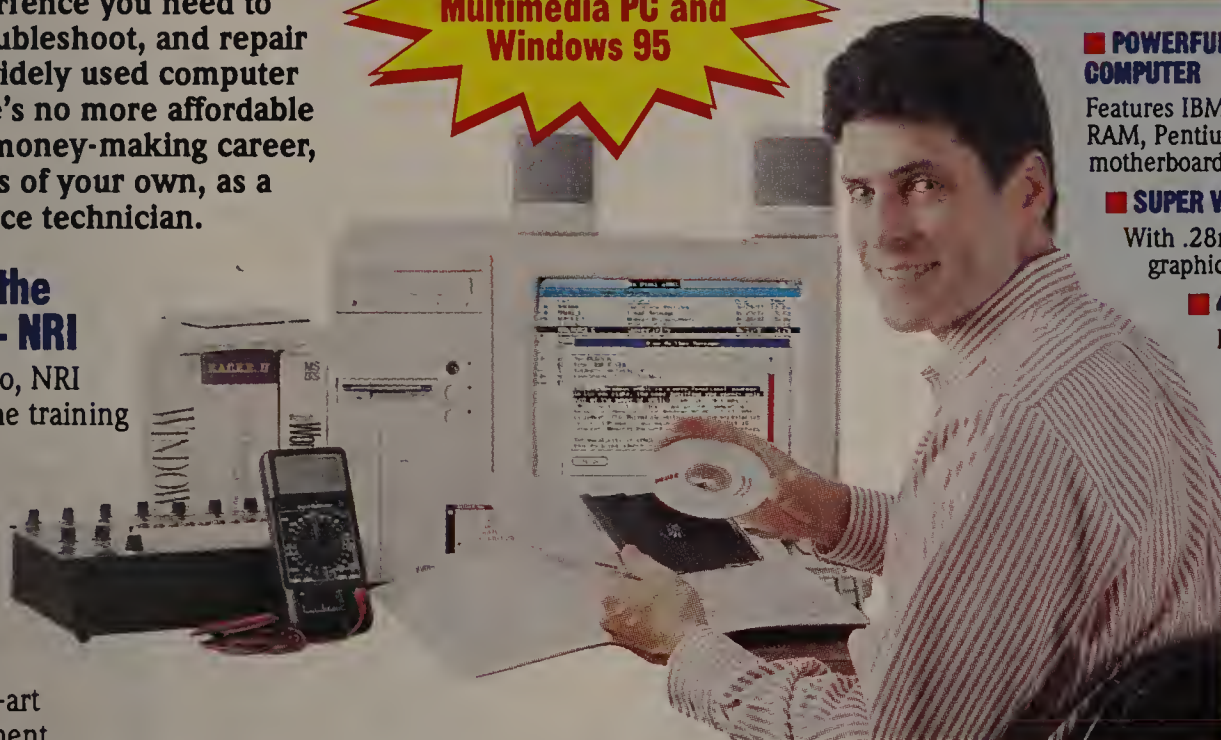
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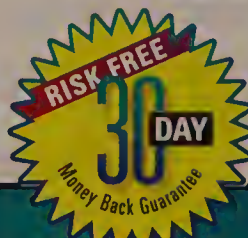
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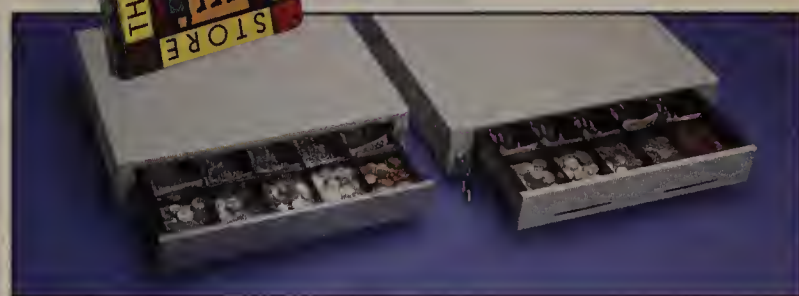
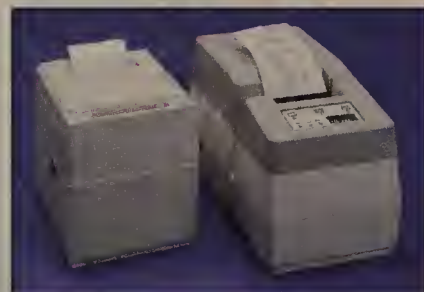


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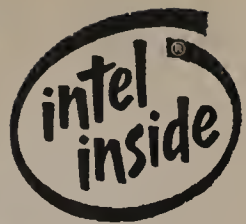


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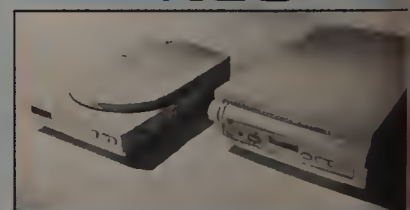
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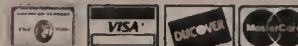
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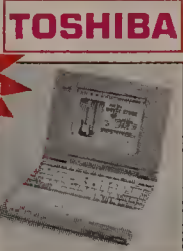


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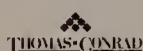
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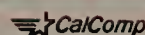
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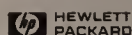
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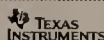
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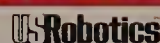
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Premium 386/33TE, 486/25TE, 33TE			
Prem. Serv., Prem II 386SX/20, 25			
Prem. II 386/25, 386/33, 486/33, 486SX/20	8Meg	500780-001	398.00
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Prem. II 386SX/20, 25	4Meg	500780-004	189.00
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Premia 4/33S, 4/33, 4/50d, 4/66d	8Meg	501159-002	379.00
Premia	16Meg	501159-003	789.00
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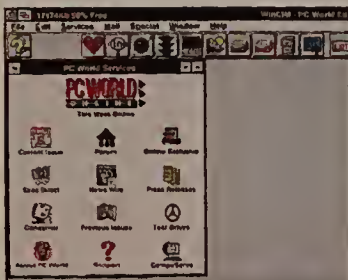
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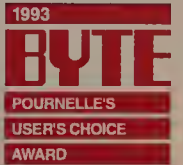
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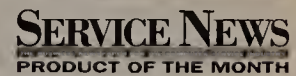
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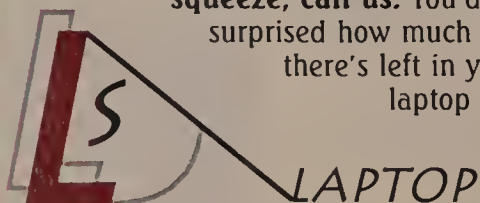
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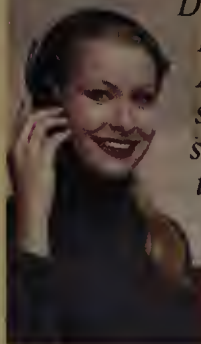
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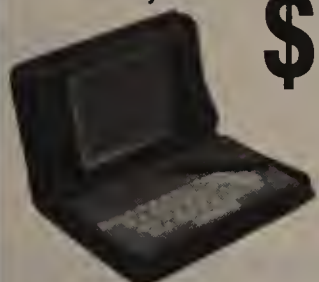
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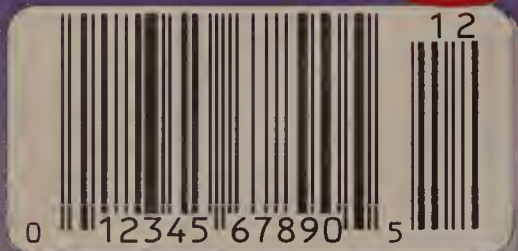
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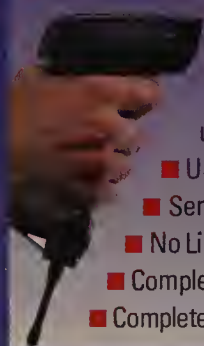
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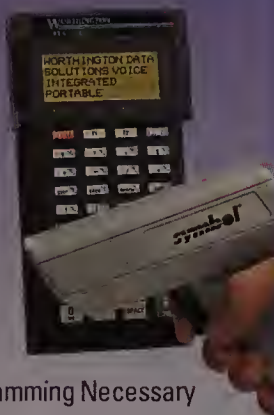
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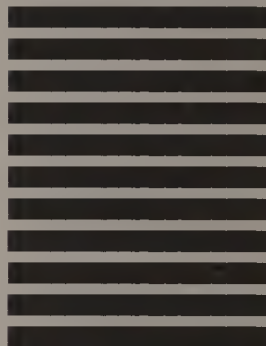
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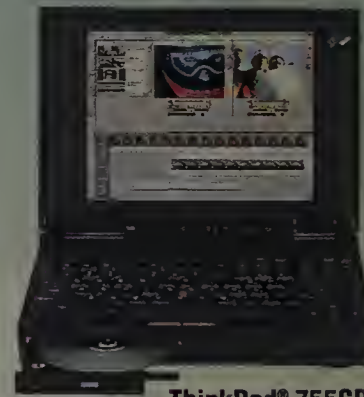
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Removable full-size CD-ROM drive
Enhanced video, stereo speakers,
MIDI/joystick port
Additional multimedia software!

Processor	Screen	Hard Drive	Price
486DX4/100	10.4" Dual Scan	340MB	\$4899
486DX4/100	10.4" Dual Scan	540MB	5299
486DX4/100	10.4" Dual Scan	810MB	5849
486DX4/100	10.4" Active	340MB	6299
486DX4/100	10.4" Active	540MB	6649
486DX4/100	10.4" Active	810MB	7199
486DX4/100	10.4" Active	540MB	7599
486DX4/100	10.4" Active	810MB	8149

*** Features built-in CD-ROM Drive**



ThinkPad® 755CD

ThinkPad 360E Notebooks

- ▲ 4MB RAM exp. to 20MB
- ▲ Modular design with lift-up keyboard, removable hard drive & floppy drive
- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ IBM DOS 6.3, Windows 3.1 & 15 FREE software titles including Lotus Organizer, cc:Mail, and Taxi tourist guide

Processor	Screen	Hard Drive	Price
486DX2/50	9.5" Dual Scan	340MB	\$3049
486DX2/50	9.5" Dual Scan	540MB	3449
486DX2/50	8.4" Active	340MB	3099
486DX2/50	8.4" Active	540MB	3449

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HP OmniBook Notebook PCs 4000 Series Desktop to-go-PCs

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486DX2/50	10.3" Dual Scan	260MB	\$2969
486DX2/50	10.3" Dual Scan	340MB	3349
486DX2/50	10.3" Dual Scan	520MB	3729
486DX2/50	10.4" Active	340MB	4459
486DX2/50	10.4" Active	520MB	4839
486DX4/100	10.3" Dual Scan	340MB	4069
486DX4/100	10.3" Dual Scan	520MB	4449
486DX4/100	10.4" Active	340MB	5179
486DX4/100	10.4" Active	520MB	5559

HP OmniBook Notebook PCs 600 Series Lightweight with Performance

Processor	Screen	Hard Drive	Price
486DX2/50	8.5" Dual Scan	170MB	\$2549
486DX2/50	8.5" Dual Scan	260MB	2829
486DX4/75	8.5" Dual Scan	170 MB	3099
486DX4/75	8.5" Dual Scan	260MB	3379



HP OmniBook 600 Notebook PC

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- ▲ 3-Year Warranty

Model	Screen	Hard Drive
486DX2/66	8MB	540MB
486DX2/66	4MB	540MB
486DX2/66	8MB	540MB
Pentium 75MHz	8MB	540MB
Pentium 75MHz	8MB	1GB
Pentium 100MHz	8MB	1GB

*AST Color Monitors start at \$349.99

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AST Ascentia 910N

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- ▲ PanVision graphics for up to 1024x768 resolution
- ▲ 2 Type II or 1 Type III PCMCIA slot

Processor	Screen	Hard Drive	Price
486DX2/50	10.3" Dual Scan	340MB	\$2949
486DX4/75	10.3" Dual Scan	510MB	3439
486DX4/75	10.4" Active	510MB	4719
486DX4/75	10.4" Active	700MB	4999



**Ascentia 910N
10.4" Active
Matrix screen**

Ascentia 810N

- ▲ LARGE, 10.4" Dual Scan displays
- ▲ 4MB RAM expandable to 20MB
- ▲ Removable hard drive and floppy drive
- ▲ 2 Type II or 1 Type III PCMCIA slot

Model	Screen	Hard Drive	Price
486DX2/66	10.4" Dual Scan	250MB	\$2949
486DX2/66	10.4" Dual Scan	340MB	3249
486DX2/66	10.4" Dual Scan	510MB	3449

Business Lease: \$88/mo.

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- ▲ 82-key keyboard
- ▲ MS-DOS, Windows 3.1
- ▲ Accupoint pointing device
- ▲ Enhanced power management

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Model	Processor	Screen	Hard Drive	Price
T2100	486DX2/50	9.5" Mono	250MB	CALL
T2100	486DX2/50	10.4" Dual Scan	330MB	CALL
T2100	486DX2/50	8.4" Active	330MB	CALL
T2400	486DX2/50	9.5" Dual Scan	250MB	\$2469
T2400	486DX2/50	9.5" Dual Scan	320MB	2619
T2400	486DX2/50	8.4" Active	250MB	2959
T2400	486DX2/50	8.4" Active	320MB	3219
T2450CT	486DX4/75	9.5" Active	320MB	3969
T2450CT	486DX4/75	9.5" Active	500MB	4269

Business Lease: \$90/mo.

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T2400

TOSHIBA

T4700, T4800 and T4850

Sight, Sound & Processing Power

- ▲ Brilliant color display with local bus video
- ▲ 1 Type II and 1 Type III PCMCIA slots
- ▲ Microsoft Sound System, built-in microphone, audio out port
- ▲ MS-DOS, Windows for Workgroups 3.11, UltraFont, Indeo video compression software

Model	Processor	Screen	Hard Drive	Price
T4700	486DX2/50	9.5" Active	320MB	\$3079
T4800	486DX4/75	9.5" Active	500MB	4189
T4850	486DX4/75	10.4" Active	500MB	4519
T4850	486DX4/75	10.4" Active	772MB	4829

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T4900 Your Dream Machine

- ▲ 75MHz Mobile Pentium Processor
- ▲ 8MB RAM expandable to 40MB
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- ▲ 10.4" active matrix color display
- ▲ 1 Type II and 1 Type III PCMCIA slot
- ▲ Accupoint integrated pointing device
- ▲ Microsoft Sound System, built-in microphone, audio out port
- ▲ MS-DOS 6.21, Windows for Workgroups 3.11, Windows Sound System 2.0, Indeo Video, and MS Video for Windows Run Time

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75MHz Pentium

10.4" Active Matrix Color Display



T4900

NEC

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- ▲ Removable hard drive, floppy & screen
- ▲ Integrated speaker and microphone
- ▲ MS-DOS, Windows 3.1, Windows Sound System, MS Video for Windows Run Time

Processor	Screen	Hard Drive	Price
486DX4/75	9.5" Dual Scan	340MB	\$3219
486DX4/75	9.5" Active	540MB	4199
486DX4/75	9.5" High Res.	540MB	4589
486DX4/100	9.5" Active	810MB	5049
Pentium 75	9.5" Active	540MB	5099
Pentium 75	9.5" Active	810MB	5599

Business Lease: \$106/mo.



Versa M

Versa S

- ▲ Upgradable hard drive
- ▲ SurePoint integrated pointing device
- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ Only 4.7 lbs.

Processor	Screen	Hard Drive	Price
486SX/33	9.5" Active	210MB	\$2179
486DX2/50	9.5" Active	260MB	2369
486DX2/50	9.5" Active	350MB	2549

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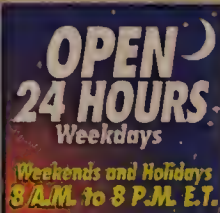
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-Joe Plouffe, C.P.A.

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- User defined numbering of accounts with up to 15 alphanumerics.
- Allows multiple departments.
- Allows transaction posting to prior or future financial periods.
- Standard G/L financials provided.
- G/L Report Writer with which user can design up to 250 financial reports per company.
- Allows recurring journal entries.
- Allows multi-company ledgers with or without consolidation.

ACCOUNTS RECEIVABLE

- Allows open item or balance forward accounting.
- Allows recurring transactions.
- Prints user-defined or plain paper statements.
- Handles cash receipts or partial payments.
- Ages receivables with user-defined periods.
- Prints mailing labels, 1 to 4 across
- Payments can apply to up to 250 invoices.
- Provides aged reports by payment date.
- Customer file show: credit limit, collection status, finance charge, YTD charges and YTD payments.
- Reports can be sorted by: customer number, customer name, customer type, zip code, salesperson code or biller code.

ACCOUNTS PAYABLE

- Prints checks.
- Calculates early payment discounts.
- Ability to distribute to 250 G/L expense accounts per invoice.
- Cash flow analysis/forecast.
- Allows entry of prepaid invoices to be expended later.
- Prepares check register of all payment transactions.
- Accounts for prepaid expenses (i.e. insurance).
- Allows immediate checks (hand-written or printed).
- Provides aged reports by payment date.
- Prints 1099's miscellaneous.
- Checks for duplicate transactions.
- User can define up to nine check formats.

ORDER ENTRY

- Allows adding stock items and customers on the fly.
- Allows real-time update of inventory.
- Invoice for sales and/or service (allows billing for non-stock, special order items).

- Complete detail sales reports with user-defined sorts.
- Hold order feature (quotes on unfilled orders).
- Allows customer credit limits and alerts to exceeded limits.
- Allows for cost of non-inventory and special orders.
- User-defined tax sales rates.
- Produces back-order report by customer.
- Displays customer balance during invoicing.
- Allows recurring invoices.
- Allows price-level lookup during invoicing.
- Over 15 order Entry reports (sales analysis, history, etc.).

PURCHASE ORDER

- Add vendors and inventory on the fly.
- Generates purchase orders from understock inventory items.
- Tracks multiple vendors for each stock item.
- Lists economical order quantity.
- Allows reprinting of purchase order.
- User-defined purchase order formats.
- Tracks promised date vs. actual date; quoted cost vs. actual cost.

PAYROLL

- Calculates taxes.
- Allows user to update federal, state and local tax tables.
- Allows for 18 pay rates per employee.
- Prints W-2's, 941 and quarterly reports.
- Submit W-2 on disk or magnetic media.
- Allows per-diem pay, contract, piece work, hourly and salary.
- Multi-company payrolls.
- Prints checks.
- Allows "after the fact" payroll.
- Allows benefits and deductions on fixed amount, unit amounts, percentage of gross or variable amount.
- Allows 22 user-defined benefits and deductions per employee.
- Allows 401, cafeteria plans.
- Supports any user-defined pay periods from 1 to 52, including daily.
- Over 22 payroll reports.

CHECK RECONCILIATION

- Single or multiple bank accounts.
- Prints user-defined checks.
- Sort by voided, stop-payment, deposit sources.
- Allows recurring transactions.
- Allows reconciliation either from checkbook or bank statement.
- Retains check register for 100 years.
- Sorts checks by number, date, payee, vendor or employees.

INVENTORY

- Minimum/maximum quality levels (reorder points).
- Lookup by number or description.
- Allows quantity decimal precision up to four places.
- Supports up to 5 quantity price/break price/levels on each item.
- Provides bill of materials processing (kits and manufacturing).
- Provides purchase and sell conversions.
- Prints user-defined inventory labels.
- Supports LIFO, FIFO, weighted average, or standard costing with standard inventory reports.

LYNX (ASCII File Converter)

- Allows importing and exporting data files (file formats provided.)

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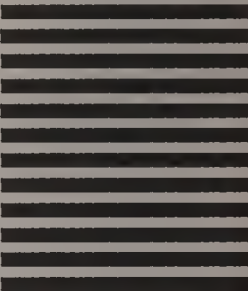
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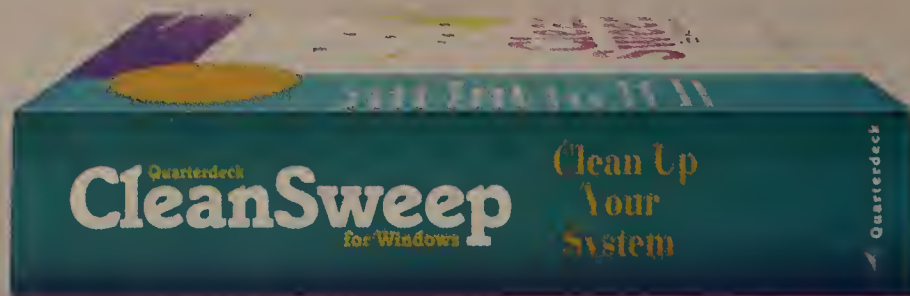
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To Boldly Go to the Cities Below

A few years ago two senior staffers in the *Star Trek* art department, Rick Sternbach and Michael Okuda, wrote *Star Trek: The Next Generation Technical Manual*, a best-selling guidebook to the starship Enterprise. They included everything from technical matters like the Bussard ramscoop and warp field theory to essays on Lieutenant Worf's *d'k tahg* knife.

Now a Windows-based CD-ROM, *Star Trek: The Next Generation Interactive Technical Manual* combines the book's textual detail with interactive digital movies, animated diagrams, walk-throughs, flybys, and episode clips. It also includes a guided tour by Commander William Riker (narrated by actor Jonathan Frakes), fascinating production comments by Executive Producer Rick Berman, and an introduction by the late Gene Roddenberry, *Star Trek*'s creator. You even get to peek behind the scenes: Did you know, for example, that one of the patient status indicators in sick bay is labeled 'Medical Insurance Remaining'?

Some of the coolest things about the digital manual are the sound effects. As you explore, you're accompanied by a series of familiar chirps, warbles, and beeps—not to mention the voice of Majel Barrett (Roddenberry's surviving spouse) as the ship's computer.

The Cardassians would love to get their hands on this stuff.

Until the Real Thing Comes Along

For months now, serious *Next Generation* Trekkers (like your humble columnist) have been anticipating Spectrum HoloByte's release of *A Final Unity*, its interactive game based on *Star Trek: The Next Generation*. The game is still in final development as we

go to press, but a DOS-based demo disc has appeared in stores.

The demo has two modes—rotoscoped, computer-generated images of the crew for small-screen close-ups, and comic-book-style drawings for full-screen shots. There are also spectacular renderings of planetside vistas, deep-space combat sequences, and convincing sound-track performances by all the video actors.

However, the demo disc shows signs of being a rush release: In at least one dialog sequence, nobody's lips moved; and before I could get the sound working I had to hack into my CONFIG.SYS to reset the DMA channel. While the demo is cheap and not without its charms, I'd recommend waiting for the real game.

Rules of the Games

SportsWorks: The Inside Guide is a DOS-based reference package with the rules for more than 120 sports—everything from rapid-fire pistol competition to softball to drag racing. SportsWorks covers a lot of ground, but in a world of flashy multimedia apps it seems a bit like a bush leaguer.

Still, I put it to the acid test: Cricket. I've never understood this complicated game, but many of my pals adore it so I need some idea of how it's played. After 30 seconds of mousing, I had the basic rules of play, and a few minutes of reading put me in the know.

However, I ran into a couple of serious flaws. For one thing, text appears in a small box; since there's no way to enlarge the window, you end up doing a line-by-line scroll. And SportsWorks

suffers from a surprising lack of diagrams. Obviously, complete graphical coverage of some 120 sports would require a CD-ROM. But that's probably what this five-floppy program needs.

Tearing Up the Pea Patch

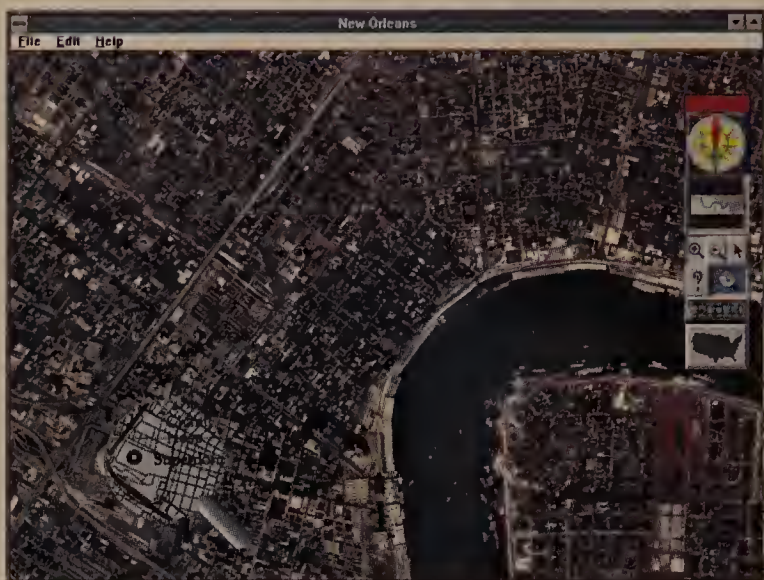
Football fans who have a taste for history (and a CD-ROM drive) will go wild for NFL's Greatest Plays, a Windows-based package from Turner Interactive. It starts with the first nationally broadcast football game (Bears versus Redskins, 1940, featuring announcer Red Barber's famous "pea patch" quote) and goes through the 40-yard touchdown pass that decided the 1993 contest between the Packers and the Lions. This beautifully designed interactive disc lets you view the action from several angles, and in forward or reverse motion; the package even includes terrific animated diagrams.

Each play is fully annotated, so you can call up information on every player as well as see an analysis of what hap-



The next time your Bussard ramscoop malfunctions, you'll find this entry in *Star Trek: The Next Generation Interactive Technical Manual* extremely handy.

By Michael Goodwin



EVER WONDER HOW NEW ORLEANS got nicknamed Bend City? This aerial view from *The Cities Below* makes it clear.

pened. For instance, you can rerun Franco Harris's famous "Immaculate Reception" catch and touchdown romp from the 1972 game between the Steelers and the Raiders—and spot the moment when the ball dropped into his waiting hands. The technical stuff is flawless: Videos run smoothly in a quarter-screen window, the sound is great, and installation is painless.

and 40,000 feet, these infrared images show more detail than you might expect—but less than you want. A Looking Glass feature reveals a calibrated map with place names and street information "behind" the aerial images.

While the city maps are great, to reach its full potential this package needs to extend coverage to the entire country. And then

Tomorrow's Atlas Today

A few months back, I wondered when we'd see an atlas based on satellite photography. Small Blue Planet: The Cities Below—The Aerial Atlas of America, a Windows-based CD-ROM, is a step in this direction.

The Cities Below is a gallery of 180 images culled from the U.S. Geological Survey's National High Altitude Photography program. Shot from planes cruising at 20,000

the world. It also would be nice if the images delivered slightly higher detail. I have little doubt, though, that this is what atlases of the future will look like.

- **NFL's Greatest Plays** \$30; Turner Interactive; 800/294-0022
Reader service no. 754
- **Small Blue Planet: The Cities Below—The Aerial Atlas of America** \$49.95; Now What Software; 800/322-1954
Reader service no. 755
- **SportsWorks: The Inside Guide** \$49.95; SoftKey Int'l; 800/227-5609
Reader service no. 756
- **Star Trek: The Next Generation, A Final Unity** \$4 to \$5 (demo disk); Spectrum HoloByte; 800/695-4263
Reader service no. 757
- **Star Trek: The Next Generation Interactive Technical Manual** \$69.95; Simon & Schuster Interactive; 800/223-2336
Reader service no. 758

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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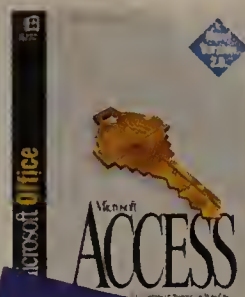
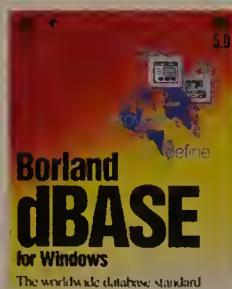
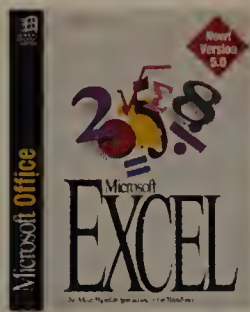
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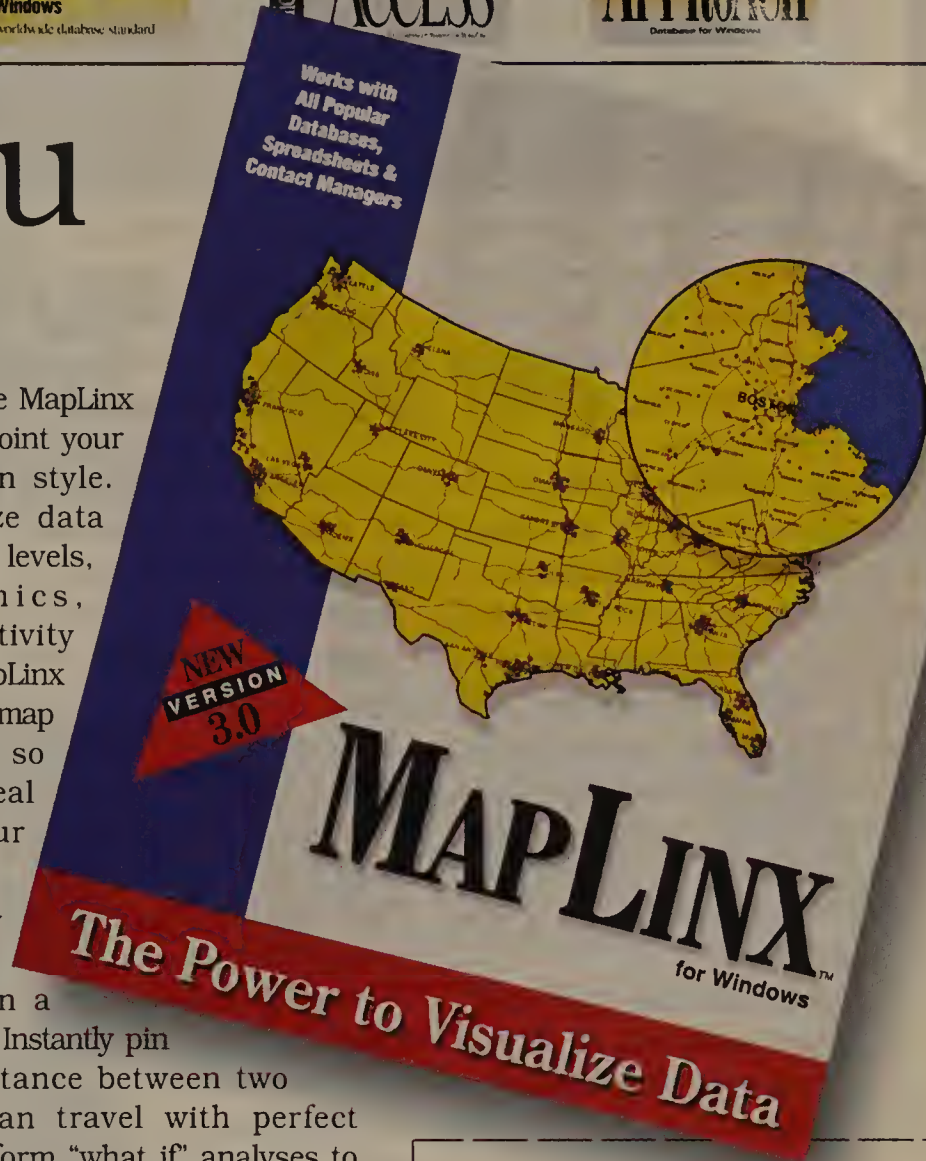
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Ancient Secrets of the Fonts

In the fifteenth century, Nostradamus predicted, "They will materialize, multiply, and gum up the works." I think he was talking about my fonts. When I first installed Windows, I had only about a dozen TrueType fonts to choose from. Then vast herds appeared mysteriously, as if summoned from the netherworld. At last count, I had over 300 TrueType fonts haunting my system.

Excessive fonts slow me down. The more I have installed, the longer Windows takes to load. And, no surprise, every font that's installed grabs another chunk of my precious Windows resources. (Uninstalled fonts are more benign—they just waste hard disk space.) What's more, I spend way too much time futzing around with fonts, trying to go for that certain something in my documents. My wife kindly calls it creativity; others accuse me of writing ransom notes.

Most fonts arrived on my system—without my permission—from new programs I've installed. The most notorious offenders are desktop publishing and design applications, and a few multimedia programs. Some fonts I actually added on purpose myself.

Making the Move

As things got out of hand, I figured I needed a free and easy way to catch new fonts as they snuck onto my system. I could identify the TrueType fonts by their TTF extension in Windows' File Manager. A font maven at my user group suggested that I move all the fonts to a dedicated fonts directory. Because most applications install their fonts in \WINDOWS\SYSTEM, any TTF files you find there after you move your existing ones are uninvited newcomers.

By Steve Bass

Moving fonts is pretty simple. Create a new directory called \WINDOWS\FONTS. Then launch Control Panel from Program Manager's Main window, and double-click the *Fonts* icon. In the resulting dialog box, click the top font on the list, then press <Ctrl>-<Shift>-<End> to select them all. Since you only want to uninstall TrueType fonts, scroll through the list while holding down <Ctrl>, clicking to deselect the fonts that do *not* have the label '(TrueType)' next to them. Be careful not to click a font while you're not holding down <Ctrl>; you'll deselect all of them. Once you have just the TrueType fonts selected, click *Remove* and make sure the 'Delete Font File From Disk?' box is *not* checked. Click *Yes to All* and Windows uninstalls the fonts.

From File Manager, move every file that has a TTF extension from the \WINDOWS\SYSTEM directory to \WINDOWS\FONTS. Then, back in Control Panel's Font Installer, click *Add*, tell the program where the new font directory is, and wait for your alphabetized list of TrueType fonts. Make sure the 'Copy Fonts to Windows Directory' option is *not* marked.

Okay, now take a deep breath, because it's time to make some decisions. Take a look at your fonts and decide which you want to keep installed for everyday use, which you want handy for a rainy day, and which should go to the great foundry in the sky. The only way to actually *see* a font is to install it first, so you may want to install everything, then go through them and make your choices. Remember, when you remove an installed font, the 'Delete Font From Disk' option controls how serious a removal it is.



Getting It Together

If you're willing to spend a few bucks, some programs take the pain out of previewing, installing, uninstalling, and deleting fonts. I use Ares's FontMinder, which gives me an added font management edge: I can organize my fonts into groups, loading only those I'll use for a specific session. For instance, I've got a group of great-looking fonts for my monthly user group newsletter, and another group of bizarre ones for responding to the Internal Revenue Service.

Nostradamus was sure right about my fonts. If only he said something to help me with my creativity.

- **FontMinder** list price \$79; Ares Software Corp.; 800/783-2737, 415/578-9090
Reader service no. 752
- **Font Control** registration fee \$25; Leaping Lizards; stevefox@c2.hinet.net (Internet), 886-2-759-1035 (fax, Taipei)
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Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online. See page 12 for more information.

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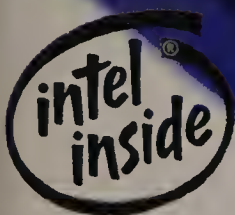
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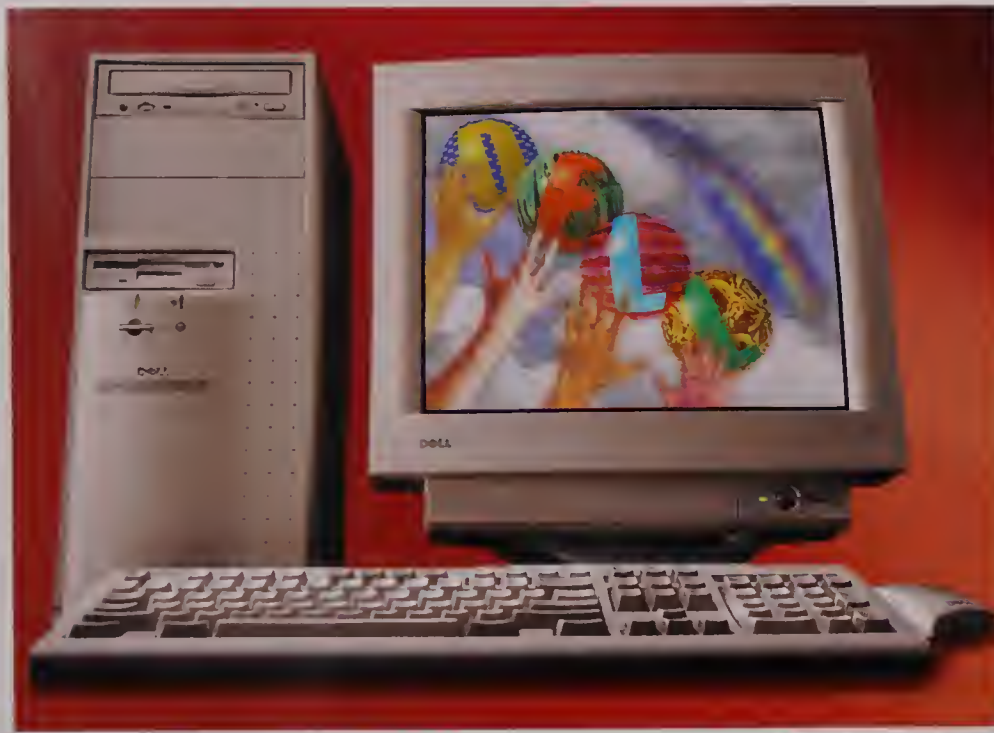
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