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WINDOWS 3.1
TROUBLESHOOTING TIPS

PC WORLD

September 1994

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224

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BUYS FOR HOME OFFICES**

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**THEY SHARE.
THEY COMPLEMENT
EACH OTHER.
THEY GIVE AND TAKE.**



IN THE MICROSOFT OFFICE, S JUST COHABIT, THEY FORM N

You might say we simply borrowed the idea from nature. Programs that live in the same place should work together.

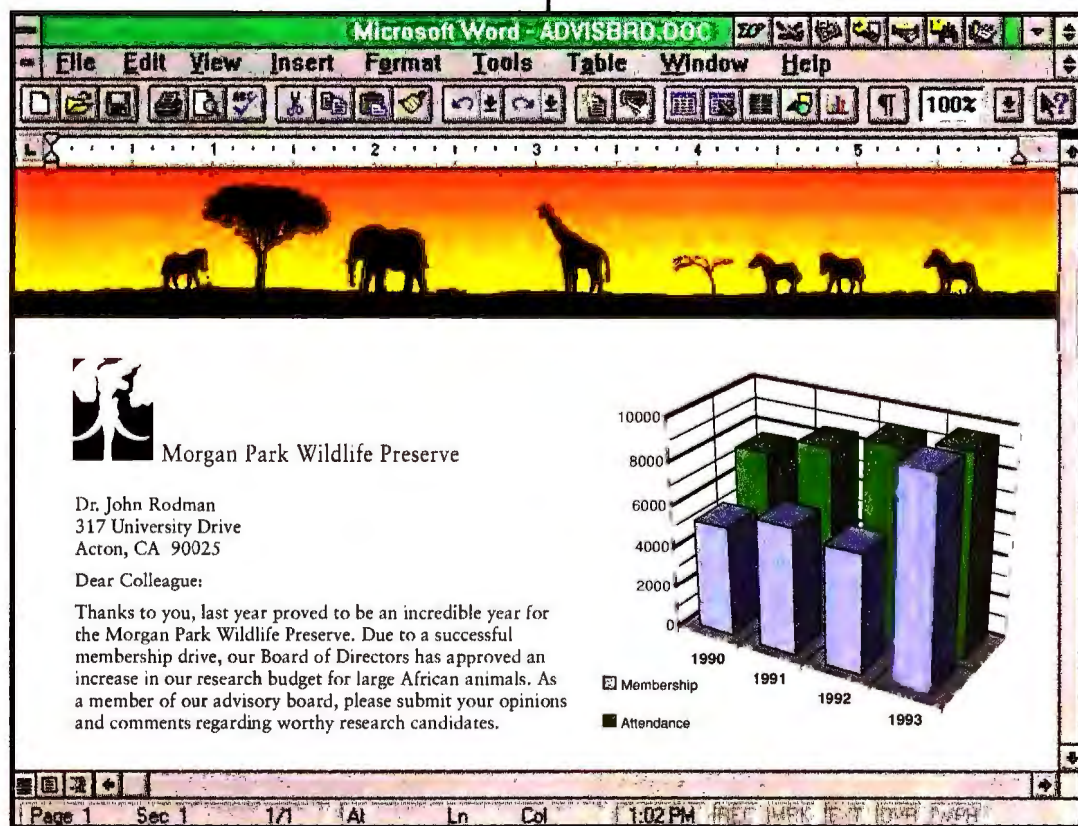
Consider what you have to do in a single week. Letters. Memos. Reports. Spreadsheets. Charts. Graphs. Presentations. Wouldn't it be great if there were a product that could help you pull it all together?

In a nutshell, that's the idea behind the Microsoft® Office.

Now all your programs can work together like one. Thanks



Now it's simple to combine information from different programs. So you can spice up a flyer with, say, a Microsoft Excel chart.



It's easy to update or manage text, data and graphics in one document with the latest object linking and embedding technology (OLE 2.0). Just click where you need to work and the tools you need are right there.

to our intuitive OfficeLinks tools, you can now share text, data and graphics seamlessly between our best-selling programs.

What's this really mean?

Simply, you'll be able to get more done. With a lot less effort.

Say you're working on a sales report. You'll probably start by writing in Microsoft Word.

Then you click to open your Microsoft Access® database and call up your sales data. By region. By salesperson. By month. By client. By vendor.

But why stop there?

You can easily send that data to a Microsoft Excel spreadsheet in just a click of a button, analyze it, turn it into a dramatic

SOFTWARE PROGRAMS DON'T MEANINGFUL RELATIONSHIPS.

chart, and drop it all back into your Word document.

It's like one big technological swap fest. The end benefit being, you can concentrate on your work, instead of your software.

Naturally, you'll want to share your handiwork with the regional managers. Just a couple of clicks later, you've created personalized letters for each one of them from within Microsoft Word. Brilliant.

One final touch. Click a

presentation. Call it a "career-enhancing" move.

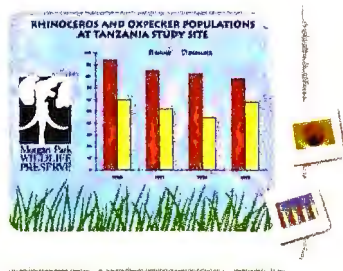
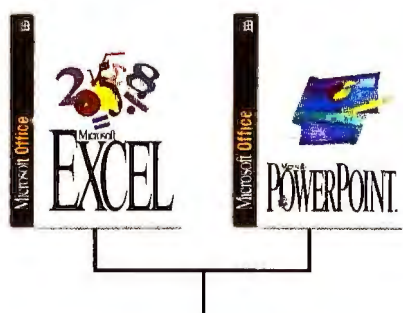
And while we're on the subject of relationships, we should mention the Microsoft Office is the only product of its kind that has unlimited product support with no service charge.*

Clearly, Microsoft Office with OfficeLinks marks a quantum shift in what software enables you to achieve. And it's a clear indication of where the future is heading.

To find out the rest of the story (a small sample of which we've covered here), visit your retailer or call (800) 894-6642, Dept. VAC, for your Office Information Kit.

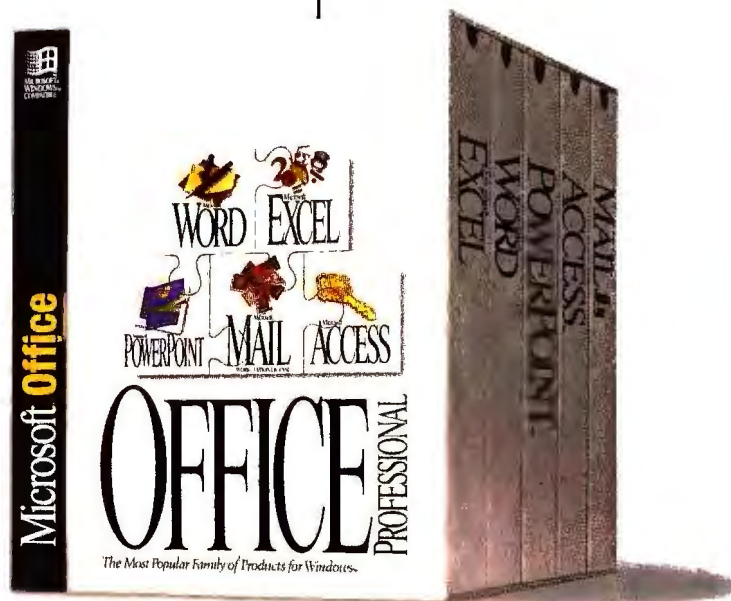
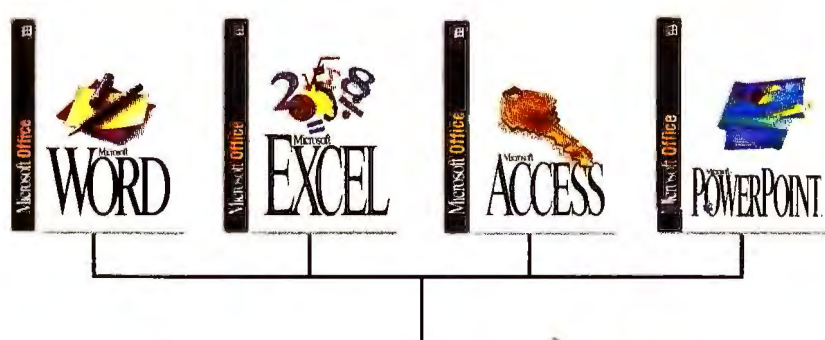
With the Microsoft Office, you'll not only improve the relationship between your programs, the same will go for you and your computer.

Microsoft Office



Create powerful presentations easily with information from different programs. Suddenly, you're a whiz presenter.

button and transform everything into an eye-popping PowerPoint®



Buying a system? Sure, you want price and performance. Support? Too often it's an afterthought.

Problem is, too many direct-order companies treat support the same way. They make the sale, then disappear.

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It's for reasons like these that *InfoWorld* (4/25/94) says, "AMBRA has been able to offer good support and customer service as well as good prices."

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- ▲ XXCAL Gold Certification Program.



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PC World named our 66MHz Blue Lightning a "Best Buy." Guess that makes our 100MHz an even *better* best buy.

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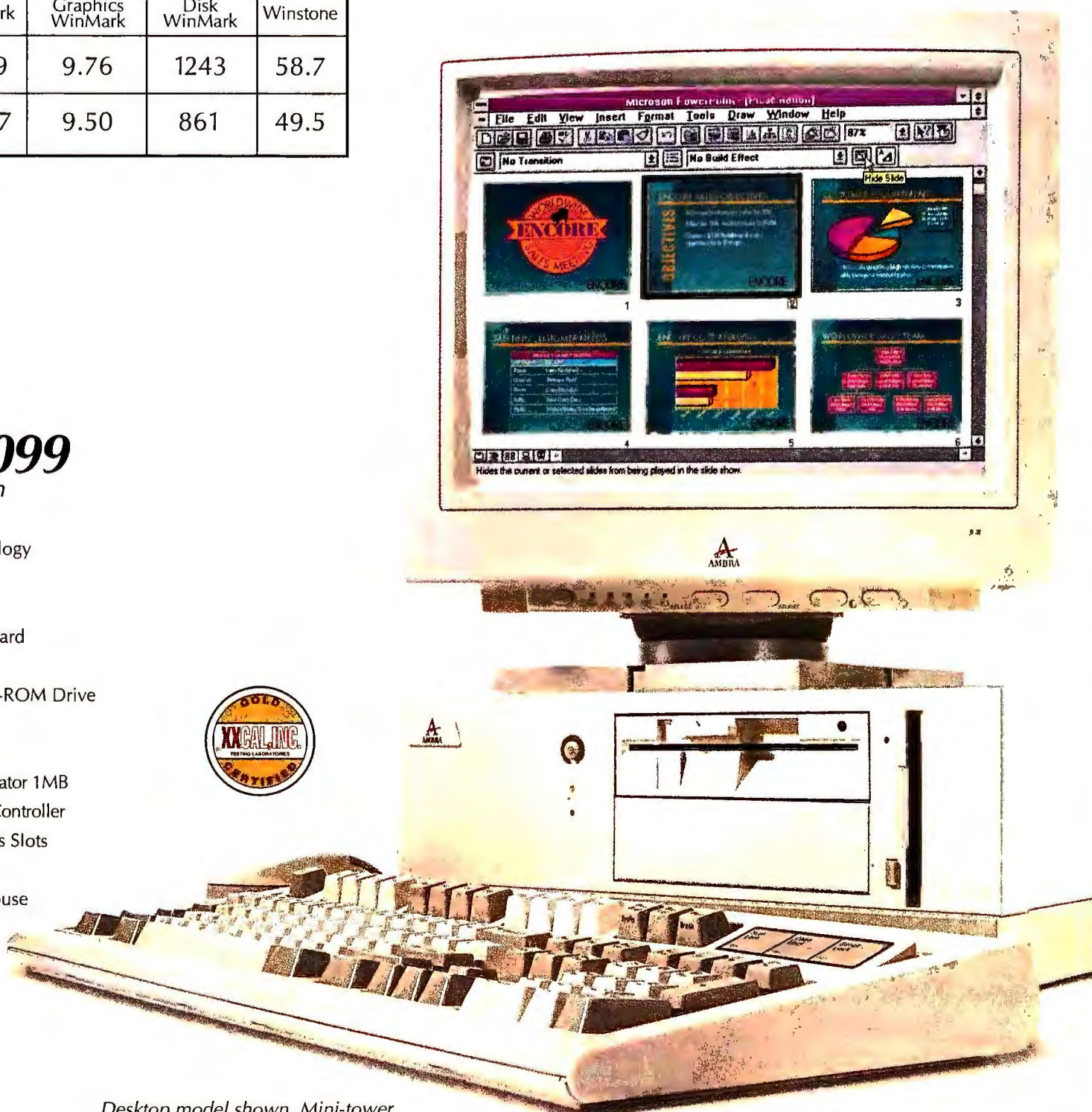
A BOLT FROM THE BLUE.

Winbench 4.0

	DOSmark	Graphics WinMark	Disk WinMark	Winstone
Blue Lightning 100MHz ¹	719.9	9.76	1243	58.7
486DX2/66 Average ²	592.7	9.50	861	49.5

D4100BL NOW \$2099
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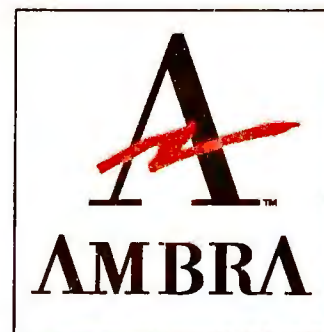
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Desktop model shown. Mini-tower and other configurations also available.

1 800-200-3389

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PC WORLD



Cover Story

132 Top 20 PCs: Beyond the CPU

You can't judge a PC by its processor. This month, DX4-100s battle Pentiums and 486-66s take on DX4-100s. To find the best values, we tested and rated them all. The champs: Dell's Dimension XPS 90, Diamond's DT 486-66, AT&T's Globalyst 200, and IBM's ThinkPad 500. Plus, complete rankings of 224 PCs, from SX-25s to Pentium-90s.

Special Report: Small Office/Home Office

230 The Savvy Shopper

Where's the best place to buy a new PC? Our undercover shopper explored the warehouses and malls of America. Here's his advice.

239 Top Picks for the Home Office

These are a few of our favorite things.

243 Great Communicators

Business phone strategies that will keep customers from hanging up.

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

Graphics

172 Speed Demons: Top Windows Accelerators

Whether it's to put some zip into Windows or power up for heavy graphics or multimedia work, a new generation of accelerators gives your PC the assist it needs. We tested 33 graphics boards and named Best Buys for mainstream as well as multimedia applications.

Fax-Modems

190 The Right Connections

We tested 23 fax-modems to find the best for combining fast online communications with automated fax transmission. From high-speed Internet surfing to paperless faxing, our Best Buys will hook you up just right for under \$150.

Investing

206 15 Ways to Leave Your Broker

When your full-service broker talks, do you still listen? PC software and online services are now available for investors, from bewildered beginners to experienced mutual-fund hobbyists. We bring you advice from the experts and review leading software and services.

Top of the News

58 The Cyrix Advantage: A Better DX2-66

More powerful than a DX2-50, cheaper than a DX4-75—Epson's notebook, the first to use Cyrix's Cx486DX2-V66, is the lightest 66-MHz mobile PC we've ever tested.

61 Close-Up Telecommuting

Norton-Lambert's \$199 Close-Up 6.0 synchronizes directories to make remote computing easy for telecommuters.

62 How to Make Your PC Listen

Talk to your PC and watch it respond. Kurzweil 1.0 for Windows is a cost-effective voice recognition keyboard replacement.

64 Making the Best of Peer Connections

Peer-to-peer nets give you the advantages of LANs without the hassle. Here's how to get connected and what to buy.



p. 172

Windows

219 Windows Detective: Solving the Mysteries of Error Messages

They appear out of nowhere, without reason, devouring documents and disrupting work. Error messages have terrorized anyone who's ever used a Windows PC. Here's a definitive guide to what those messages mean and what to do about them.

New Products

- 95** Ascentia 900N and 800N notebooks; Bravo MS, AST Premmia MX and GX desktop PCs
- 96** Epson Stylus Color and DECcolorwriter 520ic ink jet printers
- 98** Toshiba T3600CT, T2400CT, T2400CS, T1960CT, T1960CS notebooks
- 98** Dell Dimension XPS MT Pentium minitower

- 102** Select-Ease keyboard
- 102** ArtPad and Penmouse pen tablets
- 106** Photoshop 3.0, Micrografx Picture Publisher 5.0
- 107** Peachtree Accounting 3.0 for Windows
- 107** NoMouse 5.0 for Windows emulation software
- 108** Borland Sidekick 1.0 for Windows personal information manager

- 108** Lotus Forms 1.0 for Windows
- 117** SelectPhone CD ROM
- 117** CompuServeCD
- 120** GroupWise 4.1 electronic mail and groupware
- 120** Eclipse Fax 6.0
- 121** CaLANdar 3.0 group scheduler
- 121** Coactive Connector 2.0 cross-platform system
- 122** Quick Takes

Networking

- 72** **Manage Your Group's Documents**
PC Docs and SoftSolutions give your group control over critical documents.
- 76** **Struggling to Make Work Flow Work**
This Notes-based work-flow system offers a major payoff—but not without a major struggle.

Reliability and Service

- 170** **Win a Pentium-66 PC**
How satisfied are you with your PC? Whether it's trouble-plagued or trouble-free, tell us about it. Fill out and fax in this month's survey for a chance to win a Zeos Pantera 66, a Best Buy PC from September's Top 20 charts.



p. 190

Here's How



- 254** Help Line
- 258** Spreadsheets
- 262** Word Processing
- 266** Windows
- 274** Data Management
- 278** Publishing & Presentations
- 280** Communications
- 282** Hardware
- 286** Star-Dot-Star

Departments

- 15** In This Issue
- 19** Letters
- 30** Consumer Watch
- 43** Real Problems, Real Solutions
- 51** Inside Source
- 321** Break Time
- 324** Home Office

Resources

- 10** How to Contact PC World
- 288** PC World Catalog
- 299** Mail-Order Shopping Guide
- 317** Advertiser Index
- 319** Editorial Product Index
- 322** Coming Up



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■ *Computer Shopper* "top choice" (April & August 1994)

■ *PC/Computing* BEST (May 1994)

■ *PC World* Best Buy (June 1994)

■ *Windows Sources* Experts' Pick (June & August 1994)

These prestigious awards all add up to one thing—ZEOS computers are your #1 choice.

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

POWER BEYOND POWER

"At the top is the new ZEOS Pantera-66, a Pentium-66 that recorded the fastest benchmark results ever to come out of the PC World Test Center," reported *PC World*.

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

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

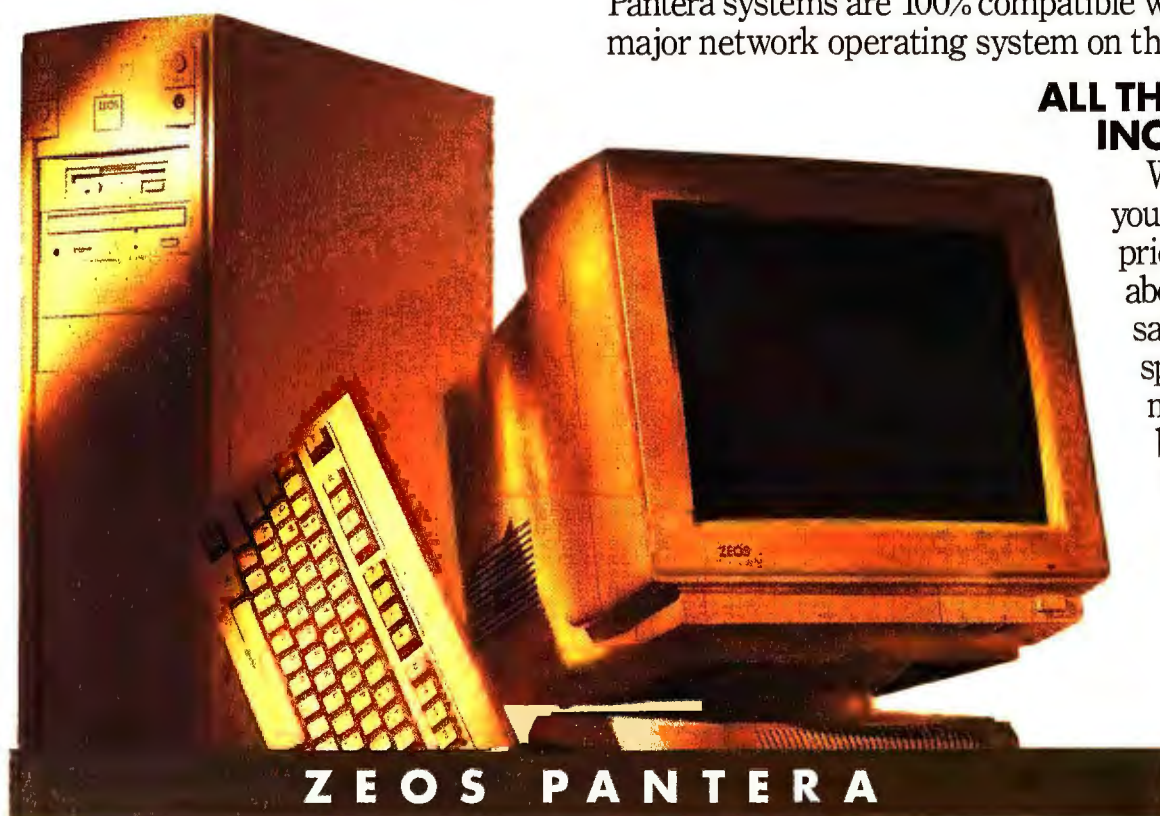
What makes the Pantera fly at supersonic speeds? A ZEOS designed motherboard with exceptional features such as a hot new integrated PCI Local Bus IDE Controller

(supporting up to four IDE devices) that, as *PC Magazine* said, "pushes disk access into new territory."

PENTIUM & 486 PANTERAS

Even better, we now incorporate the latest award-winning Pantera technology (including PCI) to our 486 PCs. The expanded Pantera line includes more processors—from a 486SX-25 to a DX4-100 all the way to a Pentium-90! The best news: The Pantera DX4-100 also earned *PC Magazine*'s Editors' Choice (June 28, 1994).

These new, improved and even more affordable systems feature local bus IDE hard drives from 214MB to 1GB; memory from 4MB to 24MB; a new 64-bit video controller; 3 PCI slots (one contains our PCI local bus video card) in addition to 5 ISA slots; and on-board Fast SCSI-2 option. And all Pantera systems are 100% compatible with every major network operating system on the market.



ALL THE EXTRAS INCLUDED

What's more, we give you all this at a marvelous price. There's no doubt about it. *PC/Computing* said: "We suggest you spend your money on this machine—it offers the best value of any system we tested."

Windows Sources agrees: "ZEOS Pantera offers the best performance for the price."

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service and support in the business. In fact, no company has won more *PC Magazine* Readers' Choice for Service & Reliability awards than ZEOS—six in all. And we were the first to provide 24-hour toll-free technical support—every day!

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Choice, Experts' Pick, BEST ZEOS® PC Now!

PROCESSORS	PACKAGE 1	PACKAGE 2	PACKAGE 3	PACKAGE 4
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Anita Amirrezvani, Steve Bass, TJ Byers,

George Campbell, David Coursey, Scott

Dunn, Bronwyn Fryer, Brett Glass, Michael

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71154,362)

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72520,2165)

Systems Operator Nancy H. Miller (PC World

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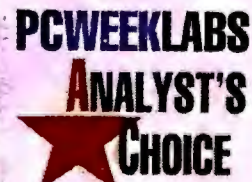
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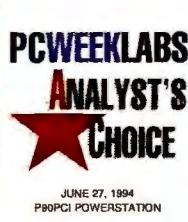
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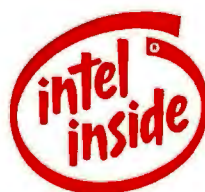


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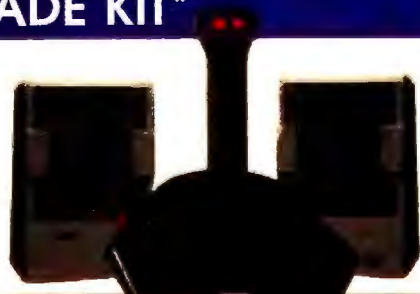
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A Skeptical Inquiry: 120-MHz Pentiums for \$5000?



industry promises of products to come.

During a visit to Intel's offices in Santa Clara, California, early this year, our skepticism kicked into high gear. Intel representatives told *PC World* editors that by the end of the year, PCs would double in performance with no increase in price. While no one disputes Moore's Law—the axiom that processor power doubles every 18 months—the notion of double the power with no price premium in just 12 months had the skeptics among us scoffing.

In dollars and sense, what did this mean? In our February Top 20 review, the top-ranked power desktop, IBM's ValuePoint Pentium-60, earned a performance rating of 80 and sold for about \$5000. For Intel's projection to hold true, we'd expect to see PCs with a performance rating of 160 for \$5000 or, conversely, a performance rating of 80 for around \$2500 in time for next February's Top 20 review.

That level of pure performance is still months away, but price/performance is fast approaching the level that Intel projected. Check this month's cover story, "Top 20 PCs: Beyond the CPU." Micron's DX4-100 earns a performance rating of 80 and sells for \$2599. Zeos's Pentium-90 earns a performance rating of 102 and sells for \$3595. Clearly, even before year's end, PC price/performance will double.

How Can You Go Wrong?

This leap in price/performance is likely to trigger a new round of capital expenditure requests in corporations across the country. But there's a catch. Look at

this month's Top 20 again. Austin's Pentium-66 outperforms two Pentium-90s we tested. NEC's DX4-100 outperforms six Pentium-60s and -66s. Ambra's 486DX2-66 outperforms two Pentium-60s. At one time a PC's processor gave buyers a rough but accurate guide to a system's price/performance, but that simple indicator no longer works. Performance levels and prices, too, are all over the map.

And it won't get easier: New notebook PCs using Cyrix's just-released 486DX2-V66 will try to compete in performance and price with notebooks based on Intel's DX4-75. Cyrix says it will ship new 80-MHz 486 chips soon; desktop PCs using this chip, the company says, will outperform PCs with Intel's 486DX2-66 and cost the same.

We expect DX4-100s to be scarce and pricey in upcoming months as companies push Pentium-60s and -66s. Intel will continue to slash prices on Pentium processors and introduce faster DX4s and DX2s that have write-back caches. NexGen should ship its Pentium-compatible CPU soon. The less skeptical among us expect to see user-installable Pentium upgrades by the end of the year. And all the while, Moore's Law continues to operate quietly in the background as Intel, IBM, Motorola, Apple, and Cyrix work on the P6 and P7, the PowerPC, the M1, and other next-generation CPUs.

Sorting Out the CPUs

What's a skeptical buyer to do when faced with competing claims about PC price/performance? Consult the *PC World* Top 20. In this month's Top 20 charts, we rank desktop and notebook PCs with no fewer than 16 different CPUs—from a 486SX-25 all the way to Pentium-90s—from chip makers Intel, IBM, and AMD. These Top 20 rankings factor in not only performance but

price, resulting in a clear, straightforward guide to value. And this month, as an aid to readers who anticipate buying a new PC this fall, we've supplemented the Top 20 charts with rankings of 224 desktop and notebook PCs—all the systems we've tested that are still on the market since we started the Top 20 charts last February. Consult these expanded rankings if you're considering a particular PC not listed on our Top 20 charts. Starting next month, we'll test an additional 10 systems per month, ranking about 400 PCs by the time next February's Top 20 rolls around.

Now Then, Where to Buy It?

Those fortunate—or unfortunate—enough to have an IS manager responsible for PC purchases are spared the dif-

Intel predicted that by the end of the year, PCs would double in performance with no increase in price. We scoffed.

ficult job of deciding where to buy their PCs. But if you own a small business or run a home office, that task falls to you.

This month, in "The Savvy Shopper," Contributing Editor Steve Bass offers his advice. Braving L.A. freeways and plaguing Southern California salespeople for weeks, Steve trudged up and down aisles at CompUSA, Micro Center, Circuit City, Office Depot, Price Club/Costco—even Montgomery Ward and Sears. He evaluated selection, availability, price, service and support options, and the technical know-how of store personnel. Whether you're in the market for a PC, dog food, or Reeboks, his guidance will help.

Cathryn Baskin, Editor



If you want a powerful database, you've got a tough decision. But if you want a powerful database you can actually use, it gets pretty easy.



What's the difference between apples and oranges? In this case, it's the difference between powerful features and powerful features you can actually use.

Introducing Lotus Approach Release 3.0.



In 1983, Lotus® introduced the world's first approachable spreadsheet. Now we introduce a truly powerful database that's as easy as 1-2-3®. So easy that *PC Computing*,



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Now you don't have to be a programmer, or even think like one, to build a relational database that brings real efficiency to your work. With the new Approach® 3.0, demanding functions like tracking sales, managing projects, taking orders, invoicing,

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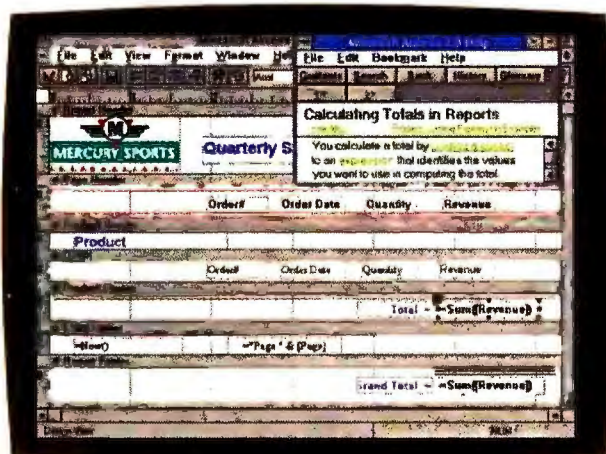
PowerKey™ technology
(for direct access
to existing data)

Lotus 1-2-3 Integration
(for working with 1-2-3)

Lotus Notes Integration
(for reporting on Notes data)

X10 speed architecture
(for blazing speed)

Dynamic crosstabs
(for drag and drop analysis)



Constructing a report in Access? "Easy"?



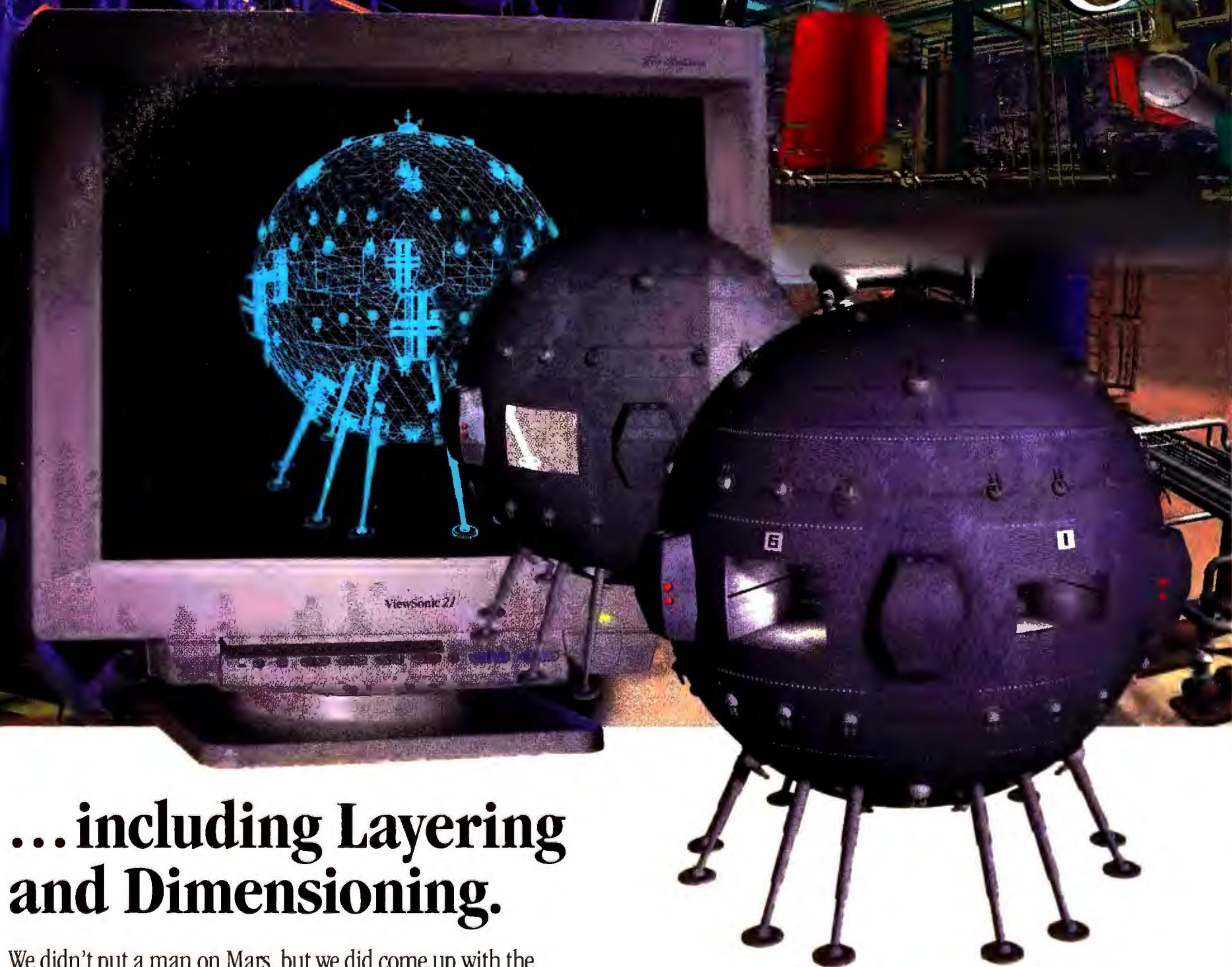
Constructing the same report in Approach. Easy.

late data. And, the friendly on-line Assistants help to design reports, forms, mailings, analyses and more. Compared to Microsoft Access®, well there's no comparison. As Infoworld recently commented, "Approach (3.0) looks like a better choice than Microsoft Access (2.0): easier to use, yet still fast and powerful."††

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Circle 224 on reader service card

Collision on the Information Superhighway

Remember the S&Ls

Joe Abernathy is the best political reporter in computer journalism today. That's a peculiar distinction but one *PC World* should be proud of. "Highway Robbery: Selling the Net" [May] is the sort of story about the information superhighway I wish I'd seen about the savings and loans before it was too late.

Remember that S&L deregulation was deemed too technical for people to understand or elected officials to take responsibility for. I'd like to think such a situation won't happen again, but it will unless people are well-informed. That is not the responsibility of *PC World* alone, but your efforts are, so far, singular. Good job!

John Robert Behrman, MCI Mail

A Palpable Hit

Joe Abernathy's timely and insightful piece about the Internet is a first-rate piece of investigative journalism. It should be required reading for all who will be affected by the flow of information in the future—that's nearly everyone. This kind of far-reaching news doesn't always appear in your pages, but you scored a major hit with this article.

I urge readers to voice their opinions about the direction that the information superhighway should take. They should contact their representatives in Washington, many of whom are not technically sophisticated and may be easily influenced by the massive lobbying effort on behalf of the telecommunications and entertainment giants.

Bill Pierce, Des Moines

Heritage Rebuts Report

Joe Abernathy undermines the credibility of his "investigative" report by parroting false allegations that he could have checked with a quick phone call.

According to one of Abernathy's sources—Jeffrey Chester, executive director of the Center for Media Education—industry not only is lobbying

Congress but has, in effect, purchased the support of several probusiness think tanks. Abernathy quotes Chester as saying, "The Heritage Foundation, the Manhattan Institute, the American Enterprise Institute, the Cato Institute, all have telecommunications projects trying to influence public policy...they're all funded by the telecommunications industry."

For the record: The Heritage Foundation has no such project. We perform no contract work. Of the more than 2000 policy papers and articles we've published in the past five years, only 3 had anything to do with telecommunications policy. Another is scheduled for publication this

year, but I'm told the author's recommendations are at odds with many of the demands made by industry. Of the 23 companies mentioned by name in that article—and the several regional Bells not mentioned by name—only one is a Heritage Foundation contributor, providing us last year with approximately 1/10 of 1 percent of our total income. We also received funding from a second company involved in telecommunications last year, an additional \$15,000 out of \$22.9 million in income.

If the rest of Abernathy's Nader-style diatribe is as accurate as the paragraph I take issue with, *PC World* owes its readers an apology.

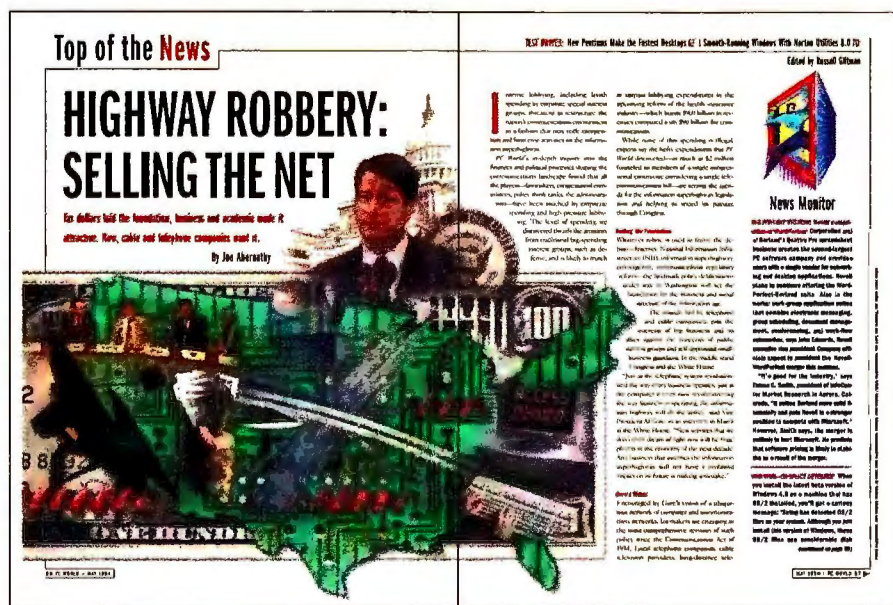
Herb Berkowitz, vice president,
The Heritage Foundation

Cato Disputes Claim

In "Highway Robbery: Selling the Net," Joe Abernathy claims that the "writing and publication" of *Telecompetition: The Free Market Road to the*

Information Highway by Lawrence Gasman was "funded by the telephone industry." That claim is false, and I'm amazed a reputable publication would print it without double-checking it.

I don't know how Abernathy came up with this notion. Perhaps he noticed that 1 of the 75 or so corporate and foundation sponsors of the Cato Insti-



tute listed in our annual report is the Ameritech Foundation. That's a slim reed on which to base the claim that a particular book was funded by the telephone industry. You might as well say it was funded by the American Farm Bureau Federation, the Coca-Cola Company, or the Golden Rule Insurance Company, all recent contributors also listed in the annual report.

The Cato Institute defends individual freedom, limited government, free markets, and civil liberties across a whole spectrum of issues. In the telecommunications field, that means letting the free market work and guaranteeing First Amendment protection for broadcasters and other communicators. If you find us taking money from a corporation and subsequently opposing free-market, voluntary solutions, then you'll have a story.

I not only support the capitalist system that makes innovation and technology possible, I admire the individuals

and companies who bring us new products and services. So if any company that provides goods and services to consumers wants to contribute to the Cato Institute's defense of free markets and civil liberties, we'll be happy to accept its support.

David D. Boaz, executive vice president, Cato Institute

Author's response: All the foundations criticized in Jeffrey Chester's quote were offered the opportunity to respond before

the article was published. The Heritage Foundation did not respond, and the Cato Institute did not respond substantively on questions regarding the sources of funding.

Moreover, having only a few direct contributions from the telecommunications industry does not mean that these foundations do not get considerable amounts of money from the industry or from individuals with substantial interests in it. The Heritage Foundation may not have many direct

corporate telecommunications backers, but its annual report indicates that major funders include the Scaise Family Foundation, the Bradley Foundation, and the Olin Foundation, all of which back media-related projects promoting laissez-faire government and antiregulatory policies. In addition, the foundation claims to have over 200,000 contributors, most of them individuals whose identity is concealed.

Similarly, only Ameritech can be identified as a direct corporate telecommunications backer of the Cato Institute. But the Cato Institute's annual report shows backing from the T. Rowe Price Associates Foundation. That Wall Street firm's New Media Fund, focusing on information superhighway development projects, lists "government regulation" as one of the risk factors of which investors should be aware.

Perhaps more important than corporate backers, however, are the hundreds of thousands of anonymous individuals who support these foundations. Because politicians are required to report individual contributions, I was able to identify how much each lawmaker accepted in contributions from known special interests. Rep. Ed Markey, for instance, doesn't accept "hard" donations from telecommunications interests, but he accepted \$61,000 in "soft money" from individuals associated with the telecommunications industry. Only if the Cato Institute and the Heritage Foundation agree to disclose the names of individual supporters and the amount they've donated will the full range of influences on their policy positions be known. So far, they have declined to do so. —*Joe Abernathy*

If It Looks Like a Bug and It Acts Like a Bug...

In "Bug Blamefest [*Letters*, May], Paul J. Mulcahy states, "This dinosaur—with 32 years of programming, systems analysis, and consulting experience—believes that unsophisticated users often expect too much from a software package," and implies that users often perceive bugs that don't exist.

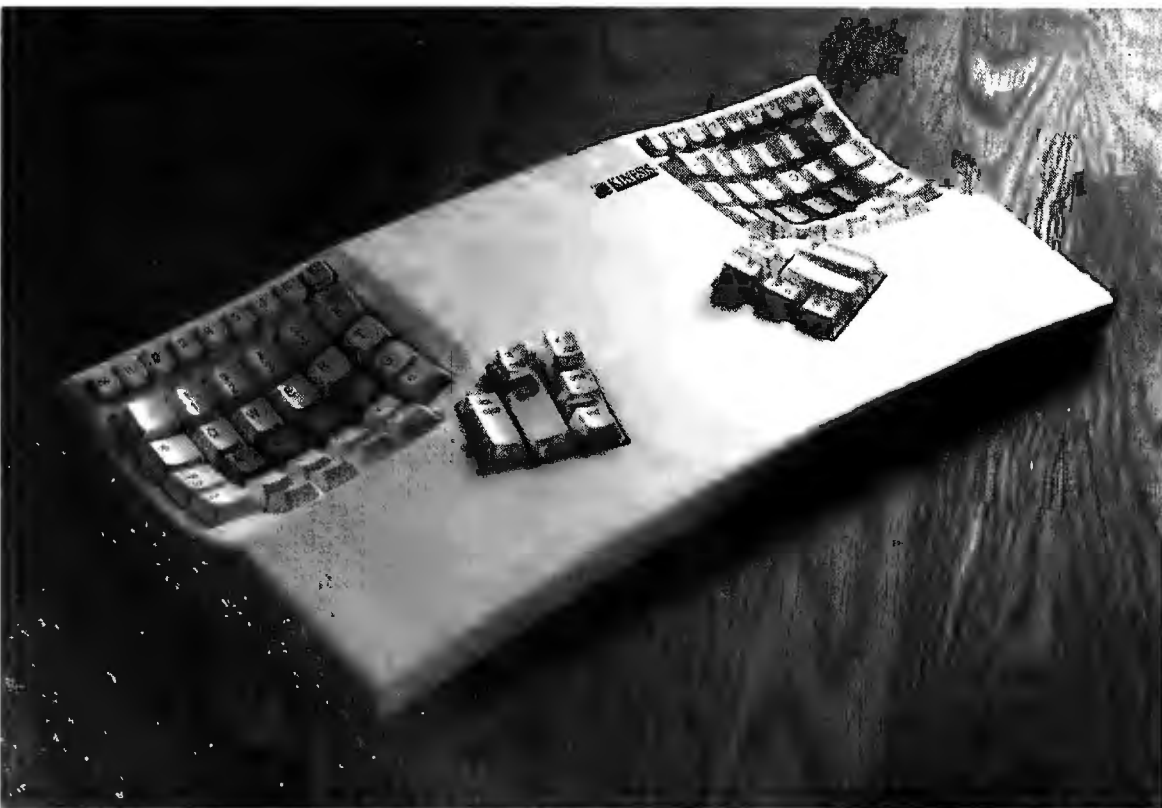
The real dinosaur in this case is the attitude that users should adapt themselves to the way the designers intended a program to behave. If an interface has elements that seem like bugs to a novice, then effectively they are bugs and should be reworked. In designing software, it is best to sacrifice originality for simplicity and directness.

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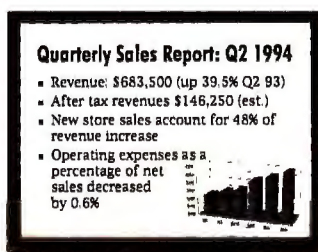
Font Works is an amazing collection of fonts and font utilities built neatly into a compact Windows application. On all the computers in your workgroup, it's guaranteed to eliminate formatting problems whether documents are received over the network, via

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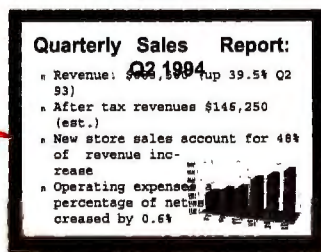
Font Work's PANOSE technology automatically creates screen and printer versions to match the fonts in question. Without messy viewers or bloated file sizes, documents print quickly and smoothly. Looking just the way they're supposed to.

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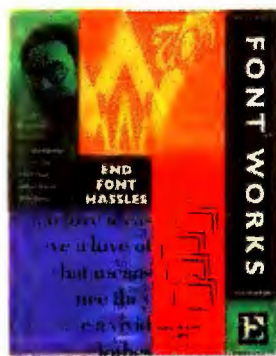


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EVERYTHING BUT
THE POPCORN.**

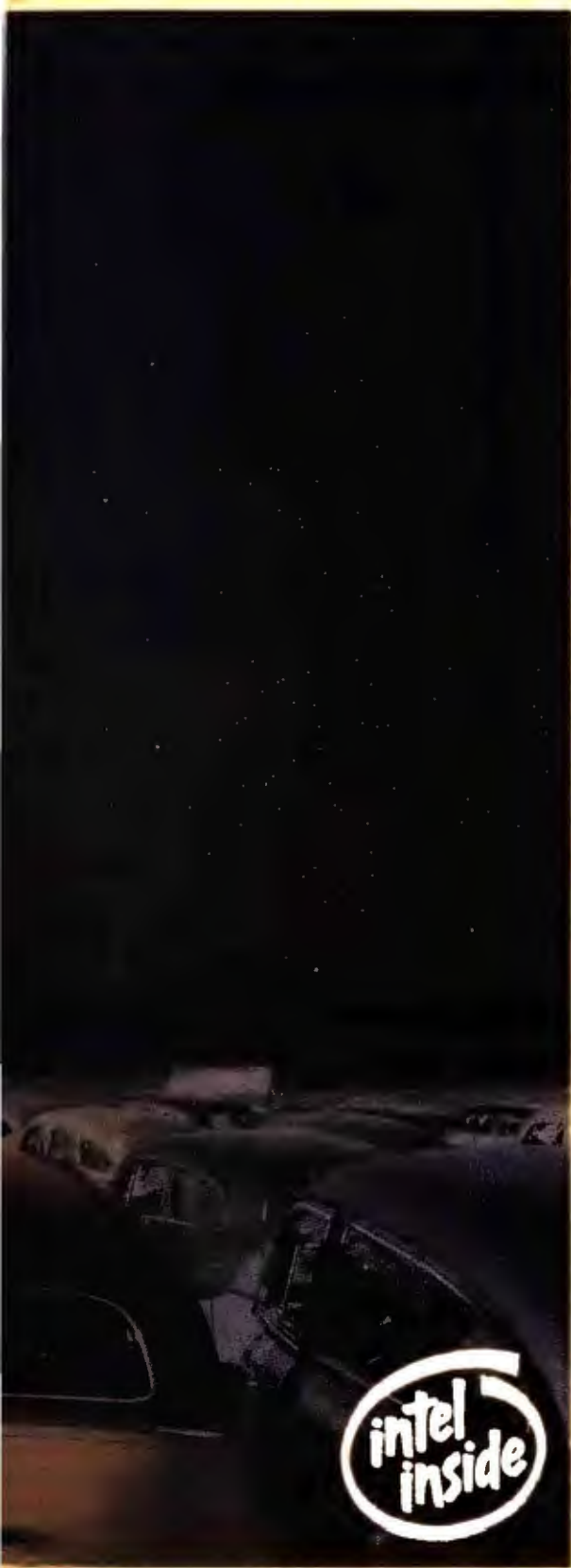


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processor, up to 75MHz. Local bus architecture combined with hardware accelerated graphics deliver as much as 16 million WinMarks.

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Battery Life	4-8hrs	3.1-8hrs	2.5-4hrs	2.5-4hrs
Pointing Device	Integrated Trackstick	Integrated Trackpoint	Integrated Trackball	External Trackball

Intel DX4/75MHz comparable products as of 6/13/94. Screen measured diagonally. Battery life from manufacturers' specifications.

900N than just an eye-popping screen. This is very much a high performance notebook, with a powerful Intel 486

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If developers—even the big names—foist buggy and confusing software on us, let's seek out new software.

Russell Belfer, MCI Mail

Double Crush on the Nerves

Regarding your news item "Keeping Up" [*Consumer Watch*, May]: Medical research since 1973 has indicated that carpal tunnel syndrome often results from a "double crush" on the nerves leading to the

hand. The nerves are pinched and injured where they exit the spinal column and again at the wrist in the carpal tunnel.

Research shows that if the pinching of nerves at the spinal column is not relieved, carpal tunnel won't be relieved by surgery or any other method. This is not chiropractic baloney; it's hard-and-fast medical research published in neurology journals.

The tendency of medical doctors to ignore this research is typical of their medi-

cine-and-surgery mindset. Not all chiropractors do such a hot job either; however, if any of your readers suffer from carpal tunnel syndrome, they should get their neck treated as well as their wrist.

*Jesse Jutkowitz, chiropractor
Washington, D.C.*

Tip Touch-Up

In reference to tip 14 in "50 Word Processing Tips" [May]: In WordPerfect 5.1 and 6.0 for DOS, you can save a keystroke when starting the block function by pressing <F12> instead of <Alt>-<F4>. To block to the end of the current line, just press <End>. WordPerfect 6.0 for DOS does not require the <Home><End> key sequence noted in your article.

Gerald W. Litynski, Crestview, Florida

Corrections and Clarifications

In April *New Products*, we reported that Hewlett-Packard's DeskJet 560C can print 600 by 300 dots per inch. We should have pointed out that it does so only in black and white. And although HP told us the 560C has an optional PostScript upgrade module, this option exists only for the DeskWriter 560C (for Macs).

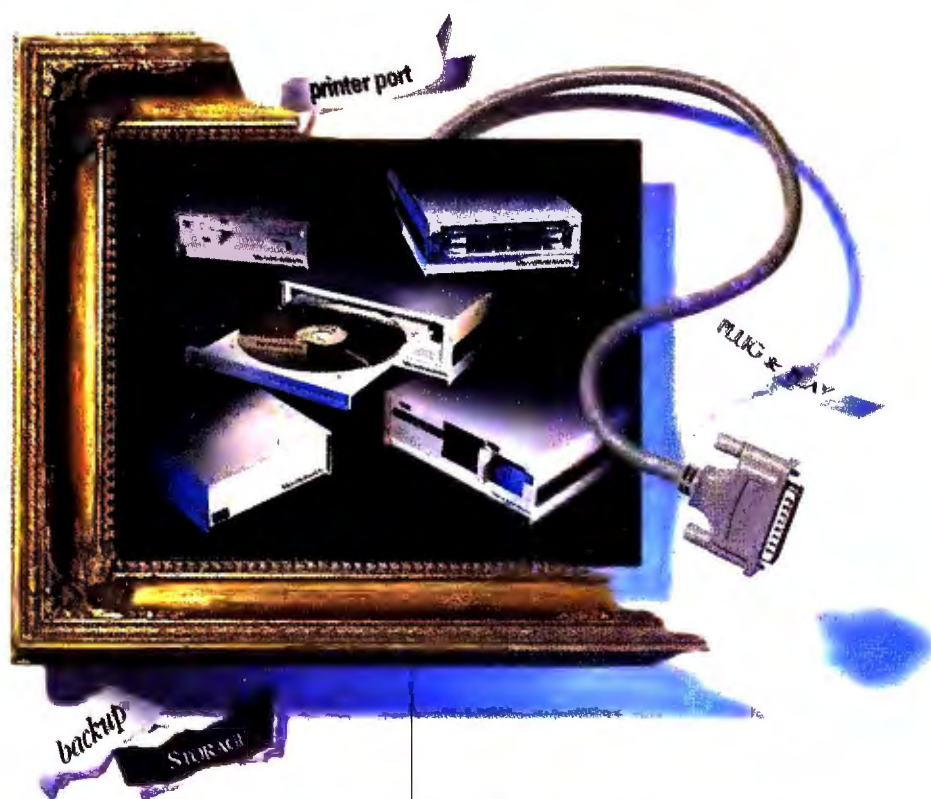
In tip 13 of May's "50 Word Processing Tips," the <F1>R keystroke doesn't work to paste a block in WordPerfect 6.0. In that version, use <Esc>R instead.

Due to an editing error, June's "Big Hard Drives: 300MB and Counting" misstated the number of drives that are supported by the Enhanced IDE standard. Under the new standard, the IDE interface supports four IDE devices if the system uses a dual channel IDE setup. (It will support more using multiple IDE connectors, but the dual channel setup is likely to be the most common.)

In July's "Best Products of 1994," we listed incorrect version numbers for two software packages. We should have listed Lotus Notes 3.0 as the winner of the Groupware category and Intuit's QuickBooks 2.0 for Windows as the winner of the Accounting category. We also gave the wrong phone number for Calera Recognition Systems. The correct number is 800/422-5372.

PC World regrets the errors.

Letters welcomes your responses and ideas (see page 10 for contact information).



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

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

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Company Name: The Camera Shop

Order

Order No	Date	Total Amount
2199	1-Jul-94	2,723.00
2286	12-Jul-94	1,235.23
2350	3-Aug-94	1,913.55

Status:
☒ In Stock
☐ Back Ordered
☐ Discontinued

Ship via: Two day
Ordered by: Telephone
PO No.: M1209

Camera

Qty	Unit Price	Total Price
2	1,195.00	2,390.00

Filters

Qty	Unit Price	Total Price
2	19.00	38.00

Video Camera

Qty	Unit Price	Total Price
1	1,565.00	1,565.00

Microsoft Word - FILTERS.DOC

File Edit View Table Record Properties Window Help

Andrew H. Broan
Executive Consolidated Enterprises
12345 East Seventeenth Street
Santa Ana, CA 92705

Dear Mr. Broan,

We appreciate your giving our valued customers an opportunity to test your new product. Furthermore, we are very pleased that you will drop ship the filters directly to our customers, thus saving us the shipping and handling.

Here are the names and addresses so that you can fulfill the orders.

CUSTOMER	Company Name	Address	City	Postal Code
1	The Camera Shop	6322 High Street	London, England	SW1 1NR
2	Visuals	38, rue du Temple	Paris, France	75004
3	Cavagnari & Co.		Sao Paulo, Brazil	13026

Thank you for your cooperation. We look forward to working with you in the future.

Sincerely,

WORLD OPTICS

Print Invoice
Upload Orders

▲ Paradox for Windows has superior integration with Perfect Office and Microsoft Office applications. Thanks to OLE 2.0, you can place a "live" Paradox table into a Microsoft Word or WordPerfect document and edit the data in place. (Access 2.0 cannot do that.)



February 1994



November 1993

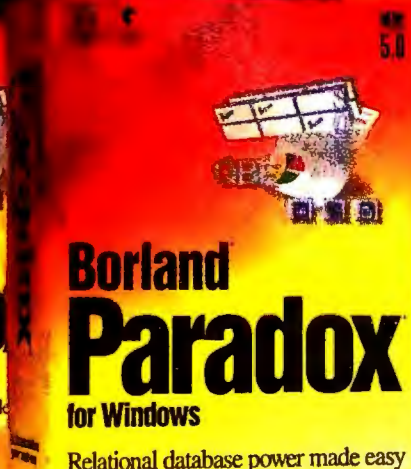


June 1994

◀ Paradox for Windows is the most award-winning Windows database on the market with over 20 major industry awards for excellence.

OX

NEW VERSION 5.0



Paradox WORLD TOUR

Coming to a city near you!

For more information
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1-800-408-0001

New version is easier than ever

The new Paradox® 5.0 for Windows is here, and suddenly managing your business data and building database applications just got faster and easier. You'll be amazed at what you can do with the new tools that let you start fast and do more. For example, 13 new Interactive Coaches quickly teach you how to accomplish any task. The Coaches even let you work with your own "live" data, so you complete your work as you learn. Then there are the on-line Experts™ that guide you step-by-step in creating professional-looking forms, reports, and mailing labels. Even your largest data management tasks will be completed in record time.

Office integration outshines Access

Full client and server support for OLE 2.0 and DDE make Paradox the best database for use with other applications including Perfect Office and Microsoft Office. For example, you can place a "live" Paradox table in a Word document, edit the table in place, and your changes are automatically updated (*Access can't do this*). And Paradox gives you record level locking, that provides enhanced productivity in multiuser environments. (*Access locks up your whole page!*)

Want to increase your workgroup productivity? Paradox's built-in Workgroup Desktop and new Mail Enablement make it easy to publish and subscribe the latest data, using your existing network or e-mail system. This makes it simple to get weekly or monthly updates like sales and expense information.

More speed, developer enhancements, and Client/Server connectivity

New Paradox 5.0 for Windows has been tuned to give you better performance. It stores and retrieves data faster, and delivers answers to queries with more speed than ever before.

Comparison Facts

End-user Features	Paradox 5.0	Access 2.0
Built-in computer-based training	✓	
Experts/Wizards to guide you step-by-step	✓	✓
Integrated graphics	✓	
Built-in workgroup and mail capabilities	✓	
Quick Filters without query process	✓	
Power-user/Developer Features		
DLE 2.0 client and server support	✓	
Compatibility with applications from previous version	✓	
Visual Data Model Designer	✓	
Transparent connectivity and scalability with database aliases	✓	
Record level locking	✓	
Full range of data types, including Time, Graphic and Autoincrement	✓	
Graphical Integrated Development Environment (IDE)	✓	
ODBC-compliant	✓	✓
Dedicated high-performance native SQL drivers	✓	

And Paradox 5.0 for Windows has kept developers in mind too. There's a new Integrated Development Environment and more than 300 new Methods and Properties help you develop ObjectPAL™ Windows applications faster. Plus, with Borland's new high-performance native SQL links, Paradox is ready when you are to upsize your applications to the Client/Server environment.

Get started fast with Paradox 5.0 for Windows' ease of use and you'll quickly discover it's the one database with the depth and performance you want to stay with.

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Unequal Distribution: The Information Haves and Have-Nots



In the barrage of news stories about the information superhighway, you may find at least a passing mention of the thorny issue of access to technology—who has it and, just as important, who doesn't. A new report from the Times Mirror Center for the People and the Press, "Technology in the American Household," sheds some light on this subject and points out an alarming disparity between PC-equipped households and those that have yet to become part of the PC revolution.

According to this study, released in May, the higher your income level, the more likely you'll have access to the latest and greatest high-tech equipment. That doesn't come as a huge surprise. After all, the more disposable income you have, the greater the chance you'll spend some of it on electronic gadgetry of all types. But the disparity is more apparent with PCs than it is with just about any other equipment, says Andrew Kohut, director of the Times Mirror Center. And the difference appears even more pronounced when you factor in the education level of the respondents, he adds.

Consider these statistics: Households in which the adults earn \$50,000 or more a year and at least one adult has a college education are *five times* more likely to own a PC and *ten times* more likely to go online. That news is disturbing enough, given the critical role PCs play in the distribution of and access to information; but the study goes on to consider what effect the unequal distribution of technology has on kids. Among college graduates with children, 49 percent of households surveyed had a PC; that compares with

just 17 percent of homes in which the parents had only a high school diploma.

Kids who don't have access to PCs at home can't compete on an equal basis with classmates who do, notes Kohut. They may not do as well in school, go on to four-year colleges, or earn significantly more than their parents. "If the road to equality is access to information technology, then there are some real roadblocks in place," says Kohut. He believes that the playing field can be leveled by providing children more equal access to computers—either through schools or through local community groups. And he's not alone in holding that belief.

Righting the Scales

Currently, a small but growing number of groups is working to bring individuals from lower socioeconomic backgrounds into the computing world. Right now, these groups operate largely independently of one another, each one focusing on a small community where the reach may be minimal but the effects can be enormous.

One such project is in eastern Long Island, New York, where three groups have come together to form the Learn-

ing and Information Network for Community Telecomputing (LINCT). For the past nine months, the coalition has been working to develop a community bulletin board system (BBS) as well as a computer access program. Organized through the local community center, the program's goal is to help residents achieve universal—and equitable—access to computers, at the lowest possible cost, says Ken Komoski, executive director of the Educational Products Information Exchange Institute and one of LINCT's founders. LINCT solicits donations from corporations that are upgrading their computers, and it passes along the still-usable hand-me-downs to low-income residents. To participate, families need only sign up for computer classes through the community center; they earn the computer as they take classes on how to use it.

It's a great program—the kind of arrangement that not only puts computers in the hands of disenfranchised groups but also makes sure that they know how to use their new machines. LINCT is working to establish similar programs in two other areas of the country—Indian River County, Florida, and the Englewood district of Chicago.

Running out of memory? A new marketing gimmick from Z-RAM (a division of Camintonn Corporation) should make upgrading your computer's memory a lot easier. PC-equipped kiosks that are set up at computer retailers display a software program that takes some of the confusion out of upgrading RAM. Type

the name and model number of your PC, notebook, or laser printer, and up pops a diagram showing the number of slots available for upgrading—and the part number and price. The downside: You're limited to the computers and printers for which Z-RAM

KEEPING UP



sells memory, and the display is currently available only at Computer City stores—though Z-RAM says more will follow. . . **Corel Software** joins the crowd of software companies charging for technical support. Instead of getting free support on a toll line, Corel customers will now pay a fee and use a toll-free number for the call.

When you register CorelDraw, Corel Gallery, or CorelFlow, you receive credit for one 15-minute tech support call on a toll-free line. After that, you can purchase additional credits, or call 900/896-8880 (United States customers only) and pay \$2 per minute.

By Roberta Furger

Introducing Delrina WinFax PRO™ 4.0. You'll wonder how you ever faxed without it.



Meet the fastest, easiest, most convenient way ever to handle all your faxing – new Delrina WinFax PRO™ 4.0, the latest version of the best-selling fax software in the world. The only one that combines the advanced faxing features you need with astonishing new ease and usability.

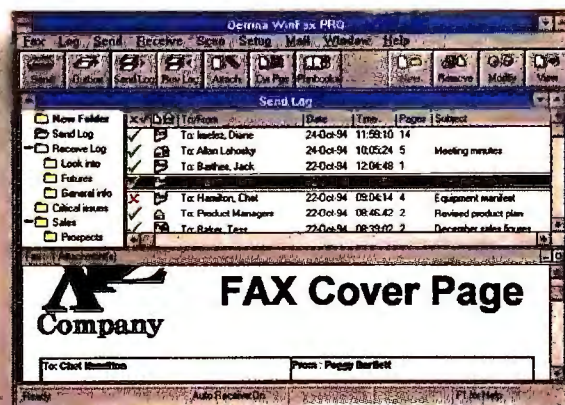
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That's what *PC/Computing* said about version 3.0. And now we've made it even better.

Starting with the revolutionary new streamlined interface that makes it simpler than ever to do anything you'd do with a fax machine, and a lot more. Like sending faxes directly from within any Windows application as easily as you'd print. Or organizing sent and received faxes in convenient

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There's added convenience with dozens of ready-to-use cover pages. Fax phonebooks that are drag-and-drop simple. And improved fax annotation tools that even let you add your signature.



Based on extensive usability testing, the new customizable interface includes folders for organizing sent and received faxes.

Don't try this with a fax machine.

Imagine faxing, not just an image of a document, but the actual file itself*, so it's ready to be used in an application. Imagine sending a single document that is automatically faxed to some people and e-mailed to others.

Now imagine you're on the road, and WinFax PRO automatically forwards faxes to you. Or lets you retrieve faxes sent to your regular fax number*. And there's more.

Get new Delrina WinFax PRO 4.0 today and put faxing where it really belongs – on your PC. Call now for information or to upgrade from WinFax PRO or WinFax LITE™. Or see your local dealer to upgrade immediately.

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*Requires Class 1 modem.

Circle 99 on reader service card



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• QMS 860 - Up to 11x17/A3 output	Increases print job responsiveness, provides a platform for convenient, cost-effective enhancements and enables peak performance as a network node with interfaces supporting protocols that include EtherTalk™, NetWare® and TCP/IP
• QMS 860 Plus - Up to 11x17/full bleed output (11x17 full edge-to-edge)	Accommodates the latest application software on all major platforms
• QMS Crown™ technology, featuring multitasking, advanced job spooling, compile-ahead processing, context switching and virtual memory	Accepts data streams on all ports simultaneously to increase system responsiveness for all users
• Compatible with a variety of languages including PostScript™ Level 2 and Level 1, HP PCL® and HP-GL®	Eliminates user intervention to select compatible printer language
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HAMMERHEAD
THE PERFECT PRINTING MACHINE

LINCT equips its PCs with a variety of software, plus a modem and software for logging on to the area's community BBS. Based on the Cleveland Free-Net model (see *Consumer Watch*, September 1992), the BBS includes E-mail and a wide range of information about community and government services. There's even an area where residents can barter goods and services.

The only downside to these programs is that the donated computers are rarely state-of-the-art. So although more people have access to PCs, there's still considerable disparity between the donated equipment and the newer, more powerful machines used in more affluent homes. But it's a start toward a goal worth pursuing on a wider scale. After all, riding a bike—even an old one-speed—is a whole lot better than walking.

Shop Talk

We Tore Up Your Check

In April's *Consumer Watch* ("If It Sounds Too Good to Be True..."), Computer Associates said that customers who requested the "early bird" version of CA-Simply Tax (free, except for a shipping and handling charge of \$9.95) would not be charged an additional \$3.95 for the final "free" edition—and that people who had already paid the \$3.95 fee would be reimbursed.

In January I sent the company a check for \$3.95, along with the order card that came with my early bird edition. I never received the refund for \$3.95 or the final edition of the software. I finally gave up and prepared my tax return manually.

George W. Snavely, Jr., Franklin, Tennessee

Editor's note: We contacted Computer Associates to see what happened to Snavely's refund—and his software package. A spokesperson for the company told us that

it never cashed any of the \$3.95 checks received for the upgrade and that it credited anyone who paid with a credit card. Computer Associates enclosed a note with the final edition of CA-Simply Tax explaining that the checks had been torn up, but because Snavely's order was lost or misdirected, he never got that letter. The representative apologized for the inconvenience.

Secondhand Warranty

Recently, my hard drive began to develop bad sectors, so I contacted the local company that made my computer. The customer service representative told me that even though the hard drive was less than a year old, the warranty was void because I had purchased the PC secondhand. Not dissuaded, I called Seagate—the manufacturer of the hard drive. A company representative told me that the hard drive was still under warranty and that I should ship it back to Seagate; the company even paid the return shipping costs.

It's a pleasure to find a company that stands behind its products and is helpful when something goes wrong. I do wonder, though, what the local computer company would have done with my old hard drive—shipped it back for repair and resale?

Larry Mormino, Cary, North Carolina

Editor's note: Most hard drive manufacturers warrant their drives to the reseller—not to the customers who finally purchase them. But most manufacturers will stand behind their products if you can't resolve the problem through the reseller, as was the case for Mormino. You may have more trouble than he did, but be persistent.

Back in the Fold

On October 25, 1993, I wrote to *Consumer Watch* concerning very poor customer service from PC Connection in Marlow, New Hampshire. Within a few weeks of sending that letter, I received a call from someone at PC Connection who told me he knew nothing of the problem until he was contacted by *PC World*. He agreed that the situation had been mishandled and offered to make amends.

When I told the representative that I had already purchased the software from another company, he gave me his direct phone number and told me to call him if I required something in the future and



Until now, this is how many fax machines you'd need to send 24 faxes simultaneously. Today you don't need any.

New Delrina Fax Broadcast™ lets you use your Windows PC to send a fax at the same time to a handful of people, or to thousands with a single call. Simply compose your document, then use Delrina WinFax™ 4.0 to make a list of recipients, then send the fax — just once — via fax modem for broadcast over the MCI network.

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POWER TIP no. 309

Quick Desktop Cleanup

To delete a Windows program group, first close the group's window, then delete the icon. That way, you don't have to delete the group's program icons one at a time.

Robert Luhn
Contributing Editor



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To leave a message please dial: 1-613-728-0826 ext. 1609.

Circle 67 on reader service card

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Ext.

wished to give his company another chance.

Recently, I was shopping for three software upgrades and decided to see what PC Connection had to offer. I called the representative directly and—true to his word—he handled my order in a most satisfactory manner. He sold me the three upgrade packages at company cost. Once again, I'm a satisfied customer, and PC Connection will continue to be my first source for software purchases.

Since I registered my complaint, I felt that I should now register my satisfaction.
Marguerite Sweeney, Ipswich, Massachusetts

The Part Costs as Much as the Whole

Recently, the president of my company told me that the screen on his previous laptop—an IBM ThinkPad 700C—was shattered and that he didn't intend to have it fixed; he had heard that a replacement for the active-matrix screen would be prohibitively expensive.

I couldn't believe it, so I checked it out for myself. All the authorized IBM service centers that I called charged more than \$3000 to replace the screen on a \$4000 laptop. Again doubting what I heard, I called the IBM parts warehouse in Colorado. To my dismay, they quoted \$3201 for the same part. I then asked my local dealer whether the screen was still covered under warranty. The warranty had expired, but the dealer checked with IBM to see what could be done. IBM told him that the screen was never covered under the warranty.

I think anyone considering a laptop should be aware of this and should check what's covered under warranty and how much replacement parts are likely to cost.

Michael Nevins, Houston

Editor's note: An IBM spokesperson told us that the active-matrix screen is the most expensive part of the ThinkPad 700C and confirmed that \$3000 is about the going rate for a replacement. The spokesperson explained that two factors contribute to the high price tag: It's new technology, and the few suppliers worldwide are unable to keep up with the high demand for the product. (IBM offers other ThinkPad models with smaller or monochrome screens.)

It's often cheaper and easier to upgrade to a newer, more powerful notebook than to get new parts for your old one. For those who want to keep the computers, they

have—or just don't want to pay the high price for new parts—GE Computer Service, one of the largest providers of on-site computer service, has introduced GE Remarketing Service, which offers nearly 900,000 used PCs and computer parts. A GE representative told us that a 486 motherboard costs between about \$300 and \$2500, depending on how many you buy, the speed of the processor, and the brand name. The company stocks computer equipment from 1500 manufacturers, including IBM, Compaq, Epson, and NEC, and parts for many notebooks (including some batteries and screens, though they do not yet sell IBM ThinkPad screens). GE Remarketing Service also offers technical assistance for installing and troubleshooting the parts it sells. For more information, call 800/431-7671.

Waiting by the Telephone

I purchased my first computer—a Compaq Concerto 486-33 notebook—in December 1993. The first unit I received wouldn't "hibernate" (to conserve the battery). After spending about 2½ hours on hold with Compaq technical support, I was told that the company would send me a disk to help the computer reboot and activate hibernation. Then a battery problem cost me another 10 hours. Finally, Compaq sent me another Concerto, but it also had problems that resulted in another 5 hours on hold.

I don't think you should recommend Compaq computers. Each time I've called Compaq, I've had to wait on hold for a minimum of 1 hour to talk to an actual person, who was not always able to fix the problem.

Niki Carrino, Plantation, Florida



POWER TIP no. 310

A Faster Way to WordPerfect for Windows Envelopes

To avoid plowing through layers of menus to get to the WordPerfect for Windows (versions 5.1 and 5.2) envelope printing macro, change the macro name from ENVELOPE.WCM to CTRL.WCM. Thereafter, press <Ctrl>-E to launch the macro.

William H. Shepherd, Jr.
Alexandria, Virginia



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Stand Out

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BUG WATCH



Microsoft Excel 5.0

In May, Microsoft posted 39 Excel 5.0 bugs reported by users. Many of them are related to OLE procedures, incompatibilities between

Excel versions, or functions that don't perform as expected; they can cause incorrect on-screen formatting, dialog boxes that don't work, or difficulty printing. Some cause General Protection Faults (GPFs) that can result in the loss of unsaved data.

Find a list of the bugs in the Microsoft Knowledge Base on CompuServe (GO MSKB) in document Q112180, "XL5: Summary List of Known Bugs."

Meanwhile, Microsoft has announced an interim version, Excel 5.0c. The company says version 5.0c includes new features (such as support for Lotus Notes FX) and changes to the interface that synchronize Windows and Macintosh versions.

5.0c fixes these three common bugs:

- If you run a Visual Basic procedure that uses the SQLExecQuery or SQLRequest functions to query an external data source, and your query is larger than 255 characters, you may get a GPF.
- You can't reference a name on a closed Excel 4.0 workbook if the name is not defined on the first worksheet.
- When you use the horizontal scroll bar under the preview window in the Text Import Wizard to scroll the columns in a text file, you may experience a GPF.

As we went to press, Microsoft had not finalized plans for distributing the 5.0c upgrade, but a company source stated that it would be too large to download and would likely be mailed. Call Microsoft customer service at 800/426-9400.

WinComm Pro 1.0

Delrina recently released WinComm Pro 1.0b, a downloadable patch file that fixes several bugs in the first version of the program. The corrected bugs include problems with printing when using certain terminal emulations, difficulty in entering serial numbers during product registration, lack of support for numeric session names, glitches when buttons are added to the program's tool bar, file corruption during transfers using the Kermit protocol, and unexpected 'Path not found' errors when exiting from Chat mode in host-mode sessions.

The patch also provides new features: one that lets you specify how long WinComm Pro will wait before returning port control to the WinFax Pro or WinFax Lite fax software; a larger scroll-back buffer; and the ability to launch COM, BAT, and PIF files using the Run command.

Find the self-extracting archive file (WCP001.EXE) on CompuServe (GO DELRINA) or Delrina's BBS (416/441-2752). Or call Delrina (416/443-4395).

Correction: Contrary to a statement in June's *Bug Watch*, versions 4.0 and 5.0 of Microsoft Excel don't automatically open files named STARTREK.XLS stored in the main Excel program directory. In fact, when you launch these versions of Excel, they open the files in that directory that begin with the letters START.

—Scott Spanbauer

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 can't provide technical support.

Scott Spanbauer is a contributing editor for PC World.

Editor's note: When we got Carrino's letter, we contacted Compaq. A spokesperson admitted that the company "did have long waits on the portable-PC support line earlier this year," but he also added that the issue is "pretty much resolved." Just to be sure of this, we double-checked with the *PC World* reviews staff, which routinely checks technical support as part of reviewing a product. Our staffers report that the

average wait for Compaq is now about 7 minutes. (I got through on the first try.)

Shop Talk is written and researched by PC World associate editor Christina Wood. Think you've gotten a raw deal—or a great one? Consumer Watch wants to hear the details. We'll investigate complaints and publish letters with the broadest interest (see page 10 for contact information).

The OL410e 600 dpi-class output and more.

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Gorgeous print quality on a home office budget.

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STANDARD NETWORKING FEATURES	HP VECTRA M2 PC	COMPAQ DESKPRO/XE	DELL NETPLEX
Advanced Bus Architecture	VL-bus		
Integrated Networking Interface	16-bit		
Integrated, multiprotocol Boot-ROM	X		
ISA Plug-n-Play Compliant	X	X	
Multilevel Security Features	X	X	X
Asset tracking	X	X	
PC tattooing	X	X	
Optional Desktop Management Software	X		
Bi-directional parallel port	X	X	X
Desktop Management Interface (DMI) ³	X		

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- ISA Plug-n-Play compliant
- Desktop Power Management
- EPA Energy Star certified

High-performance
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in a slimline package.

- Intel 25- and 33-MHz 486SX, 50- and 66-MHz 486DX2, upgradable to Pentium Overdrive
- Optional 128- or 256-KB second level cache
- 170-MB, 14-ms Fast-IDE hard drive
- 32-bit Fast-IDE local-bus hard disk interface
- 4- or 8-MB RAM, expandable to 96-MB
- Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution

High-performance
PCs for the
connected office

- Intel 33-MHz 486SX; 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive
- Optional 128- or 256-KB second level cache
- Four mass storage shelves; four expansion slots
- One available 32-bit VL-bus slot
- 210-MB, 14-ms Fast-IDE hard drive
- 32-bit Fast-IDE local-bus hard disk interface
- 8-MB RAM, expandable to 96-MB

Top performance for
experts in connected
environments.

- Intel 60-MHz Pentium with 256-KB write-back cache
- One PCI slot, one shared PCI/ISA slot, two ISA slots
- Four mass storage shelves
- 270-MB Fast-IDE hard drive with 12-ms access time¹
- Integrated S3 928PCI graphics accelerator
- 2 MB of VRAM expandable to 4 MB, 1600 x 1200 video resolution
- 8-MB RAM, expandable to 192-MB



HP Vectra VL2

- 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

from
\$1,099[†]



HP Vectra N2

- 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

from
\$1,309[†]



HP Vectra M2

- 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

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HP Vectra XP

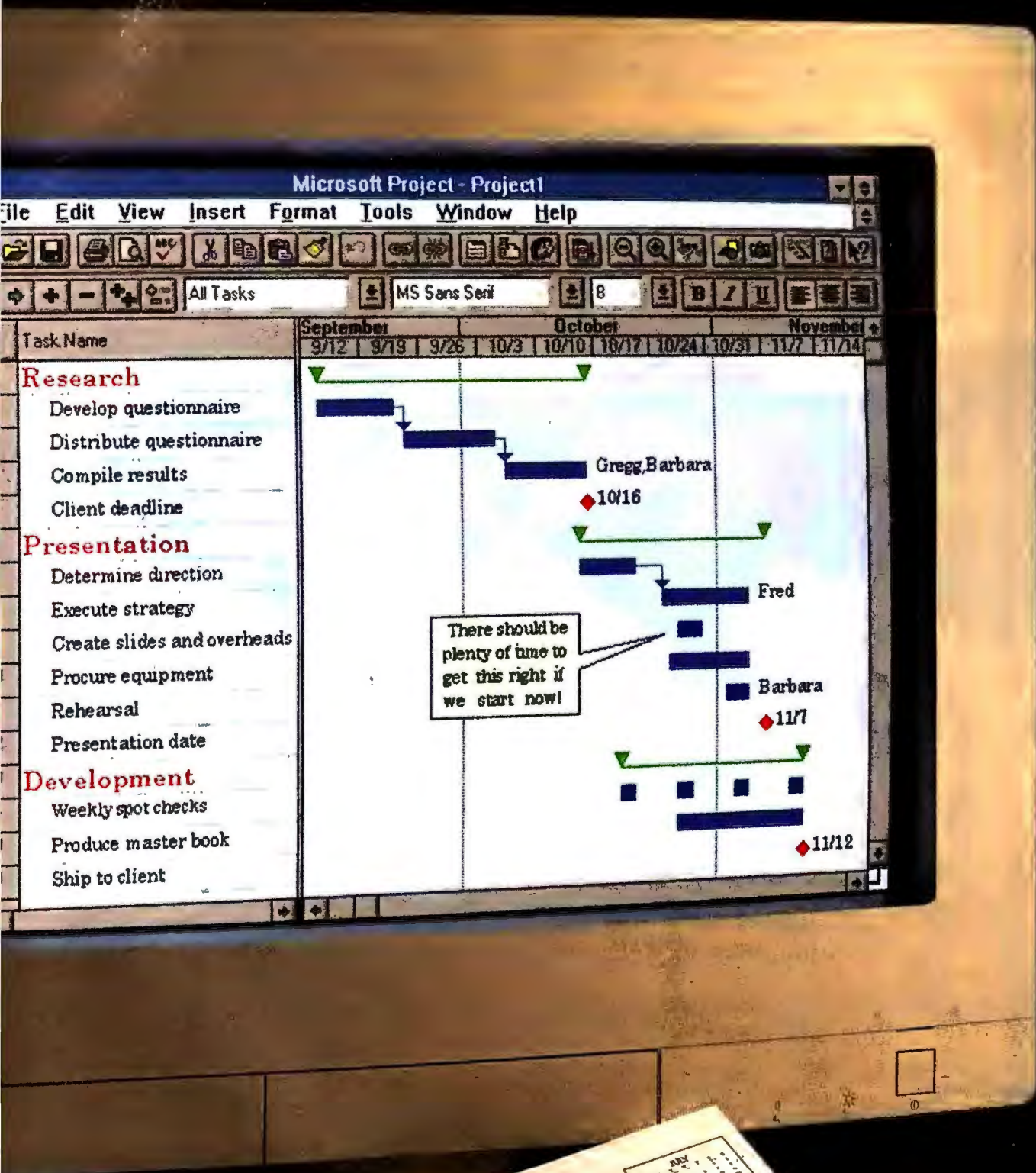
- Integrated 16-bit 10Base-T networking interface with bus-master DMA
- Flash EPROM
- Systems Diagnostics Utility
- Power-on Self Test
- Multilevel security
- Asset tracking with non-erasable serial number and customizable PC tattooing
- Bi-directional parallel ports
- Free three-year limited warranty for parts and labor²

from
\$3,559[†]



All HP Vectra PCs come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed; HP mouse and keyboard included. *Feature included with some models. †List price, dealer prices may vary. Monitor not included. †Other capacities available. ‡First year on-site, 24-hour service. Second and third year return to dealer. ‡Available 9/1/94. †With permission CRN/Benchmark. MS-DOS is a U.S. registered trademark and Windows is a trademark of Microsoft Corporation. Pentium and the Intel Inside logo are U.S. trademarks of Intel Corporation. PPG403 ©1994 Hewlett-Packard Company

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Now there's software that helps you do it more effectively than ever.

It helps you plan, manage and communicate with ease.

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It watches how you work and guides you step by step.

Like other programs in the Microsoft Office family, Microsoft Project features IntelliSense™ technology. Simply stated, your software now senses what you want to do and helps you do it.

For example, PlanningWizards offer suggestions as you go, to help you avoid problems down the line.

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plan with step-by-step instructions that stay on the screen as you work.

With GanttChartWizards, you just choose a great-looking format and it does the rest. (Just like the Chart Wizard in Microsoft Excel.)

What's this all mean? Simply that you can get started right away. And learn as you go along.

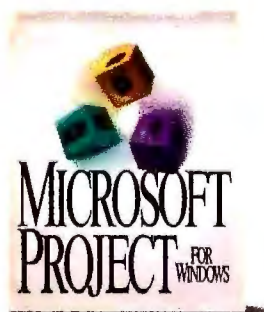
Now it's easy to keep everyone in the loop.

Chances are you're not the only one working on the project. Microsoft Project was developed with this in mind.

You can now distribute reports through your existing electronic mail system*. Click on a button to collaborate. Click to delegate. Click to get the status of your plan. Even set reminders on important tasks.

To do all this (and a lot more) all you have to do is take the first step: Call Microsoft at (800) 671-3955, Dept. KZ5, for more information or for the name of a reseller near you.

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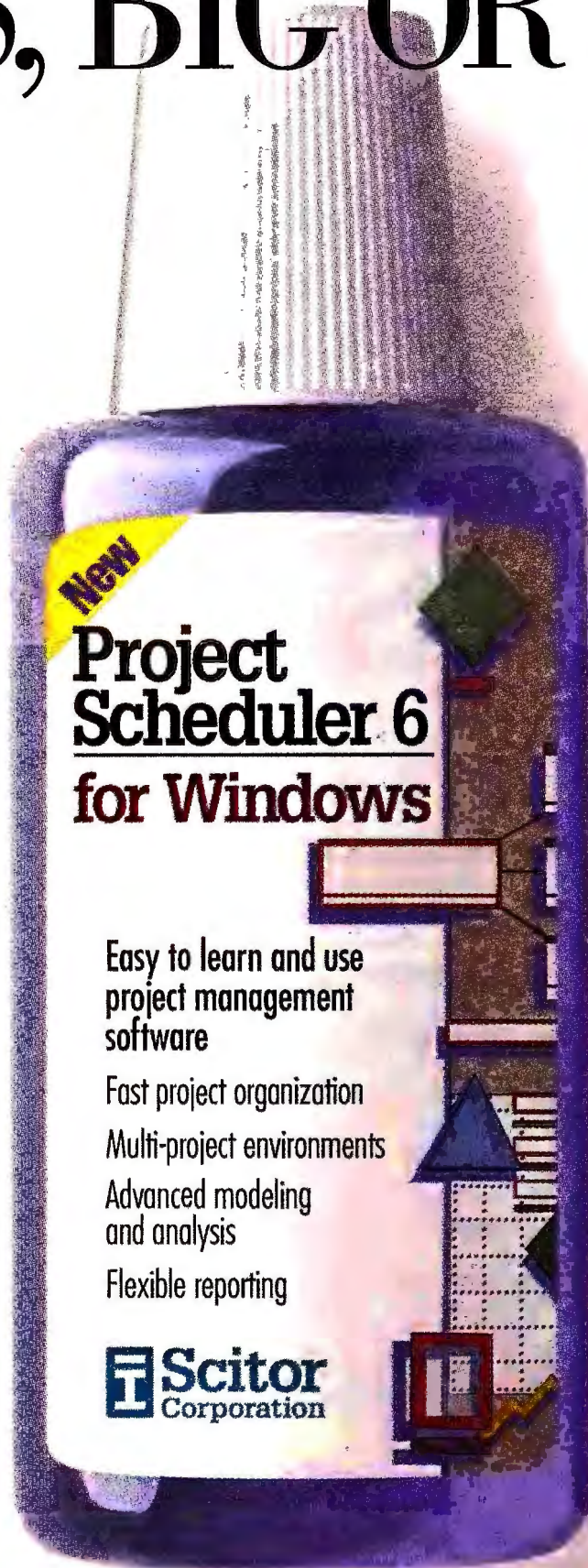
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Unlike many software programs that claim to be easy to use, Project Scheduler 6 for Windows really is, and the experts agree. According to a recent *InfoWorld* review; "Project Scheduler's interface is a joy to use...Scitor understands how people use project management software."¹

But Project Scheduler 6 offers managers more than just relief from occasional project stress.

"Project Scheduler 6 surpasses Microsoft Project and CA SuperProject – in addition to challenging many high end packages." wrote *InfoWorld*.²



Sophisticated modeling features, like the Advanced Resource Tracking Spreadsheet (ARTS)[™], let you evaluate resource costs and usage on a period by period basis using a familiar spreadsheet

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Our software's built-in object-oriented report writer provides extraordinary flexibility and convenience. And as the first project management software to share information with other ODBC-compliant applications, it even helps build greater reporting and data management efficiency throughout the enterprise.

So, as *Windows Magazine* recently put it "If you're seeking a Windows project management product that does it all and then some, Project Scheduler 6 fills the bill."³



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Auto Execs

For most managers, creating a report is a crazy-quilt process. You spend long hours pulling numbers from a database or crunching them in spreadsheets, cutting and pasting them into a word processing file, and routing the product through E-mail. All are vital tasks, but they beg for automation. This month, Lee Allen, a manager in Schering-Plough's Contracts and Information department in Union, New Jersey, tells how he uses an off-the-shelf software package to save his pharmaceutical manufacturing company an estimated \$180,000 in labor every month. —Ed.

Contract-itis

In my 36-person department, 8 people support nearly 60 field personnel who work with organizations in the managed care segment of the health care industry (HMOs, nursing homes, hospitals, and the like). The field staff uses the information we give them to negotiate contracts for purchasing drugs. The object of the game is to see that Schering-Plough is on their lists of approved pharmaceutical providers.

Two years ago, when I began working at this \$4.3 billion, 22,000-employee company, managed care contracts accounted for 20 percent of our business. This year they'll account for over half, in part because managed care is a key component of the government-sponsored health care reform plan.

The Run-Around

Our group is made up of business analysts meant to work behind the scenes helping field personnel negotiate contracts. But because we know how to access the corporate mainframe database and field personnel don't, we end up being an administrative arm as well.

Until recently, a representative would call in to find out when an HMO's contract expired or what its sales volume was. We'd access information from the

mainframe and call the rep back with the answer. Fifteen minutes later, another person would call with the same question on another account, and we'd go through the identical process again.

Because our in-house staff is versed in Excel, WordPerfect, and other applications (the field force is not), we had to pull this data into presentations, contracts, and other documents. After getting data on a customer from the mainframe, we would often have to crunch the numbers in Excel, copy the data to a word processing file, then import portions into a presentation. Finally, we would print the whole thing and ship it to the field representative, who would invariably want to make changes. This usually meant doing the contract all over again. Multiply that by 75 contracts per month, and you get the picture.

Meanwhile, our managed care business grew 200 percent in two years. And like other corporations, we were downsizing. We didn't have the personnel to support the demand: The labor required to support one representative cost around \$4000 a month.

We needed to automate the process so field representatives could assemble their own information. But how? Teaching them to access the mainframe and use a word processor or spreadsheet was out of the question: They were there to manage contracts, not learn software.

An Application Daisy Chain

Earlier this year, we discovered a Windows product that helped solve the problem: ProdeaSynergy 2.0 from Prodea Corporation (800/776-3321). It



provides a remarkable way to connect applications so they all work cooperatively together. (ProdeaSynergy sells for \$295 through September and \$495 thereafter.)

I know nothing about linking tools like DDE or OLE, but I found ProdeaSynergy easy to use. I taught it to do what I normally had to do to get information from the corporate database into the presentation package—via Excel and Word.

I did this by simply connecting a set of icons—one icon for the communications software that connects us to the mainframe, one for the database query tool, one for the spreadsheet, one each for the word processors, and one for the presentation graphics package. (When you draw an arrow between these standard Windows icons in ProdeaSynergy, the program knows to shift data from one application to another.)

For example, I dragged the communication icon tool into a work space to establish a connection to the mainframe. Then I dragged the data query

Lee Allen is a manager with Schering-Plough in Union, New Jersey.

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icon into the work space, drew a line between the two icons, and opened the data access tool. I put in a command to query the database about a common question. Next, I drew a line from the data access tool to the Excel icon.

I opened a file in Excel, applied some formatting macros to a certain range, and closed it. I drew an arrow from the Excel icon to the Word for Windows icon, opened up a file in Word, and created a bookmark where I wanted the Excel range to go to create our standard memo.

ProdeaSynergy automatically activates the data query tool, fetches the data, and passes it to the appropriate Excel range. There, a macro sets a print range and moves the data into Word, where it gets formatted.

Back to Brain Work

What happens on the representatives' end is even simpler. Using their laptops, they double-click an icon in the ProdeaSynergy library called Managed Care Groups. A menu of report names appears, such as account utilization or contract performance. (To date, we have automated 20 reports.) They click on a report topic and are presented with a list of account names. Once they click on a Run button, the product automatically pulls everything they need together in one neat, tidy Word, Excel, or Harvard Graphics document. If they need to further manipulate the data, they can.

By automating the information access and report formatting for the representatives, an eight-person team can now support 60 field personnel instead of only 15. The price of supporting a representative has been lowered by \$3000, to \$1000 per month, and the representatives can get answers to most questions themselves. Our solution has improved communication, because everyone uses the same standard reports.

Finally, we have our jobs back: Instead of fetching data, we're working as business strategists. We spend more time helping field managers work on pricing and tactical issues, and a lot less on cutting and pasting.

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. See page 10 for contact information.

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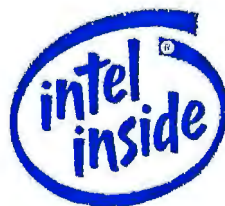


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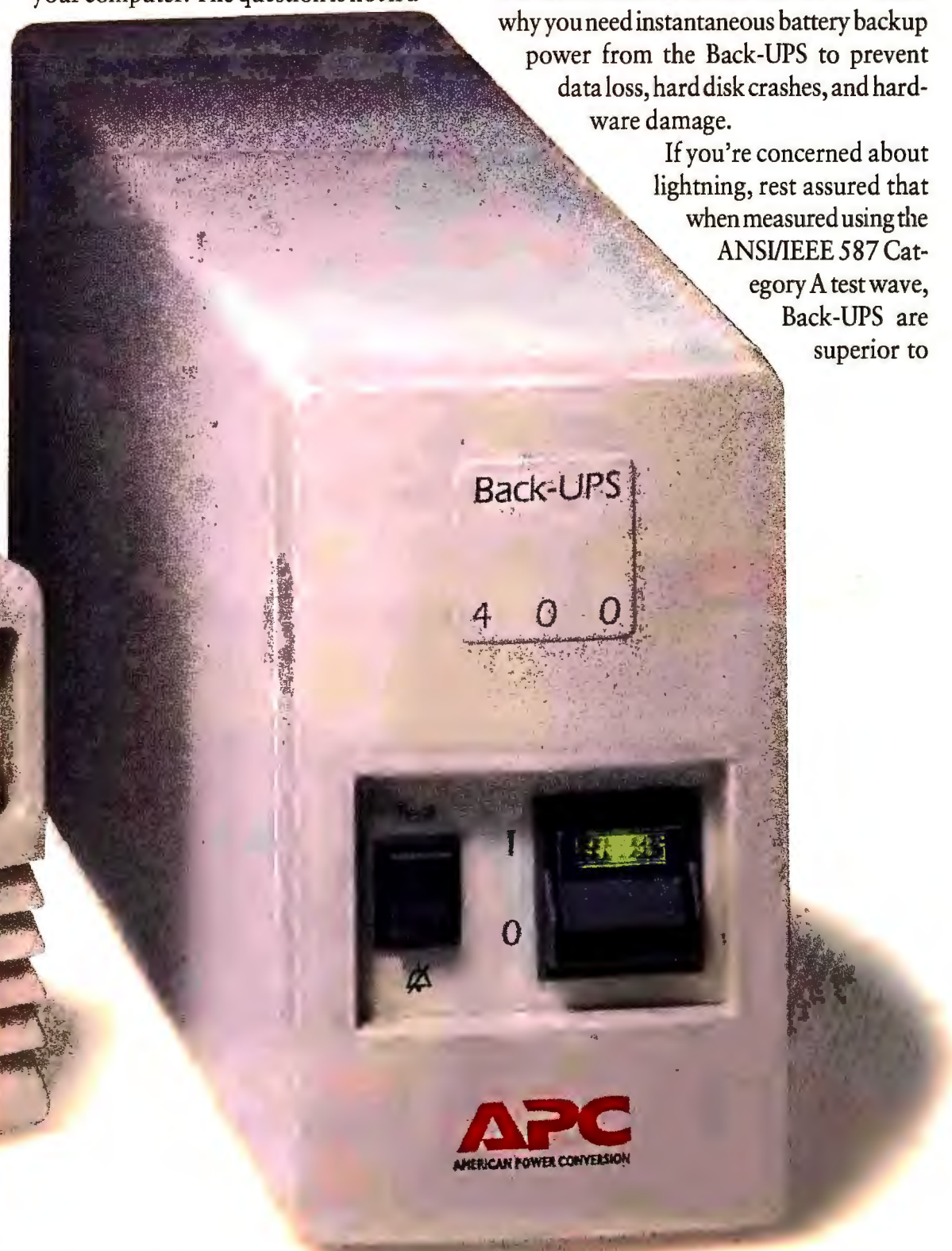
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Don Traux knows first hand about Back-UPS reliability: "It ought to be against the law to buy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked. Each morning I get a surge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



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

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

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



And since data processed on networked clients needs protection too, the \$139 Back-UPS 250 provides an



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



economical solution for all your LAN workstations.

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awards than all other brands combined, field-proven reliability, and a two year warranty, Back-UPS are power protection you can purchase with confidence.



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

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

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450	Tower 486, 386 systems, servers	\$279
600	Heavily configured systems, CAD/CAM workstations	\$399
900	Multiple systems, longer runtime applications	\$599
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Dept. P3

Circle 45 on reader service card

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Circle 73 on reader service card

The Intelligent Person's Guide to Online Services



CompuServe. Prodigy. Delphi. MCI Mail. America Online. Nexis. Now, which online services have I forgotten? And how long has it been since I checked on my NewtonMail? Hope there isn't anything important sitting there.

Remembering—passwords, user IDs, how the interfaces work, what information is on which service, which service has the information for the lowest price—is a big part of being a cybernaut. You also have to remember to cancel the services when you're finally fed up with them or have settled on one you'd like to call home.

It's easier, of course, not to join the "wrong" service in the first place. Which is where I come in.

America Online You have to wonder why a service that has been so bogged down with new users would keep sending free sign-up kits and 10 hours of connect time to every person in the United States who might possibly own a computer. Nah. When you're a Wall Street darling, you have to keep stoking the fires, right?

AOL is, in some ways, like those people you only run into at cocktail parties: Pretty, great for casual conversation, occasionally charming, always friendly, but not the brightest person you'll encounter. And possessing quirks that, at first winning, are ultimately frustrating.

Still, AOL is an excellent service for newcomers and has online versions of many popular magazines, including this one. AOL has also recently added partial Internet access and news groups. It is not a bad place to have an electronic mail account on the Internet. On the other hand, the message boards are really clumsy, and the service was obviously

designed to handle a far smaller number of users than it has today. • *America Online*; 800/827-6364, 703/448-870. *Reader service no. 801*

CompuServe is most of what an online service should be. Its scope is encyclopedic, from all the online technical support you're ever likely to need, to interest groups devoted to tropical fish, cooking, genealogy, and most anything else people do for love or money.

"CIS," as regulars call it, tends to be more expensive than other services. Don't even think of using the service without a copy of CIM or WinCIM, the CompuServe Information Manager program for DOS or Windows.

CIS lacks access to Internet services, aside from mail, but makes up for it by being so complete in itself. CIS is the best service available today. • *CompuServe*; 800/848-8199, 614/457-0802. *Reader service no. 802*

Delphi Internet Services, once a low-cost CompuServe wannabe, has recast itself as a low-cost Internet access service, at least during off-hours. If you need full access to the Internet and you don't mind a nongraphical interface, then Delphi might be the one for you.

• *Delphi*; 800/695-4005, 617/491-3342. *Reader service no. 792*

Prodigy Take everything Sears knows about computers, add everything IBM knows about retailing, and you've created an online service that illustrates why its two owners fell upon hard times. Prodigy is reasonably inexpensive and comes with its own software, but otherwise I really can't think of a reason why you'd want it, unless you have compukids. With its mail monitors, Prodigy is probably the safest place to let kids play. (Prodigy users: Flame me at my AOL address: dcoursey@aol.com.) • *Prodigy*; 800/776-3449. *Reader service no. 804*

You may get the idea that many more bad services exist than good ones. But all the online services are dramatically improving their interfaces and lowering prices. It's more important to be online than to wait for the perfect service. I've been waiting for 14 years, and it still hasn't happened!

Contributing Editor David Coursey edits P.C. Letter. He can be reached on PC World Online (see page 10 for more information).

NVidia, a Silicon Valley start-up, says it's created a one-chip solution for GUI acceleration under Windows. The chip provides 3-D and 2-D video, wave-table audio, and game control, but doesn't require new software. The chip should start showing

up in PCI-based machines next year, improving performance and simplifying system design...Have you played with **Apple's digital camera**? There's a Windows version, and it's really pretty cool if you have about \$700 burning a hole in your pocket...When I'm missing a font, **Elsewhere's FontWorks**, about

LOOKING AHEAD



\$79 on the street, creates it for me and gives useful advice on which fonts look good together...The new **Peachtree** small business accounting software for Windows, due about the time you read this, looks great...I wish I could say I had a

good time at the **Consumer Electronics Show** in Chicago, but most of the software—including a Rush Limbaugh screen saver and the Penthouse Pets (they look better from a distance than up close)—makes me understand why some parents won't let their kids near a PC.

By David Coursey

THE NEW PREMMIA™ GX. It merely starts with Intel's Pentium™ microprocessor, in two speeds, the fastest and very, very fast. In other words, 100 MHz or 90 MHz.

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raised the bar, and the new Premmia screamed right by the Compaq Deskpro and HP Vectra to 112 million WinMarks* of graphics performance. With dual 100 MHz CPUs and the fastest cache system ever, just imagine

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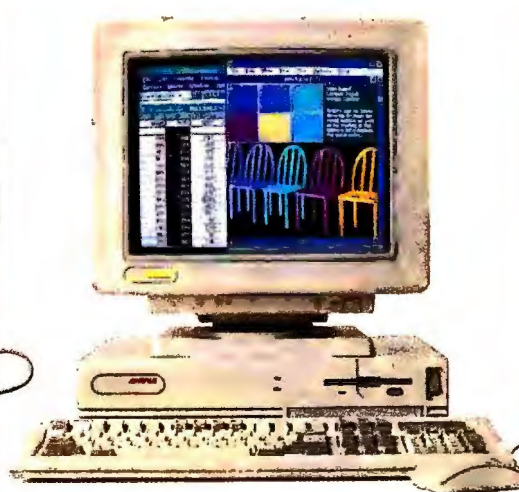
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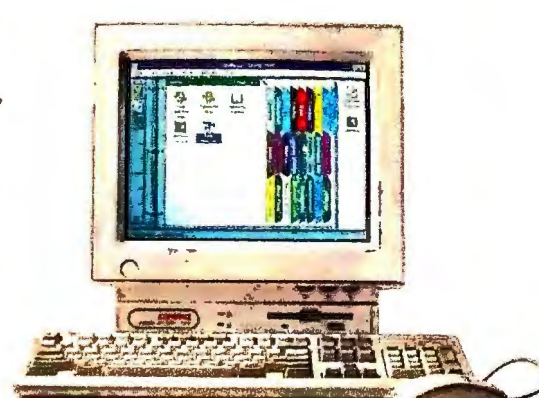
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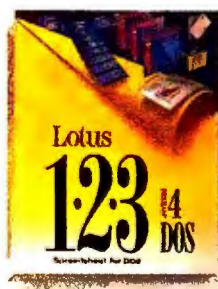
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Column Fit-Widest, a feature that automates column
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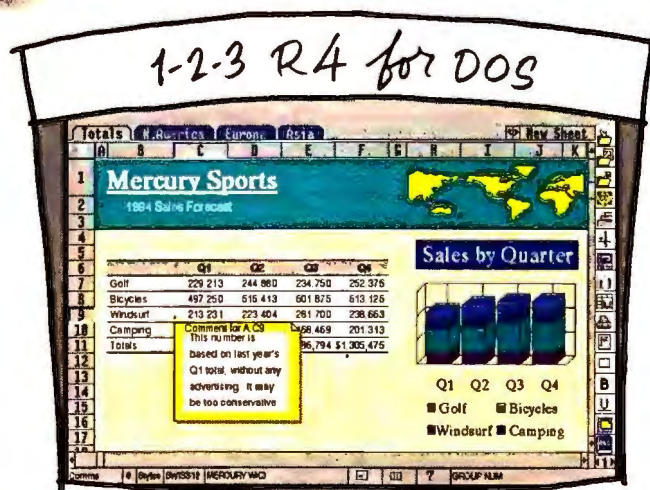
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spell checker; and a Cell Notepad that lets you attach a note to any cell on your spreadsheet.

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And the new 1-2-3 for DOS includes the exclusive Lotus® Version Manager™ technology which allows you to keep track of different versions of data in a single file. This means that

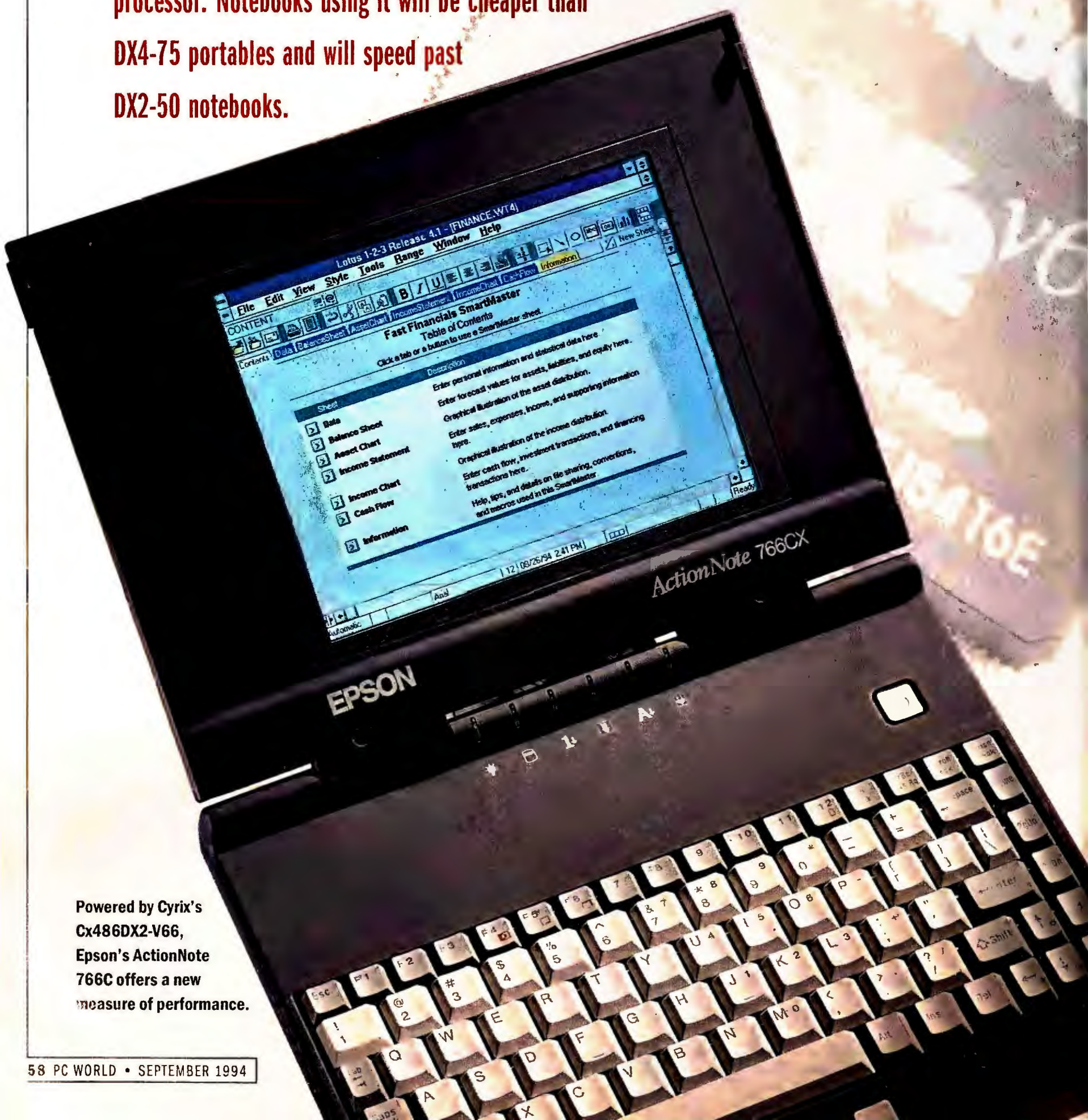


The new 1-2-3 for DOS has Worksheet Tabs, a Cell Notepad, a Live Status Bar for easy access to settings and lots of SmartIcons.

Top of the **News**

THE CYRIX ADVANTAGE:

Epson offers the first notebook to use Cyrix's Cx486DX2-V66 processor. Notebooks using it will be cheaper than DX4-75 portables and will speed past DX2-50 notebooks.



Powered by Cyrix's Cx486DX2-V66, Epson's ActionNote 766C offers a new measure of performance.

Edited by Russell Glitman

A BETTER DX2-66

TEST DRIVE

When it comes to notebooks, a DX2-50 is not so nifty anymore and DX4-75s have a new low-priced performer to contend with: Cyrix's Cx486DX2-V66 processor. While notebooks based on Intel's 50-MHz DX2 processor have provided some great deals this summer, systems powered by the new Cyrix chip promise better than DX2-50 performance and will cost much less than DX4-75s. The 3.3-volt Cx486DX2-V66 processor will debut this fall in notebooks that will be priced like DX2-50-based products but should run faster than Intel DX2-66 notebooks—by 10 percent or more, analysts say. Epson will be among the first vendors to ship notebooks using the new Cyrix processor, with systems due at the end of September. IBM Microelectronics is now making the chip for Cyrix, so there should be plenty of processors available for would-be vendors—potentially including IBM.

Cyrix's performance advantage is expected to arise from the chip's integrated cache. While the Intel DX2-66 includes 8K of write-through cache, the Cyrix processor can support 8K of either write-through or faster, more efficient write-back cache.

Write-Back Benefit

A preproduction Epson notebook we tested didn't have write-back cache implemented, although it will be in production models, and it also had only 4MB of RAM. While it slightly outran similarly configured DX2-50 systems, the Epson lagged on DOS application tests, probably because its PCMCIA drivers left only 512K of RAM free. The Epson will perform even better with the write-back cache implemented. *PC World* tests also indicate that simply adding 4MB of memory will improve Windows performance by 50 percent, which would position the Epson above the average for DX2-66 notebook performance.

Cyrix's new 66-MHz chip has two other advantages over Intel's DX2-66: a low price and a low-voltage design. In early July, Cyrix's chip was priced at \$221 in volume to PC vendors, while Intel was charging \$271. That can save vendors as much as \$50,000 for every 1000 chips they buy from Cyrix instead of Intel. Another advantage: The Cyrix chip uses 3.3 volts, compared to the Intel's 5 volts, so it generates less heat and draws less power. As a result, notebook designers can opt for longer battery life, or can trim battery size and therefore notebook weight—the route Epson chose.

Epson Sets a New Standard

At 4.9 pounds, the Epson ActionNote 766C with a dual-scan color display weighs less than any 66-MHz notebook *PC World* has tested. "We see this Epson as almost a new category," says Mike McGuire, an industry analyst at market research firm Dataquest. "It's got all the features of a notebook but comes in almost at subnotebook weight."

To achieve a low subnotebook weight, manufacturers usually shrink screen or keyboard size, or make the floppy drive external. Not so with the 766 series of notes. The portables sport either a 9.5-inch dual-scan color screen or an 8.5-inch active-matrix screen. The units also include an internal floppy drive and an almost-full-size 85-key keyboard—hard to find on a subnote. A 12mm trackball sits below the <Space> bar.

The Epson ActionNote 766C has a street price of \$2999 with 8MB of RAM (expandable to 20MB), a 260MB hard drive, and a dual-scan color display. Another dual-scan ActionNote offers 8MB of RAM and a 340MB drive for \$3099. All the Epson hard drives are removable. Pricing is in the range of low-cost DX2-50 notes. For example, the Gateway ColorBook DX2-50 with 8MB of RAM, a 250MB hard drive, and a 10.3-inch dual-scan screen costs \$2999.



News Monitor

NEW ON-RAMPS TO THE INFORMATION SUPERHIGHWAY: Cable, computer, and telecommunications companies are teaming up to test new technologies that could bring high-speed data networks—the conduits of the information superhighway—into your home. Here's a compilation of products and services under development.

Superfast Modems Intel Corporation is working with General Instruments to develop high-speed cable modems. The devices connect a PC to your existing cable TV network, and they can transmit data hundreds of times faster than a conventional modem, which connects to a standard phone line. Trials are currently under way in the Philadelphia area. Intel expects cable modems to ship next year at "high-end modem prices," around \$500 or less, says company spokesperson John Raftrey.

Killer Apps Faster may be better, but nobody needs a superfast modem for mundane tasks like reading sports scores online. Industry pundits see real-time video and graphics-intensive, interactive software as the killer apps for cable modems. In San Diego, Prodigy is testing a cable-based service (called Prodigy TV, naturally) that lets subscribers watch video clips without having to download huge files first. Subscribers can instantly view color photos that accompany news stories—a time-consuming chore with a 9600-bits-per-second modem. They can also view live video feeds from, say, ESPN and click an icon to read statistics

(continued on page 61)

Top of the News

TEST REPORT

Epson ActionNote 766C: DX2-50 Price but Better Performance

System	RAM (MB)	Application performance (in minutes:seconds)			
Epson ActionNote 766C (Cx486DX2-V66)	4	2:10	3:44	3:30	6:49
Average of four Intel DX2-50 notebooks	4	2:30	3:27	4:06	6:15

Shorter times are better.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

1-2-3 release 3.4 Excel 4.0 Word 2.0 for Windows WordPerfect 6.0 for DOS

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

With an 8.5-inch active-matrix display, the Epson ActionNote 766CX provides 8MB of RAM and a 260MB hard drive for \$3399 and 8MB of RAM and a 340MB hard drive for \$3499.

Using a NiMH battery, these notebooks should run for 3 to 5 hours, according to the vendor. The battery is hot swappable and recharges in 1.5 hours. The AC adapter weighs just under 6 ounces.

The ActionNotes include all the extras, such as local bus video with 512K of VRAM and Cirrus Logic's 5426 accelerator chip. Each unit has a PCMCIA Type II slot, a 14.4-kilobits-per-second fax-modem incorporated onto the motherboard, and Delri-

na's WinFax Lite software. Epson has bundled Borland's new personal information manager, Sidekick for Windows, and has preloaded both DOS and Windows along with their online documentation.

Epson provides an impressive three-year warranty, plus Extra Care Road Service, which guarantees a replacement notebook within 24 hours and Federal Express shipment of your notebook to and from Epson.

Bounty for Bargain Hunters

Analysts expect more machines using the 66-MHz Cyrix chip to ship this fall, at even more competitive prices. The Cx486DX2-V66 is hardly Cyrix's last hurrah. The

Richardson, Texas, firm plans to ship a 3-volt 80-MHz 486 chip, the Cx486DX2-V80, for midrange desktop systems. According to Cyrix, these PCs will hit the street in October or November, priced about the same as Intel DX2-66-based systems. Cyrix claims this chip outperforms an Intel 486DX2-66 by up to 20 percent. The company says it's still on track to deliver a Pentium-compatible processor by year-end. IBM has an agreement to manufacture all these chips, as well as Pentium-compatible processors due early this fall from NexGen in Milpitas, California. Seems as though your selection of processors is only going to increase.

—Laurianne McLaughlin

Epson ActionNote 766 Series

First notebooks to use Cyrix's Cx486DX2-V66 weigh as little as 4.9 pounds.

Key Features: 9.5-inch dual-scan color or 8.5-inch active-matrix color display

• Almost-full-size keyboard • Internal floppy • Local bus video

Pricing: \$2999 to \$3499

Availability: Immediate

Epson, 800/289-3776

Intel Slashes Pentium Prices: Life is tough at the front of the pack. Scrappy competitors such as Cyrix and AMD continue to nip at Intel's heels, introducing newer, faster 486 clones and promising cheap Pentium-compatible CPUs later this year. Meanwhile, industry giants IBM, Motorola, and Apple are promoting the PowerPC chip as the true Pentium-killer and have gone so far as to produce special effects-laden television advertisements that equate Intel's microprocessor with the long-extinct dinosaur.

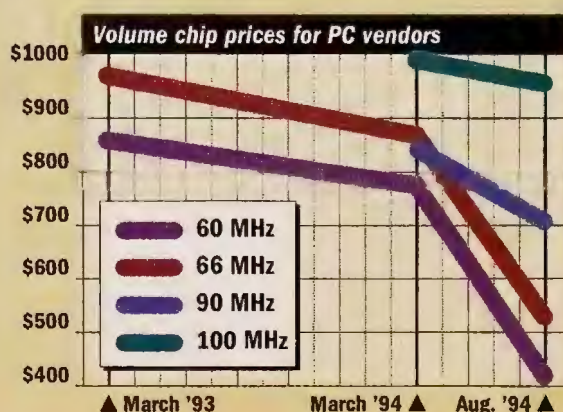
What's the Tyrannosaurus rex of processors to do? The answer: make Pentium systems so affordable no buyer can afford to pass them up. Over the past year, the price that computer manufacturers pay for a 60-MHz Pentium chip has fallen from just under \$900 to a little over \$400, resulting in dramatic price reductions on Pentium-based PCs. Recently Dell Computer was the first major vendor to announce a fully config-

ured Pentium system with 8MB of RAM, a 340MB hard drive, a 15-inch color monitor, DOS, and Windows for under \$2000.

And the Pentium's desktop-only orientation will soon end. Intel plans to introduce a 75-MHz Pentium processor for notebooks, and Pentium-based portables should reach store shelves this fall, according to Intel officials. To support its Pentium push, Intel is rapidly increasing production of the chip: The Pentium will account for 25 percent of Intel's CPU shipments by the end of the year, the company says.

So is the 486 dead? Not quite yet, say industry pundits. With Cyrix and AMD at the 486 party, buyers should find excellent prices on systems that are fast enough for standard business applications such as word processing and spreadsheets. But if your company is making the leap to processor-intensive tasks such as video conferencing, the Pentium (or one of its speedy competitors) is the better bet.

Pentium Prices Plummet



Source: Intel Corp.

Close-Up Telecommuting

TEST DRIVE

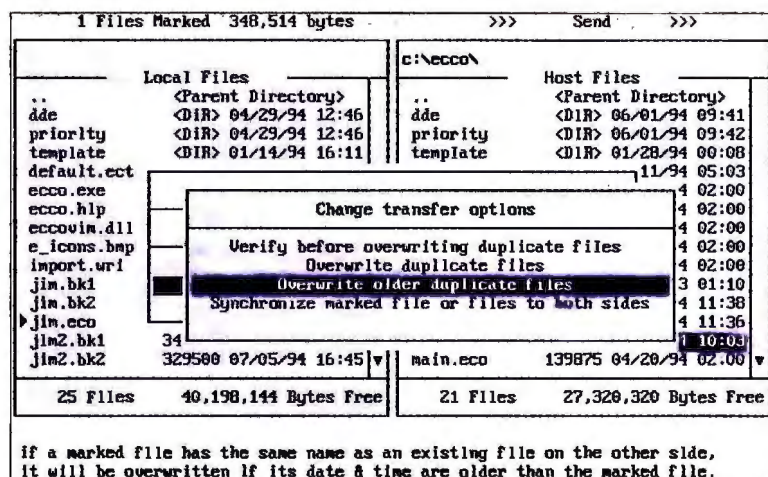
I recently moved to Vancouver, Washington. It's a long commute to *PC World's* San Francisco offices, where I'm publisher of online services. Nonetheless, to be effective I must stay in touch with my colleagues and the people who report to me.

Flying back and forth every day was out of the question, and spending the entire work week away from my home and family was too unpleasant to contemplate. The compromise solution: Two days a week I telecommute to work using Norton-Lambert's Close-Up 6.0, a speedy and well-behaved remote control program. Close-Up has made both my work life and my family life a lot simpler. The new version is faster than its predecessor and sports new transfer options including my favorite: the capability to synchronize, or *mirror*, files.

I start my long-distance workday by reading my E-mail and answering voice mail remotely. (My San Francisco office phone calls are forwarded to my home office telephone when I'm in Vancouver.) Then I fire up Close-Up and use its Remote feature to log on to my computer at *PC World* (which uses the Host part of Close-Up.) The program's automatic call-back feature prevents anyone but me from accessing my comput-

er: Close-Up reads my password, hangs up the phone, then dials my computer in Vancouver, using the telephone number associated with that password.

Once Close-Up connects, I log on to the *PC World* network just as if I were sitting in my office—in fact Close-Up is so fast, I sometimes forget I'm working from home. Using Close-Up I can "chat" with col-



FILE SYNCHRONIZATION is made easy with Close-Up's Mirror facility, which lets you rapidly update files on two systems.

leagues interactively (as long as they're running a copy of the program) and check my personal information manager (PIM) for meeting requests and changes in my schedule. A 10-to-20-minute connect time in the morning usually sets me up for the day. In the evening I update both computers by using Close-Up to call again and mirror essential directories.

Using the program's built-in file-transfer software, I can mirror two directories, bringing both of them up-to-date with any additions or deletions.

Close-Up installs like a dream: It finds your modem and the COM port the modem's using, warns you of any potential conflicts, then installs itself without a hitch—just specify your modem model (Close-Up supports over 650).

Easy to use, fast, and full-featured, Close-Up 6.0 makes telecommuting better than being there. My thanks—and those of my wife and family—to Norton-Lambert.

—Jim Moody



News Monitor

(continued from page 59)

about a certain team or athlete. America Online and CompuServe are developing similar services.

High-Speed Phone Lines Motorola is designing its CableComm service to boost the throughput of cable networks for high-speed voice and data services, including video teleconferencing. CableComm will offer two-way communications services over cable at transmission speeds up to 384 kilobits per second, according to Motorola. CableComm subscribers will be able to make phone calls via the cable network, and tap into online services at much higher transmission speeds than those offered by analog phone lines or high-speed digital services like ISDN. Market trials are slated to begin in the middle of next year, with customer shipments starting in late 1995.

A LAN in the Home Microsoft Corporation is working with California utilities provider Pacific Gas & Electric and the TCI cable network to provide energy management services to consumers. Due to be tested in Walnut Creek, California, the service utilizes a TCI set-top TV box with Microsoft-developed software. It creates a mini-network capable of transmitting data across a house's existing electrical wiring—useful for, say, using your office PC to turn on your air conditioner before you head home. According to Microsoft, testing will continue through 1996.

(continued on page 63)

Close-Up 6.0

Operate your office PC from a mobile or home office system.

Key Features: File synchronization

- Zippy performance

Pricing: Host and Remote \$199

Availability: Immediate

Norton-Lambert, 805/964-6767 ext. 1

Reader service no. 810

How to Make Your PC Listen

I have been talking to my computer for years—mostly saying things you can't print in a family magazine—and, frankly, I've been a little disappointed by the lack of response. But now that there's Kurzweil Voice, my PC can finally listen to me—even if it's still a little hard of hearing.

Unlike low-cost sound board utilities, which let you bark out simple commands to launch applications and shuffle files, Kurzweil Voice 1.0 for Windows is a full-fledged keyboard replacement: Simply open your word processor or spreadsheet and start dictating. An accomplished "dictator" could enter 40 to 50 words a minute—faster than many people type.

In the past, such speech recognition systems were hard to use and cost thousands of dollars, which limited their use to disabled people and those in specialized fields such as medicine. But Kurzweil Voice's slick Windows interface and \$995 price place voice input within reach of business users.

The implications of voice technology are enormous. Besides making PCs accessible

to people who can't type, voice input could eventually make keyboards a thing of the past—and enable computers to become far more portable. Unfortunately, to use voice input today, you'll need to learn an entirely new way of working with your computer. For the average user, the effort may not be worth the aggravation involved.

Look, Ma, No Hands

Like its competitors—IBM's Personal Dictation System for OS/2 and Dragon Systems' Dragon Dictate for Windows—Kurzweil Voice gradually "learns" your voice, becoming more accurate over time. Unlike the IBM and Dragon systems, Kurzweil doesn't require hours of training before you can use it; you simply install the software and the voice-



processing board, plug in the headset microphone, and begin talking. (However, you'll get better results if you "enroll" your voice by reading a list of 400 words; this takes about 15 minutes, plus another 90 minutes or so for Kurzweil to process the data.)

Survey of Americans and Technology:

Technophiles are hip, and they constitute a majority in the United States today, according to "Technology in the American Household," a survey the Times Mirror Center for the People and the Press conducted that studied how Americans are using electronic technologies. The survey, performed in January and February 1994, involved phone interviews with 3667 adults and 400 children nationwide. Here are some of the specific findings:

The Good:

- PC users aren't geeks; they're just as likely as nonusers to have an active social life and to participate in sports, and they're more likely to describe themselves as having outgoing personalities.
- A majority of United States citizens describe themselves as

technophiles. By a margin of 65 percent to 30 percent, Americans like rather than dislike computers and technology.

- Computers are empowering. PCs give us more control over our lives, say 42 percent of those surveyed.
- Computers let us work at home. Of regular PC users, 67 percent work at home occasionally.

The Bad:

- Not everyone can ride on the information superhighway. Only 12 percent of households have a PC with a modem.
- Not all children have the same access to technology. Among college graduates with children, 49 percent say that their children use a PC at home, compared with 17 percent of parents with only a high school diploma.

The Ugly:

- Some people think the PC is a friend of Big Brother. A whopping 55 percent of Americans think computers are being used to invade their privacy.
- Americans still spend more time watching TV than engaging in any other leisure activity.



But make sure you're packing some serious hardware: Kurzweil Voice requires a 486-33 or better system with at least 16MB of RAM and 30MB of disk space. And be prepared to spend some quality time with the manual and online tutorial—mastering Kurzweil's dictation techniques is almost like learning a new language.

For example: To control applications, you recite specific groups of words, such as *file-open* or *enter-key*. At times the syntax gets pretty obscure (*auto-caps-on?*). Fortunately, Kurzweil provides a scrollable list of voice commands for each of the 20 major Windows apps it supports. (You can also assign voice commands to other Windows programs using the Kurzweil Command Editor.)

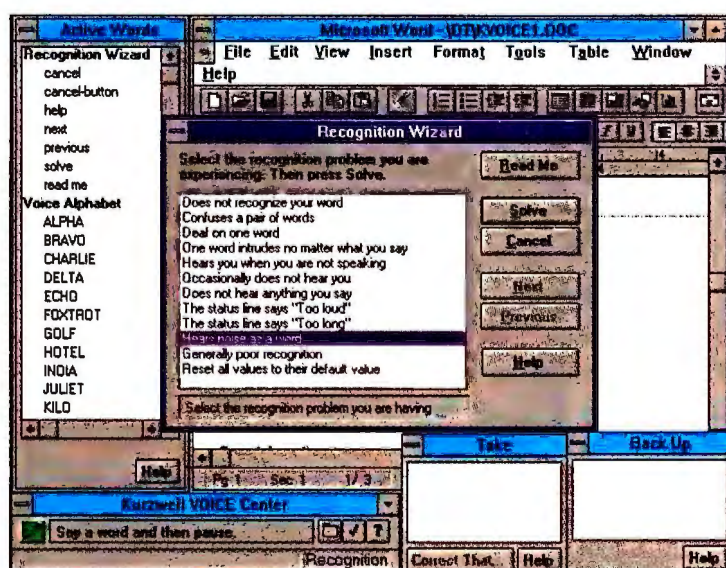
Dictating text is more complicated: You must pause... between...each...word. As you speak, Kurzweil inserts the word that it thinks you said into your document, then shows you the four closest alternative words. You can accept the new word by continuing with your dictation, or choose one of the alternatives.

If the word you want isn't listed, you have to stop dictating and correct it. You can use voice commands to correct up to the last 10 words you spoke, which allows the program to fine-tune its profile of your voice and lets you add words to Kurzweil's 40,000-word base vocabulary. You can also use the keyboard to correct errors, but then the program won't learn from its mistakes.

Speech Impediments

Kurzweil flubs words quite often, especially when you first use it. For example, it interpreted the phrase *This memo was created with Kurzweil Voice* as *This memo was defeated with curse while boys*. The program also tends to interpret background noises (such as a barking dog) as words. However, you can use Kurzweil's Recognition Wizard correction feature to solve most nagging problems, and errors tend to diminish the more you use the program.

On the other hand, navigating documents and dialog boxes using voice commands such as *up-arrow* and *tab-key* is extremely



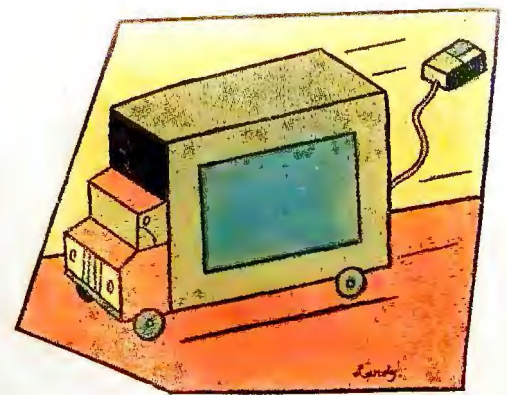
KURZWEIL VOICE'S RECOGNITION WIZARD lets you tune out background noises to increase the program's accuracy.

tedious. For example, I wrote this story using Kurzweil Voice, but I had to resort to the mouse to move around, and dictating took much longer than typing.

There are two competing products worth considering. Dragon Dictate for Windows is the only dictation product that works with 16-bit sound cards. A version with a 30,000 vocabulary sells for \$695. IBM's Personal Dictation System has a base vocabulary of 32,000 words and is available only for OS/2. It costs \$998. A Windows version is coming in the fall.

If you have to choose between working with voice and not working at all, Kurzweil Voice may be the answer, especially if you can use it alongside traditional input devices. Otherwise, you'll need to put in a lot of time and effort before you and your PC are on speaking terms.

—Daniel Tynan



News Monitor

(continued from page 61)

LONG HAUL TO CHICAGO: It may be a longer trip to Windows 4.0 than you think. Microsoft's upcoming 32-bit operating system, code-named Chicago, will ship by the end of 1994, the vendor says. But information systems managers in medium to large corporations plan to wait 4 to 12 months after Windows 4.0 ships before upgrading, according to a poll of 400 managers by International Data Corporation (IDC). "There's a great deal of reluctance to accept it right out of the chute," says Mary Conti Loffredo, research manager at IDC. Managers worry that the first version of Chicago will ship with bugs, she says.

LARGE-SCREEN, SMALL-FOOTPRINT MONITORS: Next year, IBM will introduce a dramatically different small-footprint computer display, only 4 inches deep. An application of technology invented for NASA's space shuttle program, the new monitors will be available in screen sizes up to 20 inches and will weigh about one-fourth as much as existing products. Dave Himes, brand manager for IBM's Visual Products group, says the products will compete at the high end of the market and will work with any graphics subsystem. IBM would not disclose prices or describe the monitors' technology. IBM plans to preview the monitors at the fall Comdex in Las Vegas and offer 17- and 20-inch versions for sale in 1995.

Edited by Randy Ross

Contributors: Joe Abernathy, Jeff Bertolucci, and Laurianne McLaughlin

Kurzweil Voice 1.0 for Windows

Affordable voice recognition system.

Key Features: Recognition Wizard

- Speaker independent • Support for 20 major Windows applications
- 40,000-word base vocabulary

Pricing: \$995

Availability: Immediate

Kurzweil Applied Intelligence,
800/380-1234

Reader service no. 811

Making the Best of Peer Connections

TEST DRIVE

Everyone is doing it. Getting connected. Networking. And the marketing messages are so seductive:

"Finally, networking is simple for small groups."

"This is the fastest network you can buy off the shelf. It's also the easiest to install."

Already 51 percent of the PCs used by business, education, and government in North America are connected to a local area network, or LAN, according to Marty Palka, principal networking analyst with the Dataquest research firm in San Jose, California. That number is expected to grow to 85 percent by 1998. However, most of these LANs are seething snake pits of cables and hydra-headed servers that require network acolytes to install and service them.

Networking by the People, for the People

In contrast, peer-to-peer networks are far simpler and cheaper—and paradoxically less broadly used. Only about 27 percent of small office/home office sites—the primary domain of peer LANs—have networks, according to Palka. Yet a peer network offers many of the advantages of a server-based LAN: Every computer can share resources such as files, schedules, and printers, and you can run electronic mail and work-group software. Because peer nets are less complex than server-based LANs, they are ideal for proprietors of small to medium-size businesses or for departmental managers in



NETWORKING IN HIS OFFICE: Surrounded by a plethora of peer networks, Senior Editor Joe Abernathy finds that making the right connections can be frustrating.

larger firms. In addition, you don't need to hire a systems administrator.

And the truth behind the marketing hype? Well, peer networks have some disadvantages compared with server-based LANs. Know that the more systems you connect on a peer network, the worse the performance; heavy LAN usage can bring an office to a standstill. With a server, a dedicated high-performance PC handles the network activity. Another hitch: You can't always connect PCs over the distance you can with server-based LANs; in some cases the maximum is 200 feet. You may also be restricted to connecting as few as 30 PCs. Server LANs can accommodate thousands of users and can cover a much wider area.

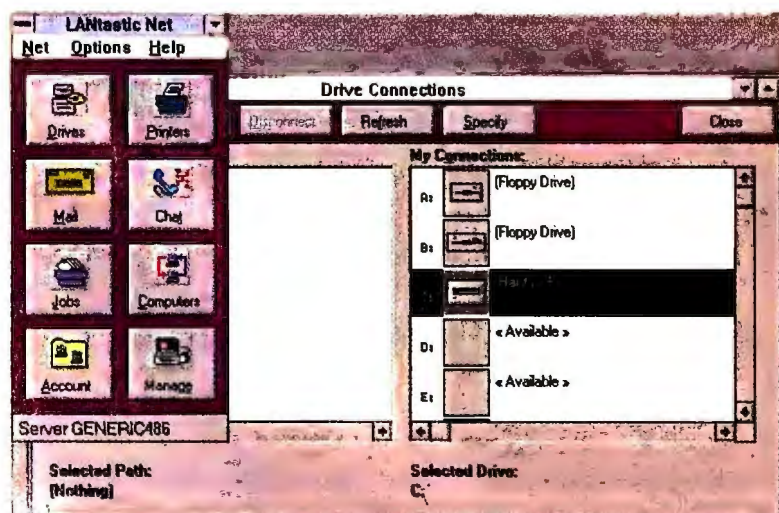
Why install a peer-to-peer network? Why install any network? Time and money. With a network, you can share resources such as database files and printers. Users will also benefit from E-mail, cen-

tralized backup, the ability to harness work-group applications, and with certain networks, the ability to access external resources such as the Internet.

How We Did This to Ourselves

We wanted a real-life office experience, so we set up a test-bed made up of six PCs and two notebook computers: The PCs consisted of an IBM clone running a Cyrix 386-25 to 486-50 upgrade chip, a Gateway 2000 486-66, a Zeos Pantera 66-MHz Pentium, a DECpc LPx 566 Pentium, a Compaq XL 60-MHz Pentium, and a Dell OmniPlex 486/100.

Only the Zeos and Compaq included adapter cards, so we laid in a stock of popular cards ranging in price from \$50 to \$200: Novell's NE2000 Ethernet, 3Com's EtherLink III, and Intel's EtherExpress 16. To tie in notebooks from Texas Instruments and Compaq, we used the 3Com EtherLink III PCMCIA adapter and a Xircom CreditCard Ethernet CE-10B2 adapter.



ARISoft's LANTASTIC is the most expandable, easy-to-install peer network—though linking to NetWare proved a bear.

DELL® LATITUDE™ XP
INTEL® DX4™ 75MHz SYSTEM

\$3399

BUSINESS LEASE*: \$126/MO.

- 9.5" DUAL SCAN STN COLOR
- 8MB RAM
- 340MB HARD DRIVE
- 3-YEAR WARRANTY†
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Keycode #11DDE

Continued from page 64

Only Coactive Connector and Simply LANtastic include cabling (owing to their proprietary nature, they must provide their own cabling), so we ran to the store and bought a supply of 10Base2 (thinnet) coaxial cables, terminators, and T-connectors. (Twisted pair, or 10BaseT, is generally used only in larger, server-based networks. 10Base2 lets you run a maximum of 800 feet of cabling, although you can buy repeaters to increase the reach. The proprietary Simply LANtastic, on the other hand, reaches only 200 feet.) Plan on spending \$10 to \$15 per PC.

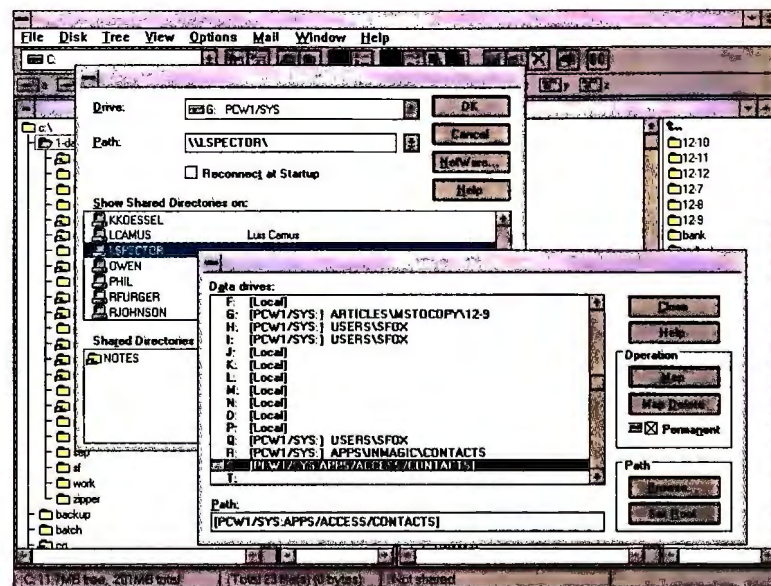
The internal network adapters from 3Com and Intel installed without difficulty—we used a simple software-based setup procedure instead of having to set jumpers or dip switches. The jumper-based NE2000 adapters were a headache and didn't work in the Gateway, Cyrix, and DEC PCs.

Microsoft Windows for Workgroups 3.11

Much as we hate to admit it, we found that in an all-Windows network, nothing beats Microsoft's Windows for Workgroups 3.11 for working with any other DOS or Windows installation, including beta versions of Windows 4.0 (Chicago) and Windows NT 3.5 (dubbed Daytona). Less positive was

our experience in trying to configure Windows for Workgroups. While it automatically detected the network adapter on many of our test machines, other systems using the Novell NE2000 Ethernet adapter locked up until we downloaded a new driver from the Microsoft bulletin board (call 206/936-6735). Also, we found that Windows would lock up while loading if the network was not properly terminated; if you don't have a cable hooked up to the NE2000 card, then you will need to attach two terminators to the T-connector.

Windows for Workgroups is the only product here to support protected-mode Microsoft NDIS 3.0, the latest Microsoft network driver spec, which requires only 4K of conventional memory and runs faster than real-mode NDIS 2.0 drivers. Most popular network adapters are supported through bundled NDIS drivers; installing third-party drivers is usually a snap. Windows for Workgroups also works with Novell IPX and ODI drivers, allowing tight



CONFIGURATION HASSLES dogged our installation of Windows for Workgroups, though it excels at Windows connectivity.

integration with Novell NetWare servers. Compatibility with TCP/IP (Transmission Control Protocol/Internet Protocol), the lingua franca of the Internet, is available as an add-on. Connectivity with Windows NT and the Workgroup Add-On for MS-DOS—which adds workstation and server capabilities to DOS machines—is excellent.

Microsoft Windows NT 3.5

Windows NT? Not Today. Not Tomorrow. Nice Try. No Thanks.

You've heard the jibes from competitors. But that was then, and this is now.

NT: New Technology. We're ready to concede that this version of Windows rocks like no other—even after spending four days treating a hard drive cancer caused by a bug in the file system of the 3.5 beta version of NT. It's faster than release 3.1 and supports high-end features such as preemptive multitasking, crash protection, and multiprocessors. Unlike 3.11, NT uses its own drivers and works with most popular adapters.

It offers networking that's compatible with Windows for Workgroups and supports a wide variety of non-Microsoft protocols, including IPX and TCP/IP, making it possible to connect to just about anything on your network—or external to your network, such as the Internet. If your business grows, you can expand

Road Map to Choosing a Network

Are you networking a small office or home office?

Do you need to share files or printers among Macintoshes and PCs?

Do you want to avoid opening your PC?

Do you want ethernet speed without the hassle?

Do you need ethernet?

Are you building a new network for a medium-size office or work group?

Will you be connecting only DOS and Windows PCs?

Will you need to share files or printers among Macintoshes and PCs?

Will you need connectivity with UNIX or proprietary workstations?

Are you adding peer-to-peer capabilities to a server-based LAN?

Are all workstations running Windows?

Are some workstations running DOS?

Coactive Connector

Simply LANtastic starter kit

Windows for Workgroups, Windows NT, Workgroup Add-On for MS-DOS; Intel EtherExpress or 3Com EtherLink III adapter

LANtastic with LANtastic for Macintosh

LANtastic with LANtastic for TCP/IP

Windows for Workgroups or Windows NT

LANtastic or Novell Personal NetWare

7 day a week, 24 hour a day hotline
dedicated to notebook support, and
nothing but notebook support.

DELL LATITUDE
INTEL SX 33MHz SYSTEM

\$1999

BUSINESS LEASE: \$74/MO.

- 9.5" DUAL SCAN STN COLOR
 - 4MB RAM
 - 200MB HARD DRIVE
 - \$99 SECOND BATTERY
(REQUIRED FOR 8
HOURS OF POWER)*
 - 1-YEAR WARRANTY†
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Keycode #11DDF

Continued from page 66

to a server-based LAN with Windows NT Advanced Server. This scheme also provides Macintosh connectivity and a variety of other enhancements. NT still requires 12MB of RAM, although we strongly recommend 16MB.

NT was fairly easy to bring online, but the hours I spent on the telephone with Microsoft's software engineers were not enough to establish a connection to the Internet using PPP (Point to Point Protocol) and TCP/IP. However, when it comes to performance, NT is what Windows 3.1 should have been.

Performance Technology Powerlan 3.0

Powerlan is a powerful peer-to-peer networking package with a few shortcomings. It provides full support for both DOS and Windows, and its DOS memory requirements (up to 76K) are acceptable.

The documentation is weak, however, and if you venture beyond Performance Technology's proprietary adapter drivers, installation becomes a challenge. While it is possible to integrate Powerlan with Microsoft networks, such as Windows for Workgroups and Windows NT, most people will need assistance to make this work. Powerlan cannot browse resources on Microsoft networks, so in order to interact with devices on the net, you have to know the name of the machine or the printer you want to use.

The key installation trip wire we found also affected the installation of LANtastic 6.0: To get the LAN up and running, you

have to load MSCDEX, Microsoft's CD ROM driver, after loading the network drivers—not an intuitive act.

Artisoft LANtastic 6.0

LANtastic 6.0 is without question the most expandable peer-to-peer network available for PCs. It includes DOS and Windows-based utilities and provides better integration with Novell NetWare than any product we looked at, including NT. Separate packages allow you to hook into TCP/IP networks and Macintosh systems.

It's easy to get LANtastic up and running when you use a network adapter supported by Artisoft. But when using an NDIS or ODI driver (which is required for interaction with Windows for Workgroups or NetWare), it is not nearly as easy as the marketing fluff on the back of the box makes it sound. We spent several hours on the phone with Artisoft's technical support department trying to get these drivers to install properly. On the positive side, though, LANtastic requires just an 80K driver to run.

Like Powerlan, LANtastic cannot browse resources on Microsoft networks, and you have to change the order in which MSCDEX loads in your AUTOEXEC.BAT. (By the way, we found that to share a CD ROM drive on any LAN, you must type /S on the

A Who's Who of Peer Networking

Coactive Connector 2.0

Price for 2 nodes:

\$399.95

Coactive Computing,
800/727-4273,
415/802-1080

Reader service no. 782

LANtastic 6.0

Price for 2 nodes:

\$459

Simply LANtastic 5.1

Price for 2 nodes: \$299

Artisoft, 800/233-5564

Reader service no. 783

Personal NetWare 1.0

Price for 2 nodes: \$198

Novell, 800/638-9273

Reader service no. 784

Powerlan 3.0

Price for 2 nodes: \$198

Performance Technology,
800/327-8526

Reader service no. 785

Windows for

Workgroups 3.11

Price for 2 nodes:

\$439.90

Windows NT 3.5

Price for 2 nodes:

\$990

Microsoft, 800/426-9400

Reader service no. 786

MSCDEX command line in your AUTOEXEC.BAT file.)

Artisoft provides an upgrade path for growing your peer-to-peer network into a server-based LAN, or for operating one in parallel in a large company, via its CorStream Server product. CorStream is essentially a version of Novell NetWare 4.01 capable of working seamlessly with LANtastic 5.0 and 6.0 clients. This compatibility makes it possible for you to add a server to the peer network without disturbing the workstations. Artisoft also offers separate LANtastic for TCP/IP and LANtastic for Macintosh products.

LANtastic is flexible enough to network

Ares Offers a PCI-VESA Combo PC:

Can't decide on a local bus? Clone maker Ares Microdevelopment of Farmington Hills, Michigan, has a novel solution—PCI and VESA in a single computer. Ares's new PCI-VESA system includes six free bus slots: two PCI, one VESA, two ISA, and a combination ISA-PCI. (The system includes one extra PCI slot that

holds a Genoa video accelerator card and one additional VESA slot with a hard drive controller.)

The Ares PCI-VESA system comes in a variety of configurations. A \$2195 system includes a 66-MHz 486DX2 processor, 8MB of RAM (upgradable to 128MB), 256K of secondary RAM cache, a 420MB hard drive, a 64-bit PCI video accelerator with 2MB of DRAM, a CD ROM drive, a sound card, speakers, and a 15-inch color monitor.

According to the PC World Test Center, Ares's 66-MHz 486DX2 PCI-VESA system scores slightly above average for its processor class, although about 27 percent slower than the fastest 66-MHz 486DX2 we've tested.

Nevertheless, if you need a system that has the flexibility to handle both VESA and PCI cards, Ares's hybrid PC is worth a look. Ares Microdevelopment, 800/322-3200. Reader service no. 787



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All in One: The QMS 2001 Knowledge System PC crams a typical desktop's worth of hardware into one desktop unit: You get a 486SX-33 PC (with 4MB of RAM, a 120MB hard drive, and a 3½-inch floppy drive); a 600-dpi, 6-ppm laser printer; a 400-dpi copier; a 400-dpi scanner; and a 9600-bps fax-modem. The Knowledge System comes with a 14-inch super-VGA monitor, a keyboard, a mouse, and pre-loaded software including Windows. The street price should be \$5000—about what you'd pay if you bought each piece of hardware and software individually.

Convenience and security are the rationale behind the Knowledge System's all-in-one approach. The bundled software makes everyday tasks—such as scanning a document, putting a fax header on it, and sending it—more private. You avoid the hassle of installing peripherals, and you contact just one vendor for all your hardware support. Analysts expect the Knowledge System PC to interest corporate departments (such as legal, human resources, and internal audit) that require above-average privacy, as well as

remote offices that need one unit to handle all office functions.

A major drawback to the Knowledge System: QMS offers no model with a hard drive larger than 120MB, and the maximum RAM is 20MB. For those who want everything but the PC, QMS sells a device that hooks up to your existing PC's parallel port and is street-priced at about \$3000.

This is one of the first of a new crop of multifunction devices that are expected to arrive during the next 12 months, says International Data Corporation senior analyst Marco Boer. Boer expects that these products won't include a PC, will use ink jet printers instead of lasers, and will cost under \$2000. QMS, 800/523-2696, 800/777-7782. Reader service no. 788

Continued from page 68

just about any computer. Combined with its TCP/IP support, this solution wins our favor for complex multiplatform networks.

Artisoft Simply LANtastic 5.1

Simply LANtastic is an elegant solution for small and home offices and is the most hassle-free serious networking product in this roundup. Installation is simple: Plug in the proprietary 16-bit adapter cards, connect the cables, and install the software. The process took 15 minutes on two test PCs, and we didn't need the manual. (Coactive Connector installs faster but has a lower level of functionality.) Simply LANtastic supports 200 feet of cabling and 20 PCs.

Novell Personal NetWare 1.0

The only real reason to consider Personal NetWare is if you need to run a peer network that must be tightly integrated with a full server-based NetWare installation. This would be the case if you wanted both inter-departmental peer services and access to a broader array of corporate network resources. Novell recommends connecting five to ten computers. In addition, NetWare has a terrible user interface, it's only slightly less difficult to install than NetWare 3.12, and it requires a hefty 640K of memory.

Coactive Computing Coactive Connector 2.0

The easiest networking product to use, Coactive Connector 2.0 supports primitive

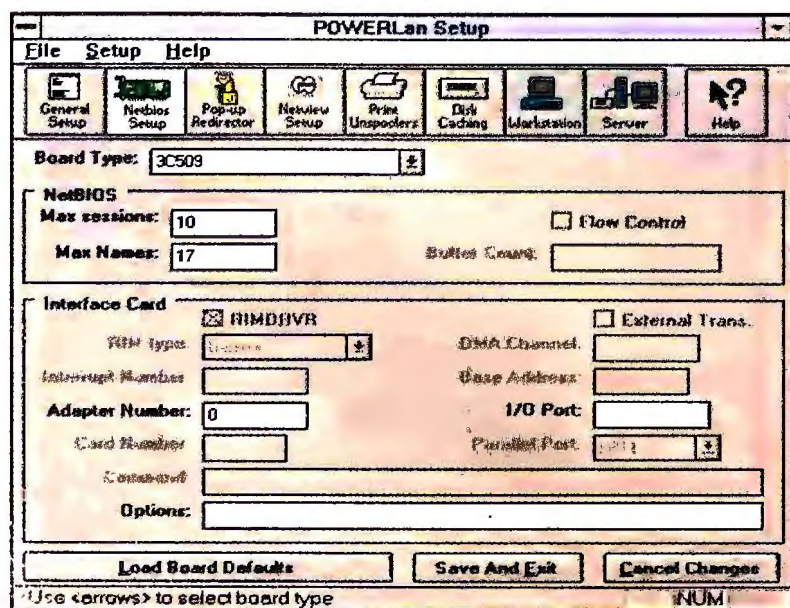
What's Right for You

electronic messaging between DOS and Windows systems and printer and file sharing. It installs quickly, plugging into the PC's parallel port, and it works with DOS and Windows PCs and Macs. It connects up to 32 PCs within 1000 feet. A pass-through port lets you attach a parallel printer to the adapter. Shared files must be stored within a central directory, and Coactive is *slow* (26 kilobits per second). But it works.

For a small DOS and Windows installation, Simply LANtastic 5.1 best carries the weight. For an all-Windows network, choose Windows for Workgroups 3.11. For low-level Mac-to-PC connections, consider Coactive Connector. For more robust multiplatform networks, however, LANtastic 6.0 is your best choice.

There are other products and approaches to connecting computers yourself: Rose Electronics makes a powerful line of easy-to-install printer- and resource-sharing devices. Moses Computers' Moses LAN offers a variety of peer-to-peer solutions, from relatively simple file-sharing options to more robust E-mail-capable products. Finally, if you have an eye on the future, look for a TCP/IP LAN. This type of product provides peer services while giving every machine the capability to act like a traditional server. The next version of Windows, Chicago, is slated to incorporate TCP/IP protocols; and TCP/IP is the native language spoken by most machines on the Internet. IBM offers TCP/IP extensions for both DOS and Windows, LANtastic 6.0 offers optional TCP/IP support, and a robust group of TCP/IP add-on products, led by NetManage's Chameleon, is emerging for Windows, Windows for Workgroups, and Windows NT.

—Jeff Noxon, Joe Abernathy, and Russell Glitman



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Networking

A PC WORLD MONTHLY SECTION ON GETTING THE MOST FROM YOUR NETWORK

Manage Your Group's Documents

PC Docs Open and SoftSolutions let you store and track all your key documents on the net.



If old-fashioned file cabinets in your office are giving way to hard disk storage on a local area network, it's time to consider buying document management software. These network-based programs let everybody on the net file, locate, and retrieve documents easily.

A document management package is a valuable tool when a DOS file name doesn't give you enough information to find the file you want, and when other people in your organization need access to your documents as well as to their own. By controlling where you save your work and then indexing it, these packages let you and your co-workers find saved documents in a variety of ways. Document managers also make it easier to retain your organization's intellectual property and to leverage information by making it fast and easy to locate anything that's stored on the network.

Document managers work by replacing the ordinary File•New and File•Save dialog boxes in your applications software with

a screen—called a *profile*—in which you enter information that will help you find the document later, including the document's topic, type, author, creation date, and so on. Completing this profile information is analogous to writing a file name on a manila folder tab and filing the folder in a specific place in a file cabinet.

The next time you select File•Open, a blank profile screen appears. Enter what

you know about the document you're looking for, and the document manager will return a list of likely candidates. You don't need to know the file name to find the document; you can enter the name of the person who created it, the topic, the date it was created, or any other range of criteria.

In addition to storing the information contained in the profile, document managers let you perform full-text searches on the information in documents. If you know that a letter contains the phrase *flight of fancy* you can search on *fancy*, and the document manager will find all documents containing that word. The search happens quickly, because the document manager searches an index of everything that's been saved. Be aware, though, that full-text searches can't find information that's been added since the document manager last updated its index.

At first, it's a little disconcerting to have to trust the document manager to find the document for you. But the process really does work quite well.

Document managers not only locate documents, they manage them for the systems administrator. For example, when you

INSIDE NETWORKING



76 / Making Work Flow Work

This firm found its Action Technologies system paid off big time—eventually.

80 / Buying Tips: Choosing the Right Fax Server

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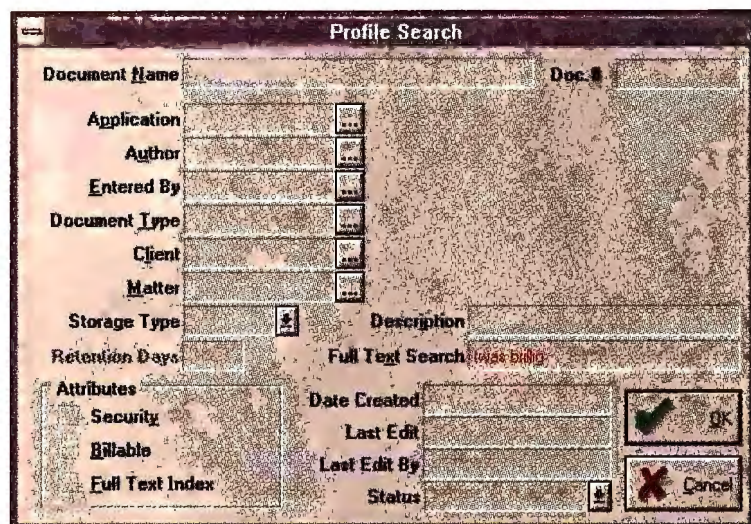
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Networking

assign a document type, you can also specify the number of days to keep it, the number of versions to keep, and other options. Later, the system administrator can delete expired documents.

Make sure the document management package you buy supports the major software applications your organization uses.



PC DOCS OPEN 2.0'S PROFILE TOOL does it all. Enter document information, assign document security, and enter phrases for full-text searches in one place.

The leading packages already work with most major word processing and spreadsheet software, and more applications are being added all the time. Note that because of the way these packages "hook" into word processors, spreadsheets, and other applications, they will probably void some integration features offered by the Windows office suites.

Here's a quick summary of two veteran document managers.

PC Docs Open 2.0 for Windows

PC Docs Open 2.0 is a Windows-based document manager that works with SQL database packages from vendors such as Gupta, Microsoft, Oracle, Sybase, and Watcom to profile, store, and retrieve business documents. (To run PC Docs Open, an organization must be running one of these SQL databases, but that's an issue for network administrators to worry about.) The package runs on networks using Novell's NetWare, Banyan's VINES, Microsoft's LAN Manager and Windows for Workgroups, and other environments.

When you start PC Docs Open, you see a desktop with icons for folders and applications—a little like the OS/2 Workplace

Shell. You organize documents by project, client, subject, or any other criteria, then place them into desktop folders; to start your work, click a folder and then select the document you want.

To start a new document, click the relevant application's icon within the PC Docs desktop. When you save the document, PC Docs Open asks for profile information. To find a document, click the Quick Retrieve button or the Profile Search button. To find a document via a full-text search—for example, to see if someone else has already written the kind of letter you need—enter a key word or phrase in the Profile's Full Text Search box. PC Docs Open will return a list of all files containing the phrase.

PC Docs Open is sold by authorized integrators—a wise approach, because installation and configuration can be complicated, and the manual isn't written for amateurs. With PC Docs Open, the systems administrator has to create the links between applications and the document manager.

For example, to link 1-2-3, the administrator must copy a certain file to the 1-2-3 add-in directory and edit 1-2-3's INI file.

PC Docs Open finds documents created by the most popular Windows-based applications, including Ami Pro 3.0, Word 6.0, WordPerfect 6.0, 1-2-3 4.0, Excel 4.0, and Quattro Pro 5.0.

SoftSolutions

SoftSolutions 4.0 for Windows takes a different approach. Rather than using a separate database package to store document profile information, it uses its own database structure. Any application that's compliant with Open Database Connectivity (ODBC), however, can get to the data.

The program supports OLE 2.01 and works with Novell's NetWare, Microsoft's LAN Manager, Artisoft's LANtastic, and a wide variety of other network operating systems.

While SoftSolutions is also sold only by authorized inte-

grators, installation is simple—the software does most of the work for you. The search capabilities are powerful; you can use buttons to write search code that contains Boolean operators (the kind that let you search using phrases like 'Lucy AND Desi' or 'Lucy OR Desi').

SoftSolutions' profile is the centerpiece of the package. The profile appears when you start the application; once you fill it out, you select either the Add button to create a new document or the Search button or Full-Text Search button to find a document. The program does provide a desktop metaphor similar to that used by PC Docs Open, but it's currently an extra-cost option (the company says that it intends to include it in the next release).

SoftSolutions was recently acquired by WordPerfect Corporation and is now part of Novell's strategy to expand its presence in the work-group application arena.

—Andrea Powers

Andrea Powers is an associate editor for PC World who can be reached at the magazine's Boston office.

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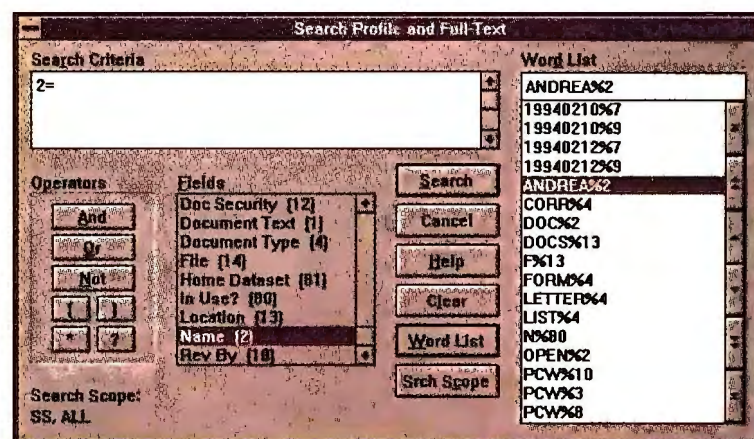
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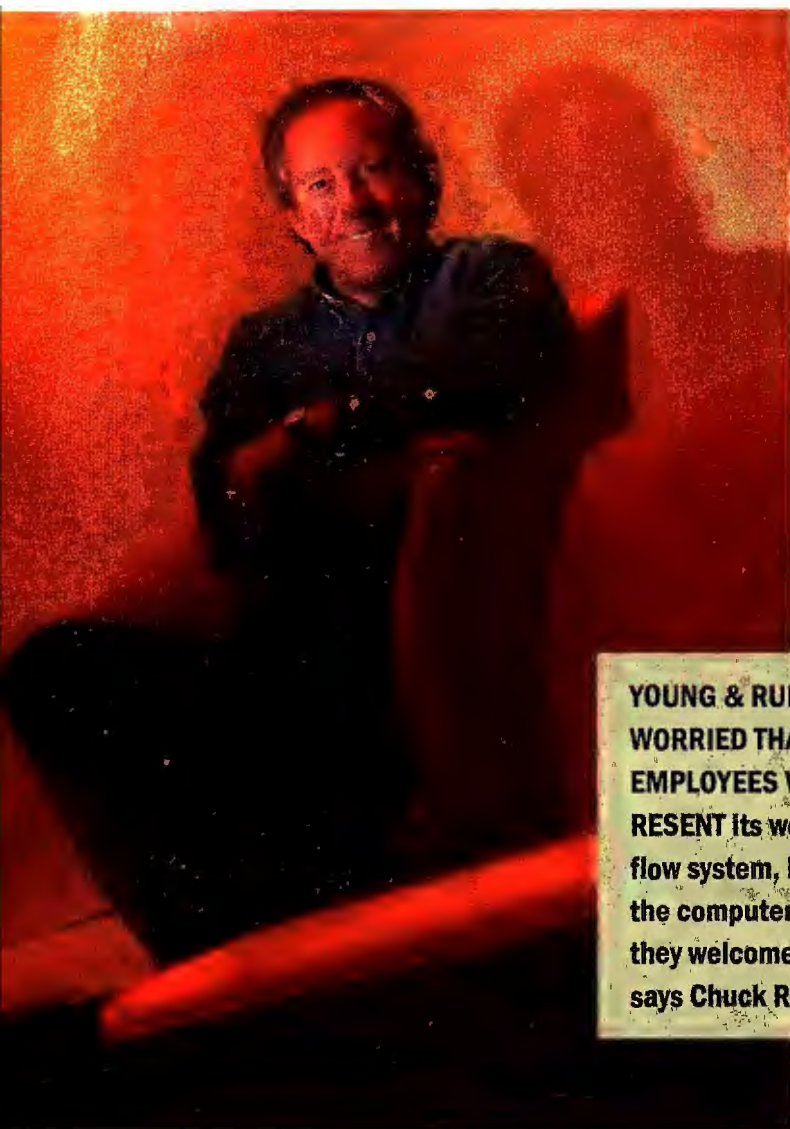
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Struggling to Make Work Flow Work

Young & Rubicam keeps business moving with Action Technologies' Notes-based system.



YOUNG & RUBICAM
WORRIED THAT
EMPLOYEES WOULD
RESENT its work-
flow system, but "if
the computer helps,
they welcome it,"
says Chuck Riley.

doubts—all of which were confirmed in the short run. "The technical people prime the pump and get the businesspeople interested, but we want things delivered, and the technical people can't always do that," Riley explains.

Y&R chose Notes and Action Technologies' work-flow kit (which was being adapted to Notes) for its new system. While Y&R won't disclose the cost, Riley's group had to install a network and a Notes server, in addition to upgrading several user workstations to run Windows.

To start the project, Riley, several colleagues, and Action employees first had to analyze the way work was being handled at the agency.

After a four-month investigation, Riley discovered how people *thought* things worked.

Then he uncovered unnecessary and redundant procedures, and at the same time discovered that a number of important tasks were not being done at all.

With this information in hand, Y&R personnel and Action developers spent three months building a system that would monitor work processes, making sure every process was done on time and in the proper sequence.

Every task is tied to a time line. When a manager sets a deadline, prompts automatically go out to all the individuals involved. Users, who for the most part work with either Microsoft Word or Excel, toggle into Notes to see these on-screen alerts. If they decide not to handle the task immediately, a pending-item icon appears in the Notes database. When they are ready to tackle the job,

"they just open the database, and accomplish certain tasks to make the notification go away," says Riley.

Bosses can quickly view progress on a given task—and so can customers, connected from remote sites via Notes. Y&R conducted research before and after installing the software to determine whether employees resented so many people peering over their shoulder electronically. But Riley says that the vast majority of employees see work-flow software as a help, rather than an intrusion: "If the computer helps them do their job, they welcome it."

A far bigger problem was software stability—the project ran for about a year before the firm's Notes 3.0 server stopped crashing. Because of the instability, Riley said, "people quickly reverted to their old paper ways." Even when the system ran smoothly, users didn't trust it and continued to file paperwork on everything as a precaution. Riley is still working to convince employees that the software is finally safe.

Given the overall success of this experiment, Young & Rubicam plans to introduce work-flow software into other areas of the business. Ironically, however, Notes crashes have left such a bad taste that future systems may run Action software on the Microsoft/Sybase SQL Server instead.

—Douglas Barney

Douglas Barney is a senior editor for InfoWorld in Boston.

A work-flow system that manages new-client business has paid off handsomely at Young & Rubicam's San Francisco office. Based on Lotus Notes, the advertising agency's system receives client requests, tracks negotiations, and helps prepare a report for the office's creative team that includes cost estimates and time lines.

Executive vice president and group director Chuck Riley estimates that his 11-person account management group now works 50 percent less overtime, performs 64 percent fewer "redos" resulting from miscoordinated processes, and gets a higher percentage of jobs done both on time and on budget. But the experience left the Y&R pioneers with plenty of arrows in their backs, Riley says.

When his group was picked 18 months ago by Y&R's chief information officer as the firm's guinea pig for a computerized work-flow system, Riley had plenty of

CUSTOMIZED LOTUS NOTES FORMS like this work-order request drive Y&R's work-flow system.

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Dell Latitude XP DX4/100 TFT	14:48
Dell Latitude XP DX2/50 STN	17:05

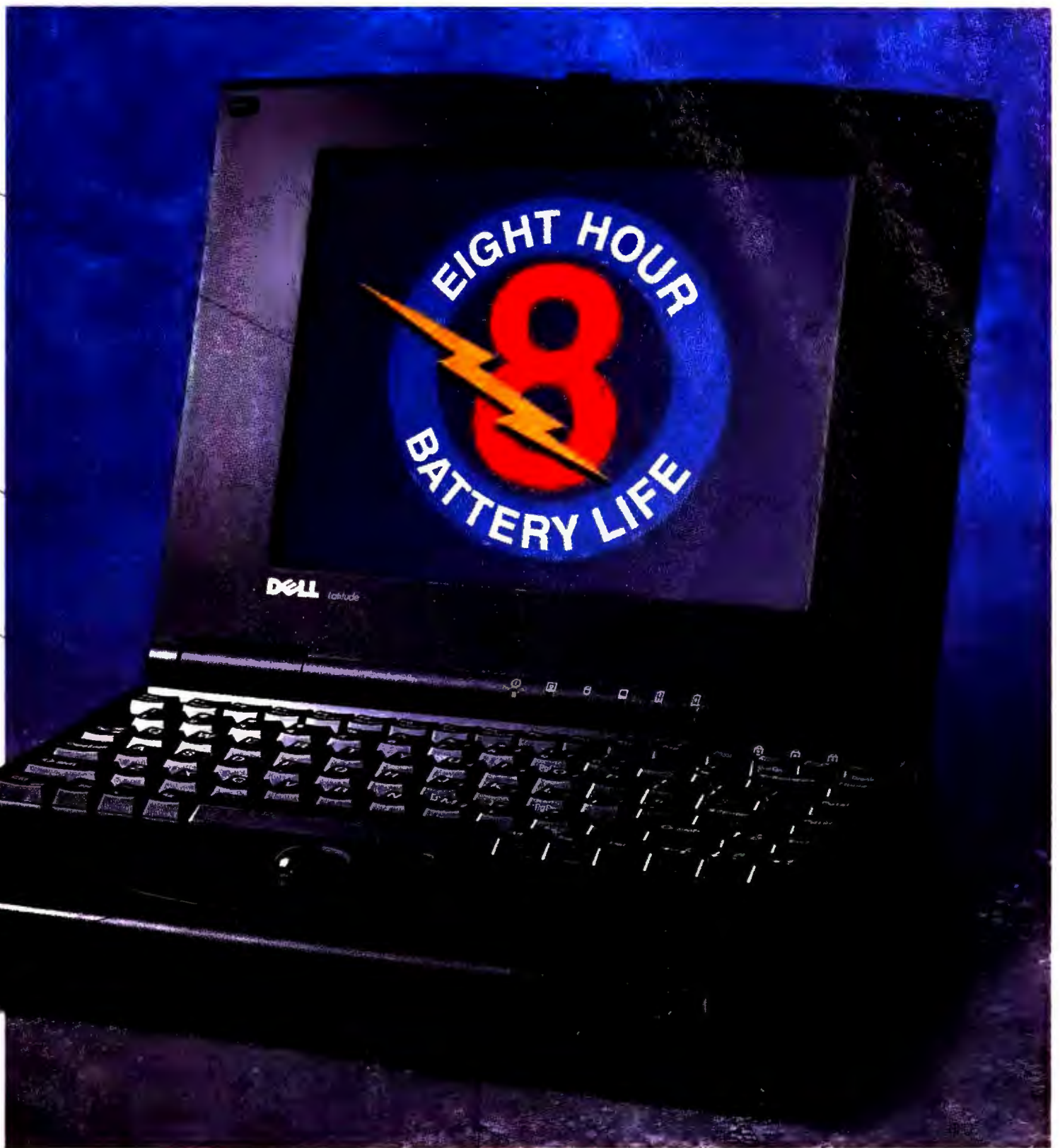
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Go Ahead, Get Carried Away



Buying Tips: Choosing the Right Fax Server

Born as a clever blend of photocopier and telecommunications know-how, fax keeps stirring new technologies into the mix. Once fax joined with PC technology, you could fax virtually anything you produced on your PC. Now network support is being added, promising to make faxing as common for PC users as

printing, word processing, and electronic mail. And with a shared fax system in place, you don't need to dedicate a separate phone line and fax-modem for each person who needs to send and receive faxes.

Low-priced solutions offer both modest cost (\$500 to \$1000 including the fax-modem) and modest features. For example,

cc:Fax, cc:Mail's fax extension, enables you to fax simple text and attached graphics.

If E-mail is well ensconced on your network, then the addition of faxing will be an easy leap for everyone. However, these low-end fax products can't babysit faxes that are queued for the fax-modem, or provide feedback about undelivered faxes.

The higher-priced solutions from Alcom, Castelle, Cheyenne Software, Intel, and others provide tracking software that lets users monitor the flow of outgoing faxes. They also offer other amenities, such as public and personal fax address books, usage logs, and the ability to balance fax traffic so that a blitz of outgoing press releases from the marketing department doesn't hold up a bulletin from the CEO. Additionally, many products offer gateways to popular E-mail systems so you can create an E-mail message and send it as a fax.

Depending on the number of employees and fax lines, you can pay anywhere from \$600 for a five-user, single-modem system to a price in the four-figure range. You must also factor in the cost of a dedicated high-powered PC or a more powerful server.

Front-end fax software should provide full-featured fax viewing and let you scale and rotate fax images and export faxes in common graphical file formats.

Most high-end products let you automatically print incoming faxes just like you do with a fax machine; in addition, most are compatible with standards that let you intelligently route inbound faxes. With the Direct Inward Dialing standard, each user is assigned a unique fax phone number, and all user fax numbers route calls to the same fax line; the server identifies the number dialed and routes the fax accordingly. With Dual-Tone Multifrequency, the sender manually enters a special code after the sending and receiving fax devices connect; the code identifies the recipient. A third standard lets you dial the extra code at the same time as your destination phone number; the fax-modem saves the code and sends it automatically after connecting.

--Bill Lawrence

Bill Lawrence is part of the team that manages a 3000-workstation network.



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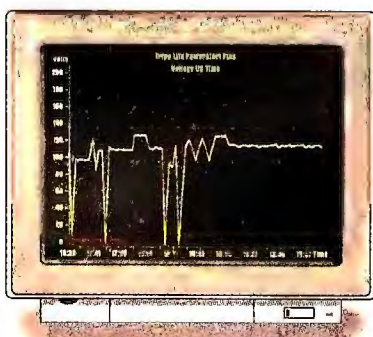
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Supernatural power. Mesmerizing features. Stunning software. It's the Gateway 2000® experience. A place where you can have the best CPUs in the land — and so much more — when you buy a Gateway 2000 Pentium™-based system. And while others are huckstering their stripped-down Pentium-based computers, Gateway presents systems packed with the all the stuff dreams are made of!

There's virtually no end to the features included: hard drives up to 1GB, CD-ROM drives, outstanding sound and video performance, the best software, fax/modems on two new multimedia models, and a standard three-year limited parts warranty.

Your dream machine no longer eludes you. Gateway 2000 is making those dreams come true!

Raising The Roof Extras

We always want to keep our customers ahead of the industry. So along with Intel®'s super-charged Pentium processor, Gateway helps you extend the life of your system by including

incredible 540MB, 730MB or 1GB hard drives on all Pentium-based systems. Get used to the feeling of being spoiled, because you also get CD-ROM drives, superior video performance *and* a ton of memory on *all* desktop systems!

All Pentium processor-based models include a PCI local bus and an enhanced PCI/IDE controller allowing your hard drive to transfer data up to twice as fast as non-enhanced systems.

And now Gateway's high-quality desktop systems *and* Gateway monitors are backed by a three-year limited parts warranty. Believe it — this is one of the best warranties you'll find anywhere!

Multimedia Mania

For those who insist on only the very best, your Shangri-La is our new P5-60 and P5-90 Best Buy multimedia systems. Watch out, 'cuz they're jam-packed with all the premium multimedia features you can imagine! Including a TelePath™ fax/modem and communications software so you can speak to the world from your own living room. And tunes never sounded so good with a 16-bit



sound card and Yamaha® stereo-quality speakers. Play your audio CDs, hear audio clips or record audio all in perfect harmony.

Wondering what "multimedia" *really* means for you? It's a whole new universe of knowledge, entertainment, communication *and* educational capabilities. Talk about being entranced! You'll experience interactive, full-motion video and stereo audio. And Gateway gives you the key to this universe in a super-fast, feature-packed machine.

Get the best of all possible worlds with these new P5-60 and P5-90 Best Buy multimedia machines!

Software Nirvana

It's a sweet deal. All Gateway Pentium-based systems now come with Microsoft Office Professional, an incredible combination of Microsoft's most popular business applications, including Microsoft Word, Excel, PowerPoint® presentation graphics program, and Access® database, all on a single CD with on-line manuals.

These programs in Office Professional are so tightly integrated, they work together as if they were a single

program. Also included is Corel Professional Photos CD Sampler with tools to view Photo CD images.

Call for more great software options including our value-packed Multimedia Starter Pack.

P5-90XL Paradise

Is it fantasy or for real? Well, it's the Gateway P5-90XL. This ultimate high-flying Pentium-based PC has a larger-than-life 1GB hard drive. You're gonna get all the power and speed you need for today *and* tomorrow! And an ATI GX video card using the Mach 64 graphics accelerator, one of the first and fastest 64-bit accelerators on the market. It's awe-inspiring to see the display on the 17-inch CrystalScan® monitor. Sound, you ask? Ensoniq®'s Soundscape™ wavetable sound card makes a staggering difference in audio quality. And you'll get a great balance of crisp highs and plenty of heart-pounding bass — in full stereo sound — from the Altec Lansing ACS-31 speakers, with subwoofer.

And for the system of *your* dreams, we'll configure a system specifically to fit your needs. Get everything under the sun with a powerful value-packed Pentium-based system from Gateway 2000!



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



You'll be in paradise with a loaded Gateway P5-90XL machine!

Know No Boundaries



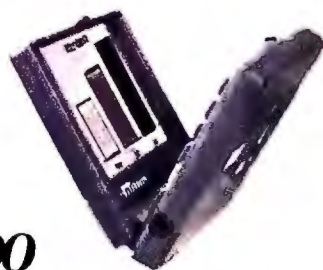
You'll be transported to outer bounds when you discover the ColorBook™ from Gateway 2000.® Experience the rapture of color portability *and* performance with a 250MB hard drive on our 50MHz and 75MHz models. A rainbow of 256 brilliant colors in VGA mode bursts from an incredible 10-inch dual-scan screen on three ColorBook models. You won't find another portable screen this big, this affordable, anywhere else.



And while everyone else is hiking up their color portable prices, Gateway still offers you an incredible value on our feature-packed ColorBooks, from the \$1,999 SX model right up to the DX4-75. And our DX2-50 model recently won *PC World's* Best Buy award in the Power Mobile PC category.

All Gateway ColorBooks are based on the Intel® SL Enhanced 486 processor with enough power and memory to run all your Windows applications. Weighing less than 5.7 pounds, measuring 1.77-inches thin, all models include two PCMCIA Type II or one Type III slots, excellent battery life, carrying case and a great suspend/resume feature. Our DX2 and DX4 models also include PCMCIA fax/modems. You also get Microsoft Works™ or MS Office Professional standard.

No, it's not an illusion ... it's the ColorBook from Gateway 2000.

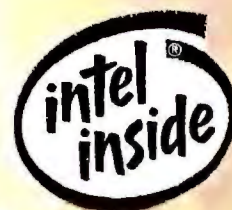


Visualize the ideal portable experience. On the road to enlightenment you'd like to have a lightweight, compact, real 486 PC at an uncommonly low price. The Gateway 2000 HandBook® 486 is so extraordinary, it's portable computing utopia! With unbelievable prices on all HandBook models (they start at just \$999!) there's never been a better time to indulge yourself in a world of 486 power that you can take anywhere.

The HandBook's slight frame — weighing less than three pounds and measuring roughly 10 x 6 inches — makes it an enchanting little PC. The HandBook DX2-50 gives you more MIPS per pound than any other portable PC. With Microsoft Office Professional included, the DX2-50 is an unbeatable value. And at these prices you can get the HandBook as a companion to your desktop system.

The HandBook's features are astounding. It has a bright, backlit VGA screen and a comfortable, touch-type keyboard along with an external diskette drive and leather carrying case. With two batteries included, the HandBook also lets you "hot swap" — change batteries or peripheral while the PC is running without rebooting the system or losing data.

All Gateway ColorBook and HandBook portable PCs come with a standard one-year limited parts warranty. A special VIP warranty is available only at the time of purchase for an additional \$100.



You Can Have It All!

The Gateway 2000 Family PC

There's no place like home when you have a Gateway 2000® Family PC™ in the house. Every member of your family will be swept away as they discover inspiration, entertainment and learning experiences.

This fully equipped multimedia system takes you to a whole new dimension. You get a fast CD-ROM drive to run the best programs and games with sound, pictures, animation and video. With its high-quality sound card and speakers, the Family PC lets you play music CDs, hear audio clips or record audio — all with magical stereo sound.

The Family PC's fax/modem has all the communication software you need to access information and other computer users from all over the world through on-line services.

Experience a virtual software playground with Microsoft Works™ Multimedia Edition, MS Encarta 1994 Multimedia Encyclopedia, MS Money,™ new MS Complete Baseball, MS Golf, and Corel Professional Photos CD Sampler.

You won't find another home PC more loaded than the Gateway Family PCs and our Pentium-based multimedia systems — in any land.

3-Year Warranty

Gateway desktop systems come with one of the strongest warranties in the industry. All Gateway 2000 desktop PCs are backed by a three-year limited warranty on parts. The new three-year limited parts warranty includes Gateway monitors.

Gateway customers also receive a 30-day money-back guarantee and toll-free technical support. And *PC Magazine* readers recently honored us, for the fourth consecutive time, with their highest rating in *PC Mag's* Service and Reliability survey.

On-site service is available during the first year in most U.S. locations and may be provided without charge if our technicians determine it necessary.

For details on our new warranty and all of our service and support policies, please call or write for a free written copy.

Payment Options

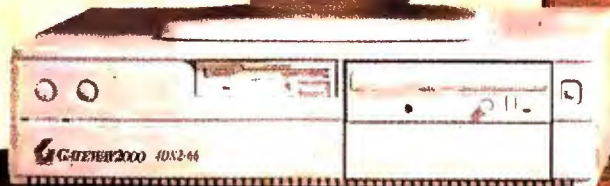
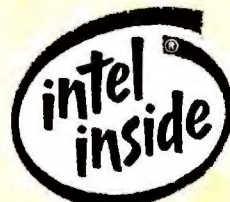
Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® Card, issued by Dial National Bank, Des Moines, Iowa.

To Other Worlds

Gateway 2000 customers in Canada and Puerto Rico receive toll-free telephone service in both countries (see the back page of this ad for special 800 numbers) along with award-winning technical support and CSA approvals. On-site service is available in some Canadian and Puerto Rican locations, and our international shipping rates are among the most competitive in the industry.



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Multimedia Systems

4SX-33 FAMILY PC™

- Intel® 33MHz 486SX CPU*
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM, 16-Bit Sound Card & Speakers
- ♥ 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS® 6.2 & WFW 3.11
- ♥ MS Works™, Encarta, Baseball, Money™ & Golf
- ♥ 3-Year Limited Parts Warranty

\$1499

4DX2-66 FAMILY PC

- Intel 66MHz 486DX2 CPU*
- 8MB RAM, 128KB Cache
- 420MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM, 16-Bit Sound Card & Yamaha® Speakers
- ♥ 2400/9600 Data/Fax Modem
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Works, Encarta, Baseball, Money, & Golf
- ♥ 3-Year Limited Parts Warranty

\$1999

P5-60 BEST BUY

- Intel 60MHz Pentium™ CPU*
- 8MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- ♥ 16-Bit Sound Card & Yamaha Speakers
- ♥ TelePath™ II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Color CrystalScan® Monitor
- Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2499

P5-90 BEST BUY

- Intel 90MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 2MB
- ♥ Double-Speed CD-ROM
- ♥ 16-Bit Sound Card & Yamaha Speakers
- ♥ TelePath II 14.4K Fax/Modem
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey® Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2999

Professional Systems

4SX-33

- Intel 33MHz 486SX CPU*
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- 3.5" Diskette Drive
- 14" Color SVGA Monitor
- Mini Desktop Case
- 101-Key Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Works 3.0 CD
- ♥ 3-Year Limited Parts Warranty

4SX-33 \$1299

4DX2-66 \$1599

(w/ 540MB Hard Drive)

P4D-66

- Intel 66MHz 486DX2 CPU*
- 8MB RAM, 128KB Cache
- 730MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2199

P5-60

- Intel 60MHz Pentium CPU*
- 8MB RAM, 256KB Cache
- 540MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- ♥ Double-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Color CrystalScan Monitor
- Desktop Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

\$2299

P5-90 XL

- Intel 90MHz Pentium CPU*
- 16MB RAM, 256KB Cache
- ♥ 1 GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- ♥ ATI Mach 64 with 2MB VRAM
- ♥ Double-Speed CD-ROM
- ♥ 16-Bit Wavetable Sound Card & Altec ACS-31 Speakers
- 3.5" Diskette Drive
- 17" Color CrystalScan 1776LE
- Tower Case
- AnyKey Keyboard & Mouse
- MS-DOS 6.2 & WFW 3.11
- ♥ MS Office Professional CD
- ♥ 3-Year Limited Parts Warranty

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Portables

HANDBOOK® 486

- 2.94 Lbs., 9.75" x 5.9" x 1.6"
- SL Enhanced Intel 486 or DX2 Processor
- 4MB or 8MB RAM (expandable to 20MB)
- 80 to 250MB IDE Hard Drive
- External 3.5" Diskette Drive
- 7.9" Backlit VGA Display
- 2 NiMH Batteries & AC Pack
- Suspend/Resume Feature
- 1 PCMCIA Type II Slot
- EZ Point™ Integrated Pointer
- 78-Key Keyboard
- Parallel, Serial & PS/2® Ports
- Leather Carrying Case
- MS Works for Windows 3.0 or MS Office Professional
- MS-DOS 6.2, WFW 3.11 & Serial Transfer Cable

HANDBOOK 486SX-25

4MB RAM, 80MB Hard Drive, Works

\$999

HANDBOOK DX2-40

8MB RAM, 130MB Hard Drive, Works

\$1499

HANDBOOK DX2-50

8MB RAM, 250MB Hard Drive, MS Office Professional

\$2499

COLORBOOK™

- 5.7 Lbs., 11.7" x 8.5" x 1.77"
- SL Enhanced Intel 486, DX2 or DX4 Processor
- 4MB or 8MB RAM (expandable to 20MB)
- 3.5" Diskette Drive and Removable 250MB IDE Drive
- 10.3" or 9.4" VGA Dual-Scan STN Color Display
- NiMH Battery & AC Pack
- Suspend/Resume Feature
- 2 PCMCIA Type II Slots (1 Type III)
- Integrated Trackball (2 buttons)
- 85-Key Keyboard
- Parallel, Serial, PS/2 & VGA Ports
- MS Works or Office Professional
- MS-DOS 6.2 & WFW 3.11

COLORBOOK 486SX-33

4MB RAM, Case, Works

\$1999

COLORBOOK DX2-40

4MB RAM, Fax/Modem, Case, Works

\$2699

COLORBOOK DX2-50

8MB RAM, Fax/Modem, Case, Office Professional

\$3199

COLORBOOK DX4-75

8MB RAM, TelePath Fax/Modem, Case, Office Professional

\$3699



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Extraordinary Extras!

A wonderland of value: Gateway 2000's peripherals and software, sold only with the purchase of a system.

MULTIMEDIA

Basic Audio Multimedia Kit

Here's everything you need to add multimedia to a Gateway PC.

- Gateway 2000 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
 - 2 Labtec® CS-180 speakers
- \$109** (with system purchase)

Wavetable Audio Multimedia Kit

Once you've heard wavetable audio, basic audio will never do!

- Ensoniq® Soundscape™ 16-bit wavetable sound card, MT-32 and FM mode compatible. Supports most software for popular sound cards and standards including General MIDI, Sound Blaster, AdLib, Roland MPU 401, MS Windows Sound Sytem and MT 32
 - New Altec Lansing ACS-31 three-piece speaker system
 - MidiSoft® Sound Explorer and Time Warner's Aegis™ software
- \$249** (with system purchase)

Altec Lansing ACS-31 Speakers

A Gateway exclusive from Altec Lansing: a three-piece speaker set at a two-piece price. Two 3-inch free-standing speakers crank out up to five watts per channel while the subwoofer can deliver 15 watts of heart-pounding bass. **\$119**

Multimedia Software Starter Pack

You get nearly \$700 worth of software for less than \$100! Package includes Cinemania '94, Mad Dog McCree, Tuneland, Mayo Clinic Family Health Book, Better Homes and Gardens Cookbook, The Lawnmower Man, Sitting on the Farm, Mavis Beacon Teaches Typing, Chess Master 3000, U.S. Atlas and World Atlas. You also get a compact disc cleaner and 20-disk storage rack. **\$129**

MONITORS

CrystalScan® 17-Inch Monitor

Non-interlaced color monitor with intelligent multi-scanning analog color display capable of 1280 x 1024 resolution in non-interlaced mode. .26 dot pitch. Upgrade from a 14-inch CrystalScan 1024NI monitor **\$395**

Upgrade from a 15-inch CrystalScan 1572 monitor **\$335**

(Prices good only for upgrades at the time of system purchase.)

COMMUNICATIONS & STORAGE

TelePath™ II Fax/Modem

Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. Includes CommWorks™ data and fax communication software, CoSession™ Host remote diagnostics, plus a CompuServe® trial membership. **\$99**

Colorado Memory Systems® TBU

250MB internal tape backup unit copies up to 9.5MB per minute. Comes with MS Windows™ and DOS software, one tape and cable. **\$149**

PRINTERS

Hewlett®-Packard 4L LaserJet Printer

A full-featured 300dpi printer loaded with enhanced PCL 5 and 26 scaleable typefaces with 1MB standard HP Memory Enhancement Technology. Parallel cable included. **\$699**

Hewlett-Packard 4L LaserJet Printer

A 600dpi printer for four times the dots of 300dpi laser printing with enhanced PCL 5 and 45 scalable typefaces. 2MB standard memory and 3 universal SIMM slots available for additional memory or PostScript fonts. Parallel cable included. **\$999**

Epson® Stylus™ 800 Ink Jet Printer

Get the look of a laser at a dot matrix price with the Stylus 800. Prints 150 characters per second at 360dpi — fast and quiet! **\$289**

Call for other printer options, including more **Hewlett-Packard** printers.

NETWORKING

Ethernet Adapter from 3Com®

Ultra high-performance 16-bit Ethernet cards from the world leaders in Ethernet technology.

16-bit Triple Media Card supports BNC, AUI and Twisted Pair media **\$119**

16-bit Twisted Pair only **\$99**

Token Ring

IBM® 16-bit Token Ring card **\$429**

PORTABLES

Peripherals and upgrades available only with a Gateway portable purchase.

PCMCIA Cards

- TelePath 14,400 Fax/Modem. **\$249**
- Token Ring adapter. **\$449**
- (Also in XJACK® version, same price)
- HandBook® VGA adapter. **\$229**
- 9,600/2,400 Fax/Modem. **\$149**
- Ethernet adapter. **\$149**

Other Accessories

- 2.2Ah NiMH batteries. Call for prices
- HandBook 3.5" external floppy. **\$99**
- ColorBook™ carrying case. **\$49**
- HandBook leather carrying case. **\$55**
- Extended VIP warranty — we ship a replacement to you within 24 hours during warranty. Point of sale only. **\$100**

Call the Gateway 2000 special Component Add-ons division at 800-846-2080 for our complete line of extras for Gateway customers.



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New AST Lineup: Faster Processors and Video

AST Research has strengthened its PC offerings with new lines of notebooks, budget desktops, and high-end Pentium workstations.

Powerful Portables

The top-of-the-line Ascentia 900N replaces AST's highly touted PowerExec family of premium portables. With a traveling weight of 8.2 pounds, the 900N is available with either a 75-MHz DX4 or a 50-MHz 486DX2 processor. The DX4 PC we evaluated was one of the fastest we've tested in this class. And battery life was excellent, at 6 hours and 44 minutes.

The new line comes with some of the largest displays currently offered on notebooks. Screen options, which vary according to system, include 10.3-inch dual scan, 9.5-inch active matrix, and 10.4-inch active matrix. Complete with local bus video (16-bit on the dual-scan unit and 32-bit on the active-matrix systems), the 900N would make an ideal presentation system, offering crisper col-

ors and smoother video playback than previous AST portables, the vendor claims. On the downside, the unit does not include built-in sound, as do some competitors' presentation-quality machines.

A 75-MHz DX4 with 8MB of RAM, a 510MB removable hard drive, and a 10.4-inch active-matrix screen costs \$5949.

The lower-end 800N products replace the company's Bravo NB line. The 800N is available with either a 33-MHz 486SX or a 50-MHz 486DX2 CPU and a 9.5-inch dual-scan display. A base model street priced at \$2300 includes 4MB of RAM expandable to 20MB, a 250MB hard drive, and two PCMCIA Type II slots. You can swap the 1.44MB floppy drive for a second battery.

On the Desktop

For budget-conscious PC buyers, AST has enhanced its existing Bravo line with the Bravo MS. This new line offers a number of improvements, including Plug and Play functionality and PCI local bus graphics. Processor options cover the performance spectrum, from a 33-MHz 486DX to a 100-MHz Pentium. All systems include an upgrade socket for some variation of the Intel Pentium OverDrive chip.

AST has also boosted the graphics capability in its new Bravos with a 64-bit subsystem. Based on a Cirrus Logic PCI local bus graphics controller, it displays 256 colors at 1024 by 768 noninterlaced resolution. AST claims graphics performance is three times faster than it was on the Bravo LC.



GOING MOBILE: AST'S ASCENTIA 900N comes preloaded with all the communications software you need to stay connected on the road.

However, the \$2450 MS 4/66d that we tested performed about average for a 66-MHz 486DX2. For those with larger budgets and more demanding applications, AST offers the Premmia GX and MX systems, which give the company's high-end LX family Plug and Play functionality, 64-bit graphics, and an optional Type III PCMCIA slot. The slot, front mounted for accessibility, lets you easily share peripherals with other compatible systems.

The lower end of the two lines, the MX family, includes systems based on Intel's 66-MHz 486DX2, 100-MHz DX4, and 60-MHz Pentium CPUs. The GX line consists of 90- and 100-MHz Pentium systems, each with a free socket available for dual processing, an integrat-

ed ethernet controller, and a FastSCSI-2 controller.

The MX models in both lines include two free PCI slots and four free 16-bit ISA slots; the GX models have one free PCI and five free EISA slots.

The Premmias sport a 64-bit ATI graphics card based on the Mach64 chip. The subsystem includes 2MB of VRAM expandable to 4MB and displays 64,000 colors at 1024 by 768 noninterlaced resolution.

Like the Bravo MS 4/66d, the Premmia system we tested was a mediocre performer. The \$2900 Premmia MX 4/100t we examined included a 100-MHz DX4 CPU with 8MB of RAM and 256K of secondary cache. This price does not include a monitor.

—Caroline Jones

Ascentia 900N, 800N; Bravo MS; Premmia MX, Premmia GX

New AST products include high-end notebooks, budget desktops, and powerhouse workstations.

AST Research
800/876-4278

Street price without monitor:
Ascentia \$2300 to \$5949,
Bravo MS 4/66d \$2450,
Premmia \$3000 to \$4000

Reader service no. 775

Low-Cost Color Ink Jets Provide Options for Buyers on a Budget

With color ink jet printers selling for less than \$600, now may be the ideal time to add color to your spreadsheets, reports, and presentations. But be careful: Not all color ink jets are great deals. In our informal tests, Epson's \$699 Stylus Color produced terrific results, while Digital's \$449 DECcolorwriter 520ic proved disappointing.

Epson's Stylus Color is a good choice for business documents. It prints text, graphics, and photos well. At press time this ink jet printer provided the highest resolution in its price range. The Epson delivers 360-by-360 and .720-by-720-dots-per-inch resolution (720 dpi works only with Windows applications and requires coated paper). The previous leader in this category, Hewlett-Packard's \$719 DeskJet 560C, provides only 600 by 300 dpi.

With color ink jets, paper

which is pricey. Epson sells 200-sheet reams of coated paper for \$21 for 360-dpi printing and \$25 for 720 dpi.

(Ink is pricey as well: Print cartridges cost \$17 for a monochrome cartridge, which lasts for 840 pages of standard, double-spaced text; and \$35 for color, which lasts for 670 pages, says Epson.)

The Epson printer proved its printing prowess in tests. I printed a newsletter page, a page with a bar chart, and a page with a map, each on both plain and coated paper, at 360 dpi. On plain paper, the newsletter page looked acceptable, but on coated paper the text appeared crisper and the colors more vivid.

The map and bar chart looked good on plain paper, even better on coated paper. A sample bar chart also printed well on a transparency. Epson recommends that you use the 720-dpi mode (and its required coated paper) for scanned images. I printed a photo (a TIFF file), and it turned out bright and sharp.

Like most ink jet printers, the Epson is no speed demon: The device prints at 2 pages per minute for letter quality black and white, and you'll find yourself waiting about 3

minutes for a color page, according to the vendor.

Low-Priced DEC

The DECcolorwriter 520ic, one of the least expensive color ink jets, is about \$250 cheaper than the Epson. However, the trade-



QUALITY COLOR FOR LESS: Epson's Stylus Color ink jet printer delivers 360- and 720-dots-per-inch resolution for \$699.

off is apparent in the print quality. The DEC produces fuzzy text and doesn't do well with photos and transparencies. It would work acceptably for an occasional chart but not for the sort of critical documents you'd want to have on hand to impress clients.

DEC's ink jet prints at 300-by-300-dpi resolution, using swappable ink cartridges. You must remove the monochrome cartridge and snap in the color cartridge when you want to print color.

The DECcolorwriter's output quality was underwhelming. The manual recommends using 18-to-24-pound paper, but don't expect to use anything less than 24-pound.

Print quality on 20-pound copier paper was poor—the text was smudged. Even on 24-pound paper, the newsletter page's headline and text appeared fuzzy. Color output looked acceptable but not what you'd call sharp. The bar chart came out fine on 24-pound paper but didn't fare well on a transparency: Black text wasn't solid, and wavy lines showed in the colored columns. The photo

printed grainy and dark both on the 24-pound paper and on coated paper.

As with the Epson, the DEC's speed is unimpressive. The device is rated to print at 2 ppm for a letter quality black-and-white page and at about 3 minutes for color.

Black ink cartridges cost about \$6 apiece and last for about 400 pages. Color cartridges cost about \$35 and last for about 200 pages.

—Laurianne McLaughlin



THE DECCOLORWRITER 520ic offers low-cost 300-dpi color, but print quality varies.

makes a huge difference in output quality. On copier paper, which typically is rated at 18 to 20 pounds, ink drops spread and text looks fuzzy. On 24-pound letterhead, output is acceptable. But you get the best results by using coated paper,

Epson Stylus Color

This 360-dpi ink jet is a good bet for pumping color into business documents.

Epson America

800/289-3776

List price: \$699

DECcolorwriter 520ic

Digital's 300-dpi color ink jet offers inexpensive color, but print quality isn't good enough for business use.

DEC

800/777-4343

List price: \$449

Reader service no. 776

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Circle 183 on reader service card

Faster Chips, Better Screens Grace Toshiba's New Notebooks

Toshiba has refined its current crop of portable systems, adding superior color screens and faster processors, and including its innovative AccuPoint pointing device in more models. While more evolutionary than revolutionary, Toshiba's new portables provide more punch for your peso.

The Portégé T3600CT is Toshiba's coolest portable. This 4.4-pound subnote now features a larger 8.4-inch active-matrix color screen, a 250MB hard drive, and a 50-MHz 486DX2 processor. The Portégé runs 3 to 6 hours on its lithium-ion battery, Toshiba claims. The \$4399 estimated street price is on the steep side, but for the traveling executive who wants a powerful PC for the office and the road, it's still well worth considering.

Toshiba's Satellite T2400C series of 7-pound notebooks incorporates one of the Portégé's most noteworthy features: the AccuPoint pointing device. It's similar to the pointer on IBM's ThinkPads and takes some getting used to.

The T2400CT has an 8.4-inch active-matrix color screen, 8MB of RAM, and a 250MB or

320MB hard drive. A 250MB system should sell for about \$4099 on the street. The T2400CS, with an estimated street price of \$3299, has a 9.5-inch passive color display, 4MB of RAM, and a 250MB hard drive. Each note features a 50-MHz 486DX2 chip.

Other features include two PCMCIA slots (one Type II and one Type III), and a SCSI-2 port for connecting external peripherals, such as CD ROM and tape drives.

At the low end, Toshiba's bargain Satellite T1960C notebooks also offer a 50-MHz 486DX2, and they feature Microsoft's clip-on BallPoint Mouse 2.0. The T1960CT features an 8.4-inch active-matrix color display, 4MB of RAM, and



LITTLE PC, LOTTA POWER: Toshiba's 4.4-pound Portégé T3600CT features a 50-MHz 486DX2 CPU and an active-matrix color screen.

a 200MB or 320MB hard drive. Street prices should start at about \$3399 for the 200MB unit. The T1960CS has a 9.5-

inch passive color screen, 4MB of RAM, and a 200MB hard drive and should sell for \$2699.

—Jeff Bertolucci

Dell Turns Up the Heat With Hot New Minitowers

Dell Computer has moved a step ahead of rival Compaq by introducing new minitowers, including a 90-MHz Pentium offering. At press time, Compaq's fastest system was powered by a 66-MHz Pentium chip.

The quickest of the new Dell Dimension XPS MT systems, the Pentium-90, sells for only \$2649, less than some 60-MHz Pentium machines. These high-performance systems would be an ideal solution for a small office, but at prices this low, they're looking good for *any* environment.

The Dimension XPS MT minitower systems feature 8MB of RAM, a PCI local bus, a 64-bit local bus graphics adapter with 1MB of video RAM, a 256K second-level write-back

cache, a 540MB hard drive, an Enhanced IDE drive adapter, a 3½-inch floppy, a 15-inch monitor, and a mouse.

Dell offers double- and triple-speed CD ROM drives as an option—and for peace of mind I recommend getting one factory installed.

As an option you can also get a high-performance #9GXE64 graphics accelerator board—which supports 16 million colors at high resolutions. DOS 6.21 and Windows 3.1 come preloaded.

Dell also introduced similar MT models in its Precision line, which is sold through outlets such as Best Buy, CompUSA, and Sam's Club. If you're going to buy a Dell, I recommend buying it direct, because the Precision models sometimes

Dell Dimension XPS MT

Dell's new high-performance, competitively priced minitower systems.

Dell Computer
800/289-3355

List price: \$2149 to \$2649,
depending on processor
Reader service no. 778

include hidden price-configuration trade-offs—such as a lower-resolution monitor.

In addition to the minitowers, the Austin, Texas, manufacturer has introduced two 100-MHz Pentium file servers. The PowerEdge SP 5100 is priced from \$11,047, and the PowerEdge XE 5100 starts at \$12,731.

—Joe Abernathy

Portégé T3600CT, T2400CT, T2400CS, T1960CT, T1960CS

Toshiba's faster portables
offer better color screens.

Toshiba America
800/334-3445

Street price: T3600CT
\$4399, T2400CT \$4099,
T2400CS \$3299, T1960CT
\$3399, T1960CS \$2699

Reader service no. 777

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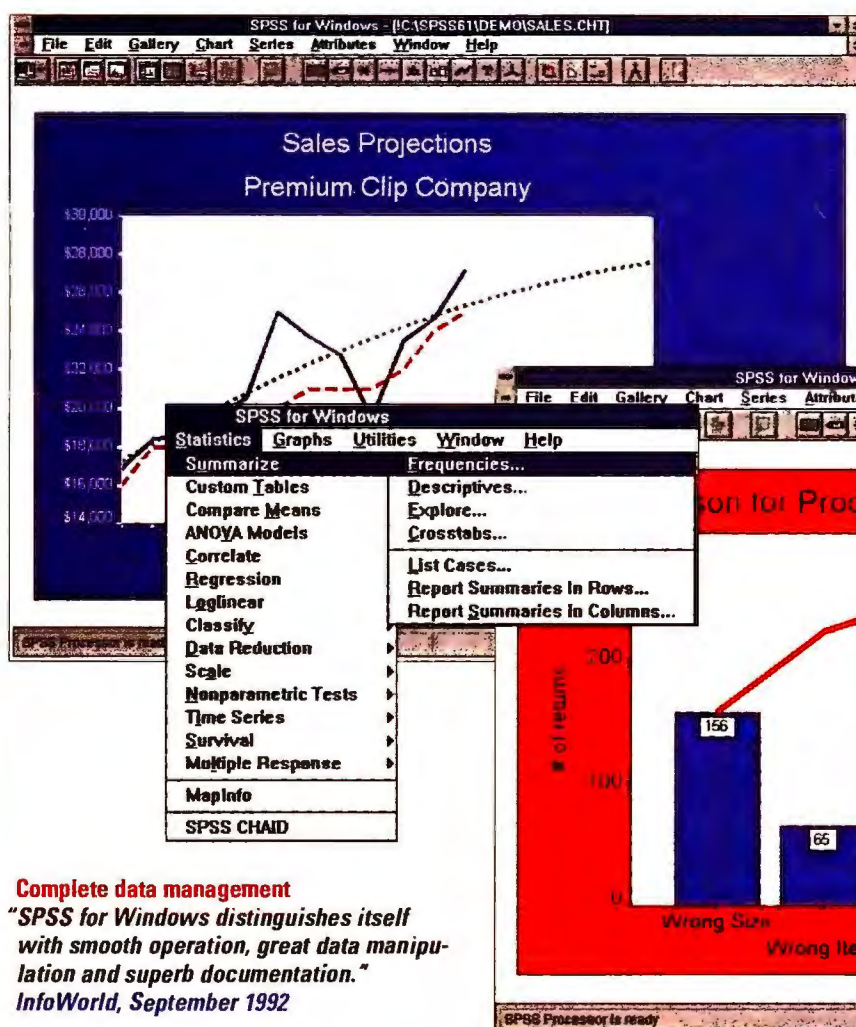
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"For more statistical analysis tools than you'll get from a spreadsheet such as Excel, without the steep learning curve, SPSS for Windows is a great buy."
PC/Computing, August 1992

PC MAGAZINE EDITORS' CHOICE

May 11, 1993
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"SPSS for Windows distinguishes itself with smooth operation, great data manipulation and superb documentation."
InfoWorld, September 1992

Automatic statistical graphs
"A complete set of graphics and charting capabilities."
PC Week, May 1992

Learn fast, work fast
"SPSS for Windows is an excellent full-featured set of statistical procedures...The Windows interface makes it easy and fast to use and I highly recommend it."
Marketing Research, Summer 1993

Reasons SPSS 6.1 for Windows goes beyond your spreadsheet:

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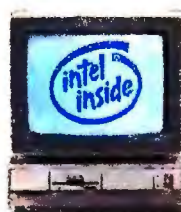
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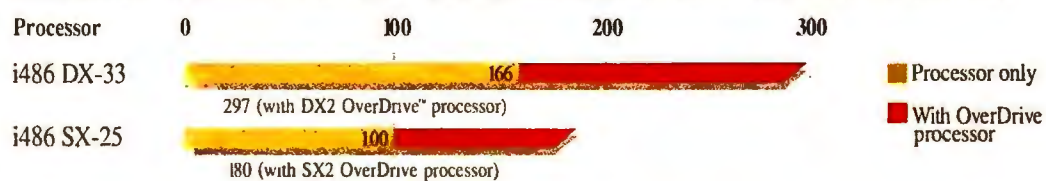
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This Comfortable Keyboard Can Split, Swivel, or Tilt

If you're like most people, you use the keyboard that came with your system, but current research on repetitive-strain injuries suggests that the standard computer keyboard design does not promote comfortable typing. The Select-Ease from Lexmark looks like a

typical keyboard, but it splits down the middle so you can adjust the device to your particular taste.

Using the knob that anchors the split halves, you can swivel either side away from the other or separate them entirely. Retractable legs allow you to adjust the height and angle of the keyboard as well.

I adjusted the keyboard so that it tilted up in the middle. I found typing more comfortable in this position.

Lexmark modified the standard keyboard layout only slightly for the Select-Ease: The <Print Screen>, <Scroll Lock>, and <Pause> keys moved above the function keys; and the <Insert>, <Delete>

<Home>, <End>, <Page Up>, and <Page Down> keys moved to the right corner.

Lexmark also added an inverted-T cursor key arrangement to the left side of the keyboard to accommodate south-paws. The <Space> bar on the

left side of the split becomes an extra backspace key, called Erase-Eaze, which makes it easy to correct mistakes.

For \$179, the Select-Ease is an inexpensive, easy way to make typing more comfortable.

—Melissa Riofrio

Select-Ease Keyboard

The split halves and retractable legs let you adjust the width, height, and angle of this keyboard for greater typing comfort.

Lexmark Int'l

800/438-2468

List price: \$179

Reader service no. 779



KARATE-CHOPPED KEYBOARD: Lexmark's ergonomic Select-Ease Keyboard features a central knob to help you adjust the two halves.

ArtPad and PenMouse: Pen Tablets for the Masses

The pen-based tablets that are favored by artists and engineers have long been among the most intuitive of input devices, but they've been too bulky and pricey to lure many mainstream users. Now two new products from major tablet makers—Wacom's \$199 ArtPad and Kurta's \$249 PenMouse—bring the virtues of pen tablets to a wider audience.

Both units include a compact tablet, about the size of a mouse pad, that plugs into one of your computer's serial ports. You use a cordless pen as your input device; moving it around on the tablet surface causes the mouse pointer to follow along, and pressing it down is equivalent to clicking a mouse's left button. A button mounted on the pen barrel acts like a mouse's right button.

As you'd expect, the pen is a natural for paint programs and other graphics packages, but it's also a pleasing all-around mouse substitute. You can control the pen with great precision, which is helpful whether you're signing your name to a fax document or simply organizing the icons on your Windows desktop. Unlike Communications Intelligence Corporation's similar Handwriter tablet, neither of these devices focuses on handwriting recognition applications, although they're compatible with Microsoft's Pen Extensions for Windows and IBM's Pen DOS system software.

Both of these tablets are a pleasure to use, but I slightly preferred the overall ergonomics of the PenMouse. Its pen felt a bit more solid in my hand, and the pebbled tablet surface

made the pen respond like a high-quality ballpoint pen. The surface of the preproduction ArtPad tablet I tested was smoother, which gave its pen a scratchy feeling.

In other respects, Wacom's ArtPad edges out its Kurta competitor. For example, while the active area of both of these tablets is almost identical, the ArtPad's overall size is smaller, making it a better choice for crowded desks. Its pen offers pressure sensitivity, which programs such as Fractal Design Painter use to simulate real-world art materials, like a chalk tool that lays down darker colors the more firmly you press. In addition, while the ArtPad worked with my mouse automatically, getting the PenMouse to do the same required some reconfiguring that was

not explained in the manual.

The PenMouse is bundled with Fractal Design's Dabbler, a nifty paint program for amateur artists. At press time Wacom hadn't determined what software would be included with the ArtPad.

—Harry McCracken

ArtPad and PenMouse

Two pen tablets aimed at mainstream users.

ArtPad

Wacom

800/922-6613

List price: \$199

Reader service no. 780

PenMouse

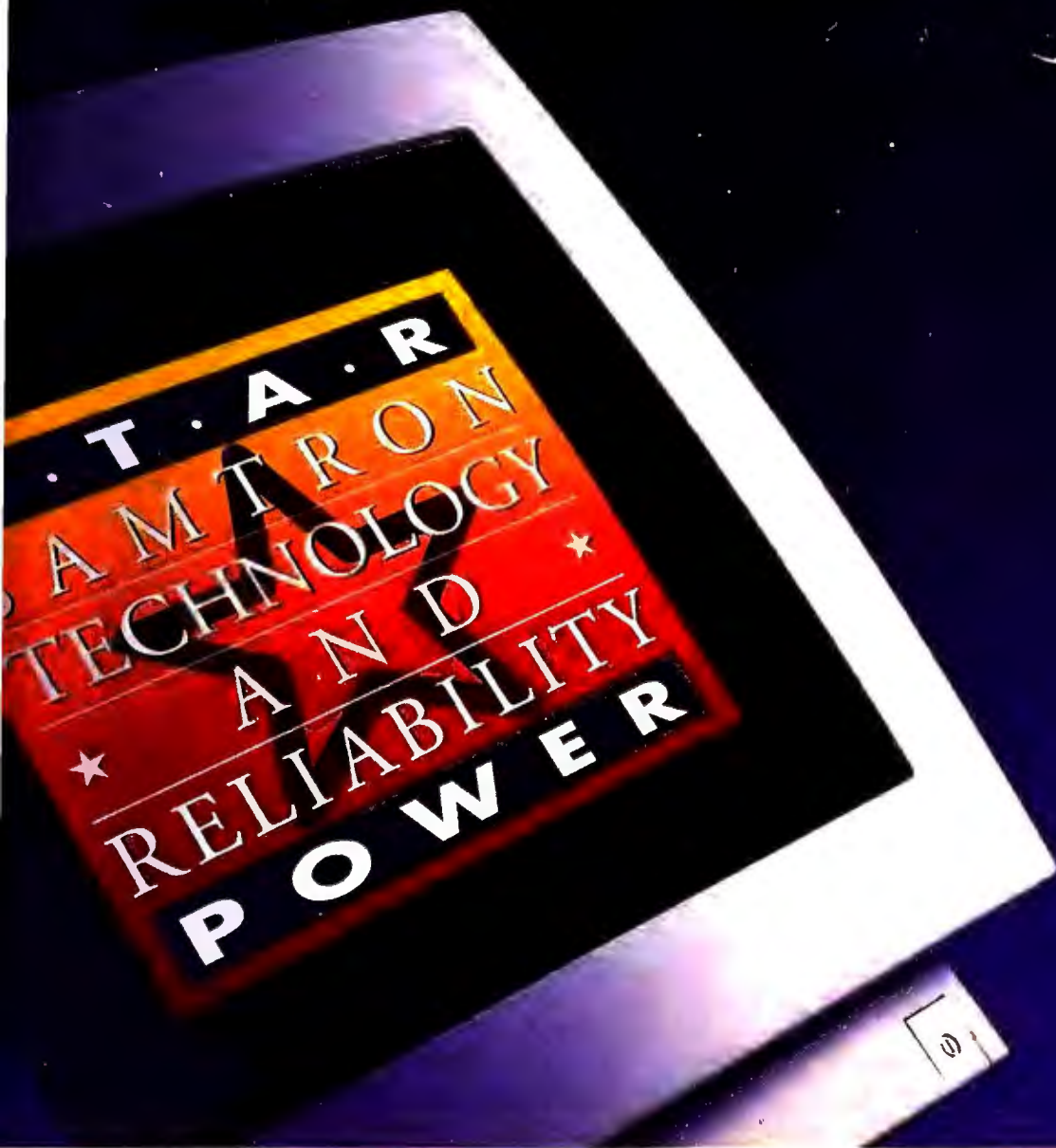
Kurta

800/445-8782

List price: \$249

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And, Unfortunately, He'll



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FLEXSHOW†
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the Z-NOTEFLEX system truly a sound investment.

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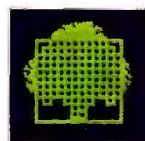
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Photoshop 3.0 and Picture Publisher 5.0: Imaging Powerhouses

If a picture is worth a thousand words, then major upgrades of Adobe Photoshop and Micrografx Picture Publisher speak volumes. Both of these imaging programs offer intuitive new interfaces that make powerful imaging techniques quick and easy.

For starters, the \$895 Adobe Photoshop 3.0 offers *object layering*. What's that? Think of it as composing a paper collage digitally. In earlier Photoshop versions, once you pasted an image on a background image, the two were stuck together like glue. Object layering lets you float multiple images above the background without pasting them, allowing you to rearrange the images later. You can save this composition in layered form (for future editing), or drop the new images onto the background and save the file as a normal Photoshop image. A

popularity means more people will discover this feature.

In fact, the \$595 Picture Publisher already offers object layering, and version 5.0 goes one step further with a new technique called *virtual imaging*. Imagine the time you'd save if you could easily edit that giant 100MB image of your company poster. Now you can—and on a 486 PC with only 8MB of RAM. Instead of opening the high-resolution image, you work on an identical *proxy* image at your screen's resolution—the proxy uses less RAM and is faster to edit. Since Picture Publisher 5.0 automatically records your editing session to an ASCII script, you can undo any mistake you make by removing it from the script. When you've finished editing, you can apply the changes to the original image. Another option is to send a copy of the

original image and the ASCII file to a printing service bureau, which can incorporate all your changes and print the image (provided that the bureau uses version 5.0).

True Colors

Color is Photoshop's strength. The four-color (CMYK) Print Preview feature in version 3.0 can help

you identify color printing trouble spots. To achieve the best printing results, use the new Sponge Tool to lighten or add color to specific areas.

Both products have impressive color editing tools: Picture Publisher's Chroma Mask and Photoshop's Color Range let



PICTURE PUBLISHER 5.0's new virtual imaging technique lets you edit huge graphics files in real time on slower PCs.

you select individual colors for on-the-fly masking, alteration, or replacement.

Getting to Know You

The nice thing about Photoshop is that users rarely have to relearn old tricks with each upgrade. The program's new floating menus make it easier to find the tools you need—and they roll up like window shades to free the screen of clutter. Another cool tool is the Command Palette, which you can customize to hold all your favorite commands. Filters with intriguing names such as Dust, Scratches, and Mezzotint help simplify photo retouching and color manipulation. And Photoshop's Lighting Tool casts simulated gallery lights on the surface of any image.

Picture Publisher has some enhancements for power users. You can modify the program's toolboxes to replace default commands with more advanced ones and record your favorite imaging tricks as macros. The Clipboard Browser, like Photoshop's Layering Palette, now

lets you see small objects you can drag over the main image.

Both programs pack more features in the new versions, but Picture Publisher's virtual editing ability gives it the performance edge. The products each include an image library and tutorial on CD ROM, but Adobe throws in Acrobat Reader, several third-party filters, and a second CD ROM of fonts.

—John Goddard



CREATIVE WHIMS ALLOWED: Alter images with Photoshop's mask layering palette.

Layering Palette shows thumbnails of each image layer—useful for drag-and-drop editing. Photoshop's special effects let you alter individual images or groups of images, then undo all your changes. While object layering isn't the latest image-editing trend, Photoshop's huge

Photoshop 3.0, Picture Publisher 5.0

Major upgrades of two popular imaging programs.

Photoshop 3.0

Adobe Systems

800/833-6687

List price: \$895, upgrade \$149

Reader service no. 712

Picture Publisher 5.0

Micrografx

800/326-3614

List price: \$595, upgrade \$149

Reader service no. 713

Peachtree Accounting 3.0 for Windows: Small-Business Bookkeeper

If you need to keep the books for a small business, Peachtree Accounting 3.0 for Windows is a superb choice. This latest release from the veteran developer of accounting software offers a broad range of accounting functions, together with a surprising degree of flexibility for such an inexpensive package.

Like most other small-business accounting software, such as Intuit's QuickBooks, the \$169 Peachtree Accounting 3.0 handles all the basics. You get a general ledger for preparing financial statements, billing and accounts receivable for keeping tabs on your customers, and disbursements and accounts payable for tracking what you owe your suppliers.

Unlike QuickBooks, however, Peachtree also handles inventory. In addition, the package features a payroll system—something most manufacturers offer as an add-on module that costs extra.

One of Peachtree's most impressive facilities is the WYSIWYG report writer. You can take any of the 100-plus report templates and customize them to your heart's content. You can drag fields to different locations,

modify the column widths, and change the fonts. You can even adjust the layout of checks to match the computer forms that you now use.

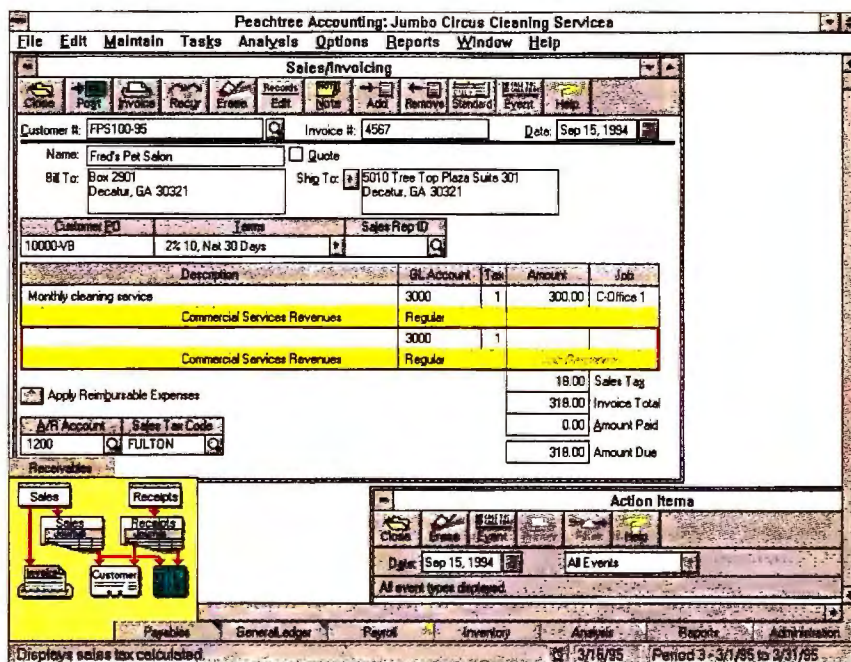
Like both MYOB and QuickBooks, Peachtree now includes business management tools, such as an events log that alerts you under certain conditions. For example, you might want Peachtree to remind you that you need to follow up on a customer's late payment.

As an alternative to the standard drop-down menus for Windows, you can activate a flowchart menu that displays the path of accounting transactions. You click on a flowchart icon to make quick changes at any stage of the accounting process. For example, let's say that your receivables flowchart shows all the customer-related accounting transactions. Just by clicking the flowchart icon, you can quickly create an invoice for a specific customer.

Peachtree keeps the books using either the standard accrual method or the simpler cash basis. Depending on your preference, the program can post transactions immediately or hold them in a batch for later posting. It can even unpost transactions up to two years old. Unposting is a great way for inexperienced users to correct errors, but it gives many auditors the heebie-jeebies because it destroys the audit trail. Access to this function can be restricted by a password control.

An added bonus: Peachtree is network ready, so you can continue to use the same program when your business grows and the books become too much for one person to handle.

—Richard Morochove



PEACHTREE ACCOUNTING 3.0 FOR WINDOWS lets you prepare a quotation for a customer, then later convert it into an invoice.

NoMouse That Roars

If you think a mouse is more rodent than pointing device, NoMouse 5.0 for Windows is your pest control. The latest version of this mouse emulation software lets you control the cursor from the keyboard using cursor keys and customizable hot keys. And you can assign multiple hot keys to any NoMouse operation.

Convenient for laptop users who don't like the trackballs and pointing sticks that come with many portables, NoMouse 5.0 for Windows is also designed for keyboard-oriented desktop users.

NoMouse 5.0 offers improvements that let you control the cursor's speed and change its size and shape—great for hard-to-read laptop screens. You can also control the keyboard's simulation of a mouse's double-click. A new Shifted Speed function allows you to adjust the speed at which the cursor moves across the screen—par-

NoMouse 5.0 for Windows

Mouse emulation software replaces trackballs and pointers with keyboard controls.

Abacus Software

800/451-4319,

616/698-0330

List price: \$49.95

Reader service no. 715

ticularly handy for graphics programs that require you to have great aim to edit an image.

Also added to NoMouse is a Screen Wrap function that lets the cursor move off one edge of the screen and reappear on the opposite side. This feature and the new Magnify and Snap-To functions are similar to features that are supplied by the latest Microsoft Mouse driver. The new version also provides an enhanced help file and installation program. NoMouse 5.0 for Windows lists for \$49.95.

—Michael S. Lasky

Peachtree Accounting 3.0 for Windows

Powerful bookkeeping software for small businesses.

Peachtree Software

800/247-3224,

404/564-5700

List price: \$169 (floppy disk or CD ROM), upgrades \$79; 60-day money-back guarantee

Reader service no. 714

Sidekick Finally Rides Into Windows

Three years after its last DOS upgrade, the Gabby Hayes of personal information managers has returned, sporting a slick Windows interface and an amiable \$29.95 price.

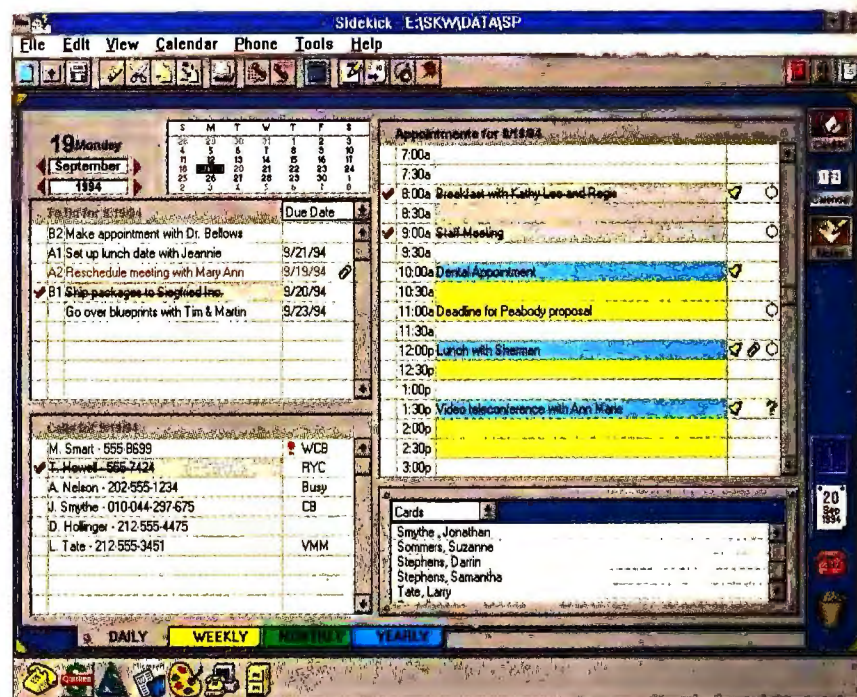
Clearly, this Sidekick has learned a few Windows tricks during its absence. The program looks like a desk blotter, with windows showing your address book, calendar, to-do list, and more. To make an appointment, you simply drag a name from the address book and drop it on your calendar; to dial a phone number with your modem, just drop the name on the phone icon. Like most PIMs, Sidekick lets you keep a log of each event and create reports showing all your activities. You can take notes in a text editor and organize them into folders, print your address book or schedule in Day-Timer and other popular formats, and launch other applications from a convenient icon bar.

Sidekick's strongest feature is its address book. You can sort contact data by any combination of fields—for example, you can view all your contacts by company name or ZIP code. Unfortunately, however, the calendar lacks smarts. Sidekick lets you set up recurring appointments, such as a weekly staff meeting, but it won't give you any warning if the meeting lands on a holiday or conflicts

with your semiannual dental examination.

The program also lacks the sophisticated features found in other PIMs such as Lotus Organizer or Arabesque's Ecco, including OLE hooks to E-mail programs. If error-free scheduling is what you're after, get one of the pricier packages. If all you need is an electronic Rolodex with some snazzy calendar and scheduling features, Sidekick for Windows could make a trustworthy desktop companion.

—Daniel Tynan



SIDEKICK FOR WINDOWS lets you scroll through your address book while perusing your calendar, phone messages, and to-do list.

Lotus Joins the Electronic-Forms Fray

With the success of Lotus's groupware products, such as Lotus Notes and cc:Mail, it's no surprise to see the company enter the burgeoning electronic-forms market. Lotus has leveraged its groupware expertise to create Lotus Forms 1.0 for Windows, an automated forms package that uses E-mail software to route forms.

Like many other offerings in the hotly contested forms market, Lotus Forms is divided into separate Designer and Filler modules. In a typical business setting, a supervisor or forms administrator can use Forms Designer to create and maintain electronic forms, while end users can input data with the Filler module.

Any forms package worth its salt excels at trafficking forms among users and handling complex routing instructions. Lotus Forms should do well in this area; the software supports the popular VIM and MAPI messaging protocols, so users of

cc:Mail, Microsoft Mail, and other leading E-mail packages can send and receive forms across the net.

Not surprisingly, Lotus Forms provides superior integration with Lotus's cc:Mail (including cc:Mail Remote) and lets users send forms directly from the Forms screen. Administrators can create routing instructions using LotusScript, the company's BASIC-like scripting language. For instance, an expense report above a certain dollar amount can be routed to the Big Boss for final approval. To provide security, Lotus Forms supports digital signatures and data encryption.

One of the biggest benefits of using a forms package is its ability to access corporate data quickly. Using industry-standard ODBC drivers, Lotus Forms can locate information stored in Paradox, Access, Fox-Pro, dBASE, and other database file formats. For example, when a Lotus Forms user enters a customer ID number into a

Lotus Forms 1.0 for Windows

Lotus's first offering in the competitive forms-software market.

Lotus Development Corp.
800/346-1305

List price: One Designer module and five Filler modules \$395, additional Filler modules \$149 each

Reader service no. 717

form, the program can search a database, find the customer's address and other contact information, and automatically paste it into the form.

Users will find that Forms looks a lot like other Lotus applications, with its customizable SmartIcons and its helpful status-bar prompts. Lotus Forms costs \$395 for one Designer module and five Filler modules. Additional Filler modules cost \$149 apiece; volume discounts are available.

—Michael Desmond

Sidekick 1.0 for Windows


The original PIM returns with a slick Windows interface.

Borland International

408/431-1000

List price: \$29.95

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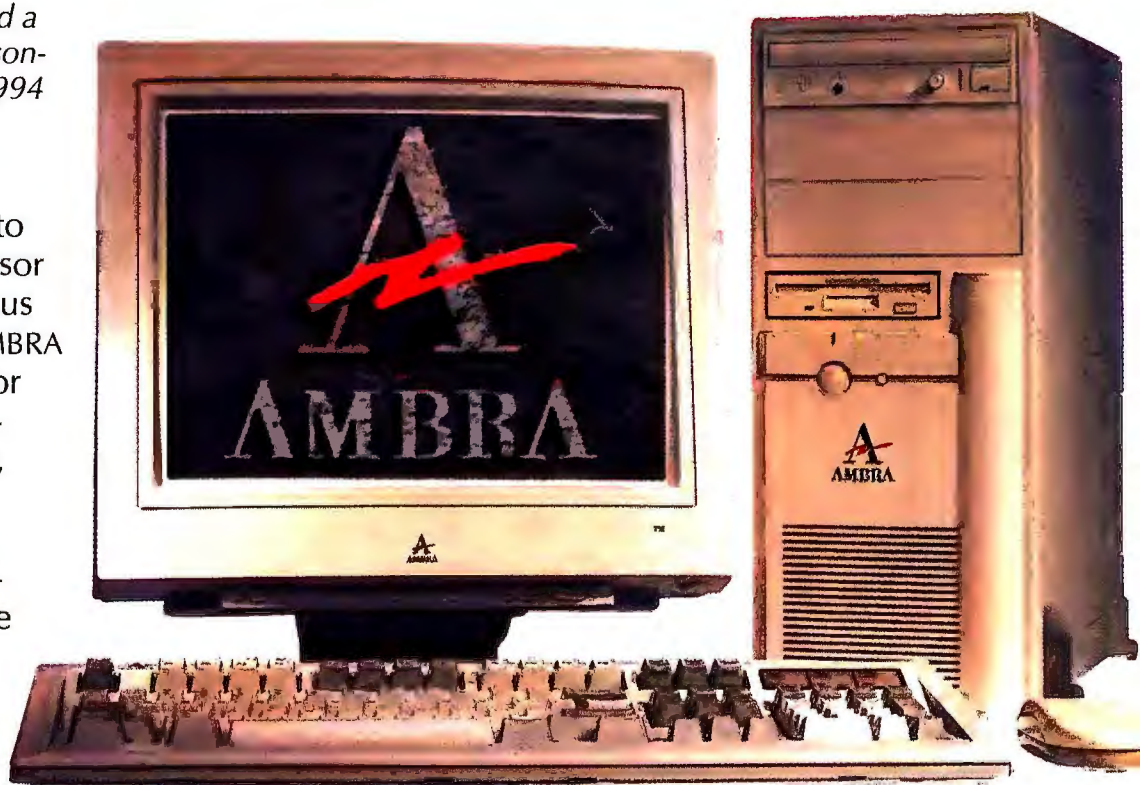
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—PC Magazine, June 28, 1994

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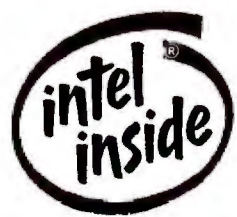
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—Windows Sources, April 1994

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The AMBRA DP60PCI System, InfoWorld, March 14, 1994



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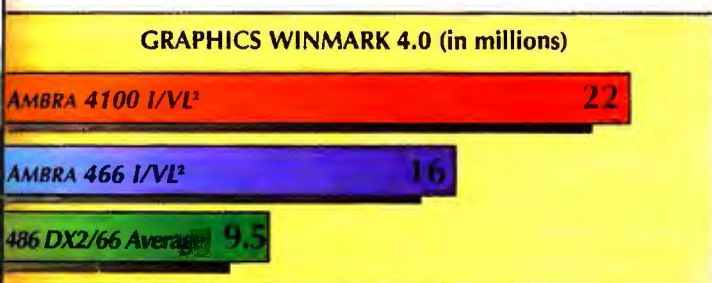
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The AMBRA D466 I/VL
InfoWorld, April 4, 1994



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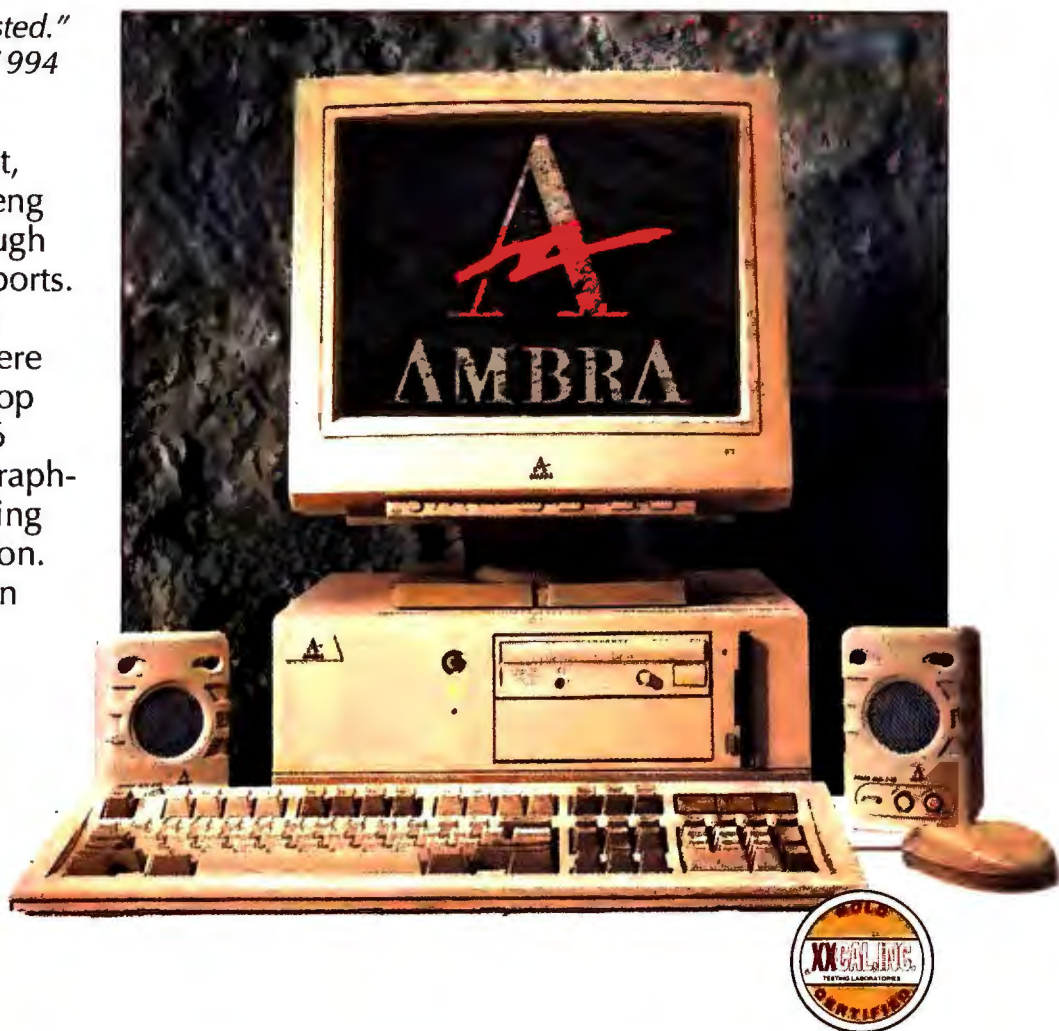
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N75D-340
PC World,
August 1994 issue

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N75D-340,
InfoWorld,
May 23, 1994

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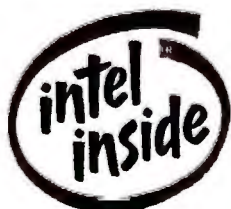
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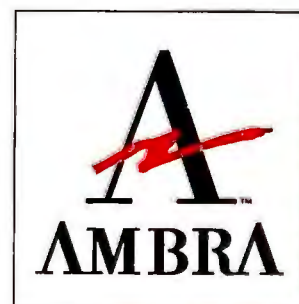
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InfoWorld, April 4, 1994

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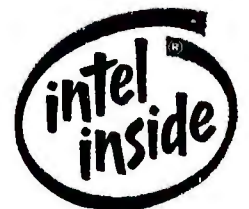
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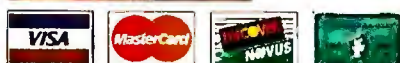
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Business Lease: \$78/Month

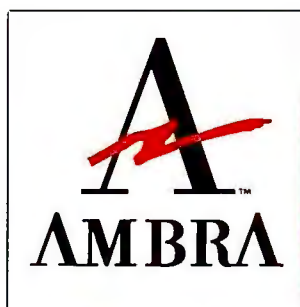


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1800-200-3394



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SelectPhone: America's Phone Book on CD ROM

Some ideas are so brilliant you wonder why it took so long for someone to think them up. In the case of Pro CD's SelectPhone, a CD ROM compilation of every phone directory in the United States (that's about 80 million phone numbers *and* addresses), it was probably more a matter of waiting for CD ROM technology to get up to speed. Considering how long it takes to drag out your local directory and look up a number, or how much it costs to call long-distance information (and how, when you do, you can't always get an address or more than one number), this new Windows-based business tool is a fantastic time-saver.

A fast, powerful search utility makes it a snap to call up multiple listings sorted by name, address, area code, ZIP code, or business type. Want to know how many competitors your business has? Simply enter a search based on SelectPhone's industrial classification codes, and a list of firms will appear.

You can limit your searches to business only or residence only. Once you've got the information, you can process it in several ways: Print it, export it to your word processor, send it to your database pro-

gram in a format that supports mailing label output, or simply click the World icon to have the program's MapLinx Lite utility show every highlighted listing on a U.S. map. There's even an auto-dialer.

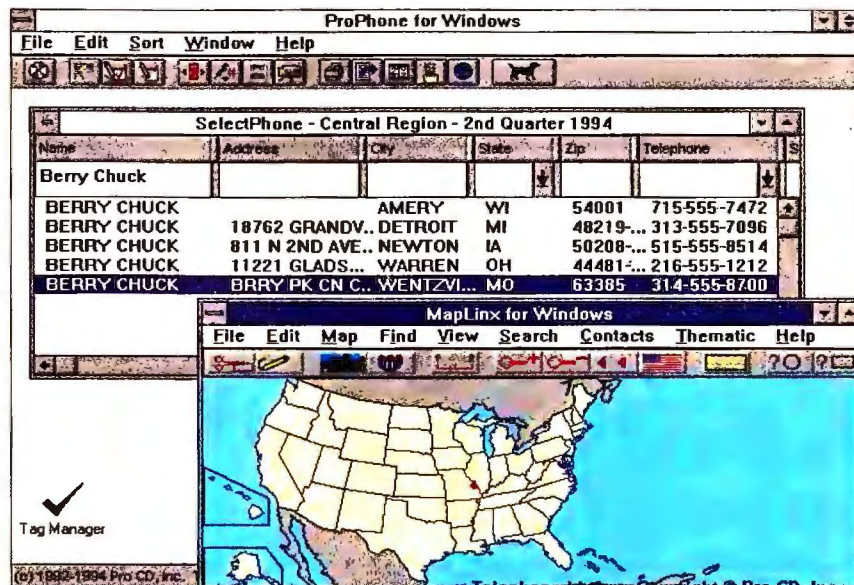
Considering the massive amount of data SelectPhone needs to sort, its search routines are amazingly fast. Even allowing time to load the disk into your CD ROM drive and start the program, SelectPhone is much faster than paging through a phone book (not to mention paging through 10,000 phone books). Pro CD has pledged to update its listings quarterly, as new directories are released. The current listings are accurate as of early 1994.

I have only one complaint: Since it takes four regional disks to cover the United States, if you really need to check listings all over the country, you'll have to do four separate searches and combine the results manually.

Pro CD sells two other, similar products: DirectPhone includes the same phone numbers and addresses as SelectPhone but is searchable only by name; the package costs around \$99 on the street. FreePhone, a fully searchable listing of every 800 number in the United States, costs about \$29.

SelectPhone isn't the only Windows-based U.S. phone book. Digital Directory Assistance's PhoneDisc for Windows offers similar features and should be shipping by the time you read this. Unfortunately, it was unavailable for review at press time.

—Michael Goodwin



BACK IN THE U.S.A.: Even rock 'n' roller Chuck Berry is easy to find using SelectPhone's powerful search function.

CompuServe Goes Multimedia

CompuServeCD is a cross between a digital magazine about CompuServe and an interactive, multimedia guide to the online service. The product has a shopping section, articles about the service, videos, and even games and entertainment.

You can take a behind-the-scenes look at life on the road with Jimmy Buffet, check out the movie previews, play demo and shareware games, and listen to music clips from soon-to-be-released albums.

If you're nervous about CompuServe's high hourly online charges, you can use the CD ROM to preview CompuServe forums before logging on. But if you're like most people, you're probably too busy to spend hours browsing an online service. The disk's File Finder may therefore be the most useful feature. It lets you locate interesting files on CompuServe before you log on. Then, when you do connect,

CompuServeCD

MULTIMEDIA Multimedia magazine and guide to the online service.

CompuServe

800/848-8199

Price: \$7.95 per disk

Reader service no. 768

File Finder downloads the files for you automatically. The disk also comes with the latest version of CompuServe Information Manager for Windows, a graphical interface that makes it easier to navigate the online service.

A CompuServeCD subscription costs \$7.95 per disk. Until mid-1995, CompuServe will release a new disk every other month. After that, disks will come out monthly. To subscribe, type **GO CCD** on CompuServe and follow the instructions. Your subscription will be billed to your CompuServe account.

—Christina Wood

SelectPhone

Every U.S. residential and business phone number and address on CD ROM.

Pro CD Inc.

800/992-3766,

508/750-0000

Street price: \$199

Reader service no. 767



These days, all it takes is a little success to overload your business. The more you demand of your computers, the slower things can get. Well, that's because PCs are made to be PCs. And at this point, what you really need is a server—the most efficient way to get your PCs working together.

So we'd like to introduce you to the Compaq ProSignia VS. Now, for the price of a desktop, you can get a real, industrial-

strength server made by the company who knows the technology best. (Compaq is recognized as the world leader in servers.*)

Unlike a PC, the ProSignia VS is specifically designed for the job of powering a computer network in small- to medium-sized businesses. It's optimized for high-speed file transfers, to eliminate the finger-tapping during everyday tasks, like calling up a customer record to take an order. It also expands easily to

NOW THAT YOUR BUSINESS IS GETTING
A LITTLE BIGGER, GUESS YOU'LL
BE NEEDING AN OFFICE MANAGER.



provide vast, centralized storage as your business grows larger.

And while most servers are complicated, the ProSignia VS can make your life easier. Our optional CD-based SmartStart simplifies the whole process of setting up a reliable system. And Insight Manager (also an option) keeps an eye on key parts, pinpointing problems *before* they can disrupt operations.

Of course, the ProSignia VS also provides the security of

Compaq's three-year on-site warranty** and 24-hour support line.

To find out how you can give your company more agility as it grows, visit an authorized Compaq reseller. If you'd like more information, or if you'd like the name of your nearest reseller, call us at 1-800-638-8258, ext. 450. We can show you the best kind of office manager: One **COMPAQ** that works as hard as you do.

Manager are registered trademarks of Compaq Computer Corporation. *Source: International Data Corporation, 1993. **Certain restrictions and exclusions may apply. Monitors, battery packs and certain options are

Circle 88 on reader service card

A Better-Integrated WordPerfect Office: GroupWise 4.1

The most immediately apparent change in the latest version of WordPerfect Office—WordPerfect Corporation's electronic mail and groupware package—is that it's not called WordPerfect Office anymore. The company has dubbed the new version GroupWise 4.1 (changed from Symmetry at press time), saying that products like Microsoft Office have led users to associate the term *office* with business software suites, an entirely different kind of package. The company also wants to distinguish GroupWise from its PerfectOffice business suite, which ships this fall.

Despite the new name, WordPerfect Office 4.0 users won't find major changes in the program's E-mail, calendar, and scheduling functions. Many of version 4.1's improvements increase GroupWise's interaction with other applications; for example, it now supports the Simple MAPI protocol, which allows Windows users to send E-mail directly from within the wide range of MAPI-enabled programs. Since developers can tightly integrate their applications with GroupWise, you'll be able to access, say, a word processing feature from a GroupWise menu. WordPerfect plans

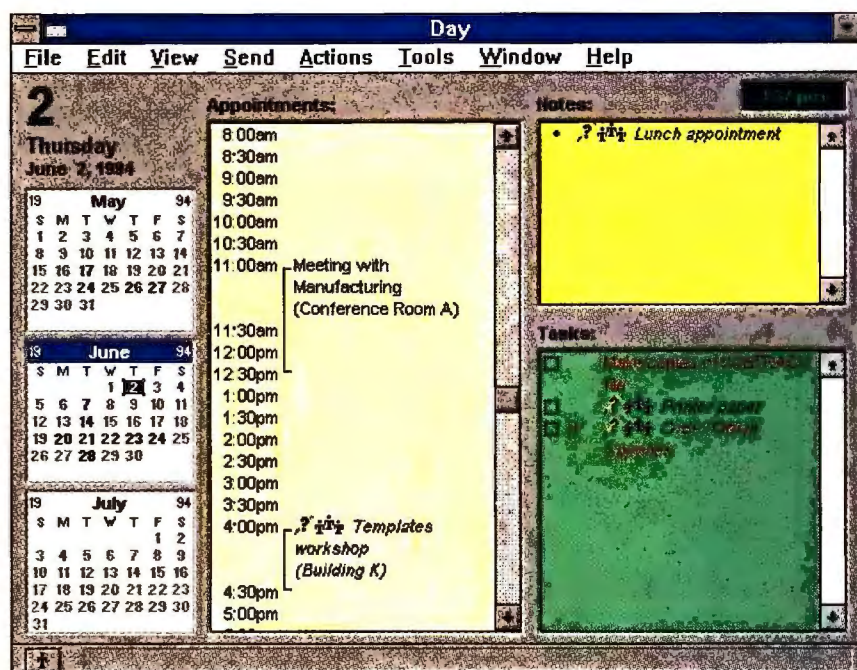
to extend this level of integration to its InForms forms application and other programs.

GroupWise's Windows client is one of the first WordPerfect programs to adhere to PerfectFit, a set of specifications designed to create a common look and feel for the company's major applications. Like similar strategies at Microsoft and Lotus, PerfectFit will result in programs that have similar menu layouts and dialog boxes, and that share other features such as a spelling checker. PerfectFit will be implemented more substantially when it appears as part of PerfectOffice 3.0.

GroupWise 4.1 retains its remote client software, which lets mobile users keep in touch with the office and adds optional support for pagers and the most pervasive communication devices of all: touch-tone telephones. Support for the latter is provided via the Telephone Access Server, a \$9995 OS/2-based module that allows travelers to dial in from a phone and use voice menus to check E-mail and calendar items; you can also make schedule changes and send voice messages to other GroupWise users.

Most of the other enhancements are under-the-hood fixes aimed at network administrators, although many of these will also benefit end users. For instance, net managers can now do routine maintenance on the GroupWise database without disrupting users' access to the E-mail system. And in addition to DOS, Windows, and Macintosh versions, there are new GroupWise editions for seven UNIX platforms and a version for PowerPC-based Macs.

—Harry McCracken



GROUPWISE 4.1 INCLUDES WordPerfect Office 4.0's E-mail, calendar, and scheduling features and improves network integration.

Eclipse Fax 6.0: Fast Fax Manager

What's in a version number? Phoenix Technologies' \$84.95 Eclipse Fax is the latest Windows package to make the leap to version 6.0—even though it's in its third release. Version confusion aside, Eclipse Fax 6.0 includes several significant enhancements. Most notable is the program's new Fax Assistant utility, which automates the processing of incoming and outgoing faxes. Let's say you want to store all faxes received from Sharon in C:\FAX\SHARON; Fax Assistant will automatically recognize an incoming fax from Sharon's fax device and save it in that directory.

How does Fax Assistant work? Most fax devices transmit their fax number at the top of the page when sending a fax. Fax Assistant reads the number and determines if it matches a fax number in your Eclipse Fax phone book. If it finds a match, Fax Assistant processes the fax

Eclipse Fax 6.0

Low-cost fax program with automatic fax processing.

Phoenix Technologies

800/452-0120

List price: \$84.95

Reader service no. 706

according to your instructions. Fax Assistant can automatically print, save, delete, or OCR incoming faxes. It can also date- and time-stamp faxes, and fax copies to as many as ten recipients. You can configure Fax Assistant to automatically select different cover sheets for different recipients. You can also send complex presentations in thumbnail form—an easy way to reduce phone costs.

Eclipse Fax 6.0's enhanced dialer supports multiple credit cards and can save a specific credit card number for each person in your phone book.

—Jeff Bertolucci

GroupWise 4.1

WordPerfect Office gets a new name and under-the-hood changes.

WordPerfect

801/225-5000

List price: \$695 (for five users and DOS administration; discounts available for additional licenses)

Reader service no. 705

CaLAndar 3.0: This Scheduler Rides the E-Mail Highway

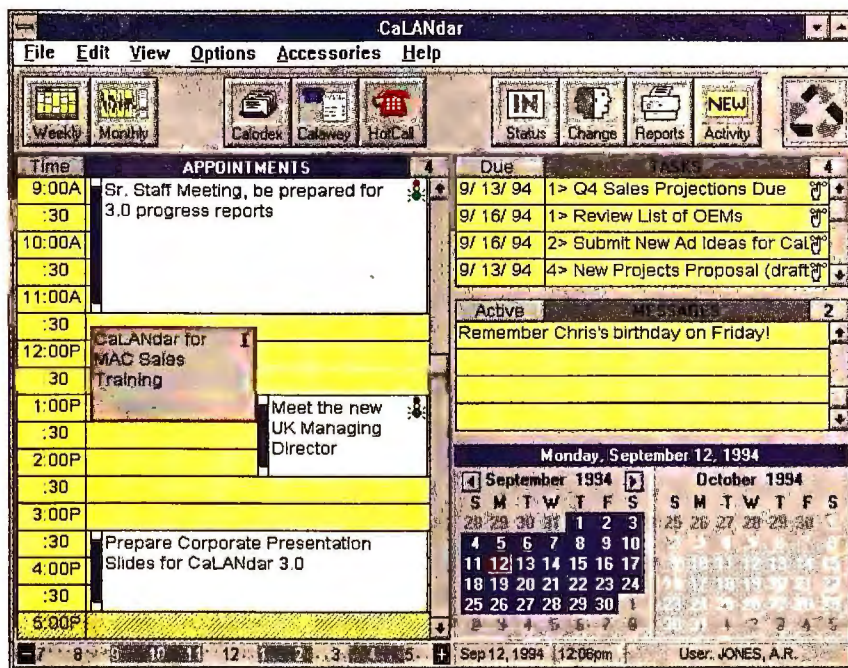
Is it groupware? A scheduler? A personal information manager? Microsystems Software's CaLAndar 3.0 is all of the above and more. At heart, CaLAndar is a group-scheduling package that juggles and coordinates the schedules of virtually any number of people. With versions available for DOS, Windows, and Macintosh PCs (not to mention a Satellite version for mobile users), it's especially well suited for large companies with cross-platform requirements.

CaLAndar has enough features to make it the PIM of choice for most users, and its well-integrated interface is easy to learn. CaLAndar features the usual personal and group appointment scheduling functions, a handy task list, and a message center. Also included are public and private address books, as well as an electronic "pegboard" for keeping track of who's in and out. With its graphical displays of group schedules, CaLAndar is particularly adept at coordinating meetings and other office activities. Give it a list of people and the length of time an activity will require, and CaLAndar will pick a time when everyone's available.

You can use CaLAndar by itself; its automatic "enote" feature will send data across the network. But if you have a full-fledged E-mail system (such as cc:Mail, Microsoft Mail, or an MHS-compatible product), CaLAndar tightly integrates itself with the system and uses it to transport schedules, notifications, and so on.

Another unique CaLAndar feature is People Pools. It allows a manager or administrative assistant to schedule a group of individuals (such as off-site personnel).

—Stan Miastkowski



KEEPING COORDINATED: CaLAndar 3.0 schedules both group and individual activities and can work via your network's E-mail system.

Coactive Connector 2.0 Does E-Mail

Coactive Connector, the plug-and-play network for small offices, now features E-mail for Windows users. Designed for businesses that have simple file- and printer-sharing needs, the product has won accolades for its ability to link DOS, Windows, and Macintosh computers easily—no networking knowledge required. Coactive Connector for DOS/Windows plugs into the parallel port (so you don't have to open the machine) and uses standard phone cable to connect up to 32 machines within a 1000-foot area.

Coactive Connector's file throughput speed has been improved in version 2.0 to 13 kilobits per second—still miserably slow compared with ethernet's 10-megabit-per-second rate, but fast enough for simple file transfers and print jobs.

The big news, however, is Coactive Connector 2.0's new E-mail facility for Windows

users. Although bare-bones compared with sophisticated E-mail programs such as cc:Mail and Microsoft Mail, Coactive's CoMail software does support the basics: sending and receiving messages and file attachments. Unfortunately, Coactive doesn't yet offer E-mail for Macintosh or DOS users.

The Connector for DOS/Windows includes an internal processor. On the Mac side, Apple's built-in networking eliminates the need for a micro-processor, which greatly reduces the cost: Coactive's Connector for DOS/Windows is \$149.95, while the Macintosh version is only \$29.95.

There's no question that just about anyone reading this can get a Coactive network up and running in less than 20 minutes. The question is, *should* you? In many cases, the answer is no. Wide area networks are becoming increasingly important, and it isn't that hard to install an

Coactive Connector 2.0

Simple printer- and file-sharing LAN now includes E-mail.

Coactive Computing Corp.

800/727-4273,

415/802-1080

List price: Connector for DOS/Windows \$149.95, two-machine starter kit \$399.95, Mac-to-PC connection kit \$179.95

Reader service no. 782

ethernet card and have a fully operational, extensible network. If you run solely under Windows, the networking software built into Windows for Workgroups is an option. And if you need to connect a mix of computing environments, you could install TCP/IP, which gives you a full suite of elegant network protocols available to *any* machine—whether UNIX, DOS, Windows, OS/2, or Macintosh.

—Joe Abernathy

CaLAndar 3.0

Group-scheduling software that works with virtually all popular E-mail packages.

Microsystems Software, Inc.

508/879-9000,

508/626-8515 (fax)

List price: \$30 to \$59.50 per user (depending on E-mail system and number of users)

Reader service no. 707

AnyTime 2.1 for Windows

For people who want an inexpensive personal information manager (PIM), AnyTime 2.1 for Windows provides basic functionality at a rock-bottom \$30 street price. The new version adds one significant feature: the ability to import and export data from existing databases and scheduling programs. AnyTime 2.1 also offers 53 customizable print layouts—useful for taking contact and schedule information with you. Modules include a scheduler, an address book, and a to-do list, and AnyTime sports the necessary PIM convenience features, such as the ability to set recurring appointments. While AnyTime 2.1 doesn't have all the features of more-expensive PIMs—for example, you cannot link documents to contact names—it's an easy-to-use application with a painless price, and it should serve beginners well. Version 2.0 users can get the upgrade for just a \$4.95 shipping fee. AnyTime 2.1 for Windows lists for \$49.95. Individual Software, 800/822-3522, 510/734-6767.

Reader service no. 757

American Heritage Talking Dictionary

The American Heritage Talking Dictionary on CD ROM does just what its name says: It pronounces more than 200,000 words for you. It has all the features you'd expect from a traditional printed or electronic dictionary, including correct spelling and sample sentences. You can search for words based on spelling, partial definitions, and Boolean search criteria. The disk also includes the 500,000-word Roget's II Electronic Thesaurus, and there's even an anagram feature: Type in a word,



LOW-COST INFORMATION MANAGER: Street priced at about \$30, AnyTime 2.1 for Windows offers many useful scheduling features.

and the program discovers more words by rearranging the letters. The American Heritage Talking Dictionary lists for \$59.95. SoftKey Int'l, 617/494-5801.

Reader service no. 756

Conversions Plus 2.5 for Windows

Conversions Plus for Windows lets you exchange files between PCs and Macintoshes. Version 2.5 supports several new file formats, including Word 6.0 for Windows, Excel 5.0, WordPerfect 3.0 for the Mac, and OLE 2.0. You can move files via a floppy disk or network from Mac to PC, PC to Mac, or PC to PC. The product supports many word processor, spreadsheet, database, and graphics file formats. Conversions Plus 2.5 for Windows lists for \$149. DataViz, 800/733-0030.

Reader service no. 758

DisplayMate for Windows

The first Windows version of this software utility helps you get the most from your computer's display without having to know all the technical details. DisplayMate produces a series

of complex images that test monitor scanning frequencies, video modes, and color palettes and intensities. The program suggests monitor and video board adjustments that you can make for enhanced sharpness, contrast, color and gray-scale accuracy, and other technical improvements. DisplayMate for Windows is priced at \$79. Sonera Technologies, 800/932-6323, 908/747-4523 (fax).

Reader service no. 759

DacEasy Executive Information System in DOS

DOS is dead. Long live DOS. DOS really *is* dead, except in the accounting world. Who wants to reenter five or ten years' worth of company data? DacEasy, a longtime leader in accounting software, seeks to put the best face on this problem with a Windows-based package called DacEasy Executive Information System (EIS). It reads DOS-based DacEasy accounting files and lets you create charts, graphs, and presentations in Windows, either on screen or as overheads or 35mm slides. The product includes standard presentation

tools, such as background templates, clip art, and screen-show transitions. EIS lists for \$149.95. DacEasy, 214/732-7500.

Reader service no. 761

Emergency Disk 2.0, SpeedTools 2.0

Central Point's Emergency Disk 2.0 and SpeedTools 2.0 are inexpensive subsets of the company's popular \$179.95 PC Tools utilities package. Emergency Disk creates a single crash-recovery floppy disk containing all your critical system information. It includes DOS versions of Central Point's DiskFix, Memory Information, Undelete, PC Format, and Unformat utilities—all of which should fit on the emergency floppy. SpeedTools 2.0 is designed to make your Windows PC run faster. SpeedTools analyzes your machine, then gives performance-boosting recommendations, defragments the hard drive, and provides help for editing Windows INI files. Both Emergency Disk and SpeedTools (\$29.95 each) come with an offer to upgrade to the full PC Tools package for \$49.95; considering that PC Tools sells for about \$100 on the street, this upgrade may be the cheapest way to buy it. Central Point Software, 800/964-6896, 503/690-8088.

Reader service no. 762

TripMaker for Windows

Ask anyone who's tried to navigate the freeways of Los Angeles or circumnavigate Boston's labyrinth of streets: You're a sucker if you don't plan a car trip ahead of time. Before you drive off to your next destination, take a look at Rand McNally's TripMaker, a Windows program packed with



INTRODUCING REMOTE EVERYTHING: NEW CARBON COPY 2.5

It can happen anywhere: at home, in your hotel room, an airport lounge, while you're overseas. Suddenly you've got to get at a file, access e-mail—maybe even run a program—that's in the PC back at your office.

Now there's a total remote-communications package that lets you do it all, faster than ever. Microcom's new Carbon Copy™ 2.5 offers you easy access and complete control of the files, applications and peripherals of another PC or LAN, no matter where you are.

With its new software gateway you can dial into a single LAN modem and access any PC on the network (ideal for small offices). A built-in terminal emulator allows direct access to on-line services like CompuServe®, and electronic bulletin board systems (BBSs). And Carbon Copy 2.5 supports

All-In-One Remote Communications

Integrated Terminal Emulator

Remote Control

File Transfer

Software Gateway

Remote Clipboard

Also check out Microcom's 28.8 DeskPorte™ FAST and TravelPorte™ FAST high-speed modems.

Upgrade to Carbon Copy 2.5 for only \$49

Now for a limited time, upgrade to Carbon Copy 2.5 from any competitive remote communications software, or any version of Carbon Copy, for only \$49. Call today: 1-800-765-1750.

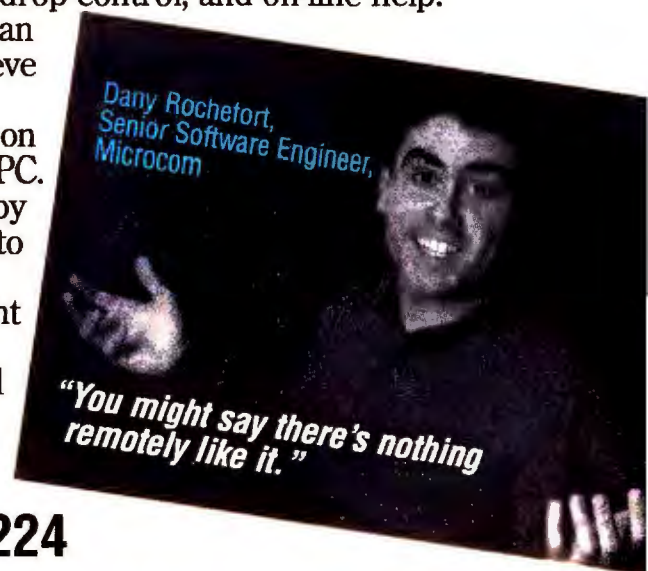
leading file transfer protocols—no need for additional communications software.

A true Windows application, Carbon Copy 2.5 runs effortlessly, right out of the box. With simple point-and-click, drag-and-drop control; and on-line help.

What's more, you can now send and retrieve files between PCs, whether or not Carbon Copy is on the host PC.

New Carbon Copy 2.5: when it comes to fast, easy remote access, we've thought of everything. For free information and the name of your local Microcom dealer, phone

1-800-822-8224



microcom®

The brightest ideas in remote access.

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Microcom Australia, (61) 2 410-9953

Microcom is a registered trademark and Carbon Copy, DeskPorte and TravelPorte are trademarks of Microcom Systems, Inc. All other trademarks are the property of their respective trademark holders.

maps of the United States and an extensive database of tourist information about roads and cities in the United States, Canada, and Mexico. TripMaker finds direct routes from point to point, calculates travel times, and even suggests fun side trips. For example, it can help a business traveler find the quickest route to cover four cities in three days, and vacation planners can search TripMaker's database for cities within a given distance and filter them based on, for example, historic sites or children's activities. TripMaker offers 88 preplanned trips, such as a tour of Northern California's wine country.

One limitation: While TripMaker provides national and state maps with insets of some cities, it doesn't offer detailed city street maps—presumably, that much information would be hard to fit on floppies. However, the \$79 program does give page and grid references to the printed Rand McNally Road Atlas. Rand McNally, 800/671-5006 ext. 102, 708/329-8100.

Reader service no. 760

PowerLAN 3.1

Peer-to-peer LANs are finally getting some respect and are branching out from their small-business-only orientation into corporate work groups connected to large networks. PowerLAN 3.1—the latest incarnation of a peer-to-peer package that is not as well-known as it should be—offers enhancements that integrate it easily into existing NetWare LANs. PowerLAN is easy to install, has advanced management features, and is no slouch in the performance department. You can install it on any NetWare workstation without having to reconfigure the system. The product cleverly

color-codes network resources, with PowerLAN in blue and NetWare in red. A five-user PowerLAN package sells for \$395, single add-on licenses are \$99, and for ultimate performance, \$295 buys PowerServe, a dedicated server package. Performance Technology, 210/979-2000, 210/979-2002 (fax).

Reader service no. 763

Kai's Power Tools 2.0 for Windows

What image-editing tool does Purple Haze, Strawberry Fields, and other cool effects? Kai's Power Tools. Version 2.0 is faster than its predecessor, and its slick new controls unveil all the advanced features buried inside the earlier version. This add-on utility works with Adobe Photoshop, Fractal Design Painter, Micrografx Picture Publisher, Fauve Matisse, Corel Photo-Paint 5, and any image editor using Adobe's plug-in standard. If you're creating a background or filling a font, the new real-time preview screen lets you see the results before applying them. Better interaction between the Texture Explorer, Gradient Designer, and color path tools radically improve each tool's precision and power.



EYE-DAZZLING EFFECTS: Kai's Power Tools 2.0, a special-effects utility, now offers faster performance and an improved interface.

You can select from many textures—and if none is right for your design, you can pick a new color or use the “equalizer” tool to alter the texture's detail, blur, or roughness. The 33 filters include the new Seamless Welder for creating smooth patterns, and Fade Contrast for aging images. Kai's Power Tools 2.0 for Windows lists for \$199; upgrades are \$59.95. HSC Software, 310/392-8441.

Reader service no. 764

Sharkware Professional 2.0 for Windows

The new Professional version of CogniTech's Sharkware personal information manager helps you manage contacts and any documents related to them. Sharkware Professional 2.0 supports OLE 2.0 and integrates with VIM- and MAPI-compliant E-mail (including cc:Mail and Microsoft Mail) and with popular fax programs such as WinFax Pro 4.0. Thanks to the OLE 2.0 support, you can link or embed objects (such as documents and spreadsheets) into appointment-book entries and contact histories. And CogniTech has rewritten some of Sharkware's code to make it run faster. Like Symantec's Act con-

tact manager, Sharkware Professional 2.0 offers many features for customizing and managing large groups of contacts. In addition, Sharkware Professional gives tidbits of advice from Harvey Mackay, author of the best-seller *Swim With the Sharks Without Being Eaten Alive*. List price is \$199.95. CogniTech, 800/947-5075, 404/518-4577.

Reader service no. 765

Carbon Copy 2.5 for Windows

Remote-control packages have become essential tools for accessing a PC via modem. Carbon Copy was one of the first, and version 2.5 has new features that make remote connections faster and easier. Microcom claims that a new Windows virtual communications driver makes the new version 30 percent faster than its predecessor. Carbon Copy 2.5 also supports Microcom's 28.8-kbps V.fast modems, which can use a PC's parallel port instead of the slower serial port.

Also new and useful is a full-featured integrated communications package for one-stop access to online services such as CompuServe. And for networked environments, there's a software gateway that works two ways: On the road you can access your network remotely, while in the office multiple users can share a single modem and phone line. At \$199, the price remains the same; an upgrade from a previous version will cost you \$49. Microcom, 800/822-8224, 617/551-1000, 617/551-1021 (fax).

Reader service no. 766

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

**"I knew it.
I knew it.
I knew it."**

I blew it...

The surge protector I've been using didn't have the *joules for the job*. They tried to tell me, "the more joules your surge protector has the more protection you have!" But did I listen? I guess that's obvious! And did the surge protector come with a *connected equipment warranty*? Ask my checkbook.



Curtis Surge Protectors offer the highest joule rating totals in their class. The higher the joule rating, the more energy the surge protector can absorb.

Curtis also backs their surge protectors' performance by covering the equipment that is plugged into it. So don't "BLOW IT". Dare to compare—you won't find better value *anywhere*.



Curtis offers a complete line of ten different surge protectors.
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Root canals. Bad haircuts. Business graphics. A few scary things you go through life trying to avoid. Well, fret no more friend. Visio™ is here. It's graphics software that gives you the courage to do things you've never done before. In a nutshell, it's business drawing for people whose business isn't drawing. What your spreadsheet does for numbers, Visio does for visual communication. With 20 stencils and over 600 pre-drawn SmartShapes™ to choose from, you'll be drawing all kinds of stuff without drawing one darn thing. Organizational charts. Project timelines. Computer network diagrams. Engineering schematics. The big word here is ENABLING. No other business graphics program lets you do so much, so fast.

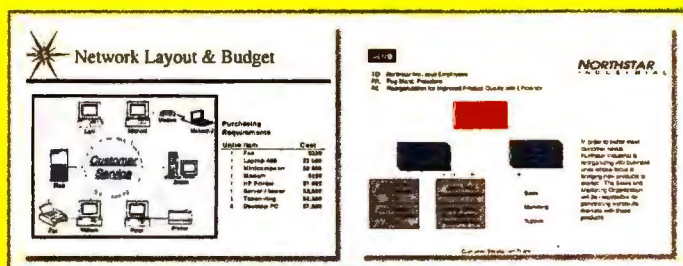
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High-Performance That Won't Hurt The Environment.



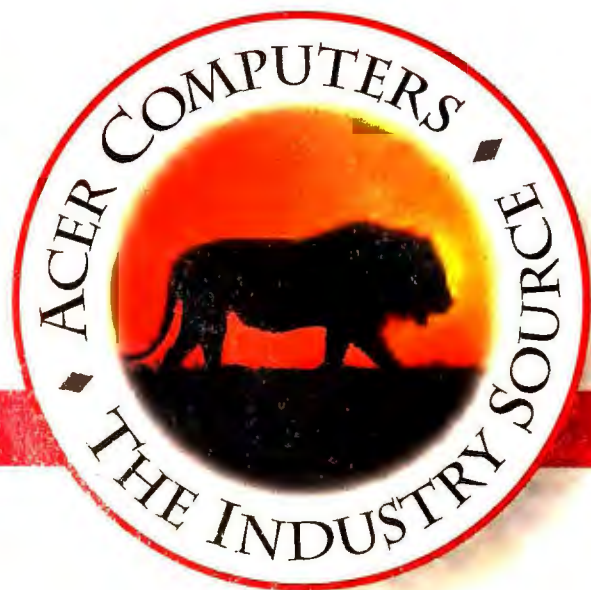
When you demand the highest level of performance and total control in an environmentally sound monitor—get the AcerView™ 76i with innovative on-screen controls.

This EPA Energy Star-compliant monitor delivers unsurpassed image quality, ergonomic features and a rapid refresh rate of 76Hz for all resolutions up to 1024 x 768. In fact, *PC World* declared the AcerView 76i a Best Buy for its affordable price, large viewable screen area, energy saving capabilities and convenient controls.



Ready To Take On Demanding Applications.

The AcerView 76i is PC and Macintosh® compatible and the 17" non-glare, superfine dot pitch and high-contrast flat screen makes it perfect for 3-D modeling, DTP, CAD/CAM/CAE and other graphics-intensive applications. Compatibility with VGA, SVGA, XGA, Ultra VGA and all VESA display modes means you can access today's most advanced applications.



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The "i" in the AcerView 76i means intelligence on screen. The iScreen® is Acer's patented on-screen display control technology that lets you adjust brightness, contrast, image position, size and more—you can even degauss your CRT!

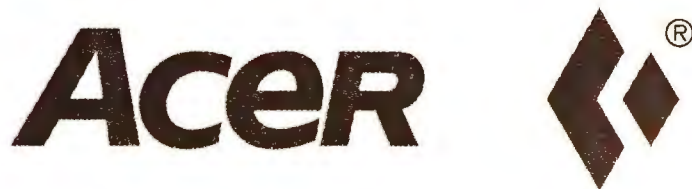
Plus the AcerView 76i meets the stringent safety standards it takes to earn an MPR-II rating for safety and low radiation.



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No matter what your monitor needs are, there's an AcerView monitor that's right for you. The 15" AcerView 56L incorporates sophisticated, low-radiation cathode tubes in a high-resolution color monitor. And if you're looking for quality on a budget, the 14" AcerView 34T or 11DG is the choice for you.

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Circle 102 on reader service card

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“Outstanding”

level of performance...



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**HEWLETT®
PACKARD**

Top 20 PCs:



1 POWER MOBILE PC

ATI AT GLORIOUS
300M (4800X250)
HIGH-CAPACITY
VIDEO & SOUND
CLOCKING/4.5GHz



1 BUDGET DESKTOP

DIAMOND D
486-66: More
performance
than you would
expect in a
\$1699 budget
system.

We've tested 224 PCs with 16 different processors. Which offer the best blend of features, performance, and

All right, we admit it—we're guilty. Like most people in the PC world, we tend to use shorthand, referring to a computer by the name of its processor. Unfortunately, that habit casually perpetuates the notion that a system's prowess can best be judged by its CPU. Granted, a powerful processor is fundamental to a fast PC. But that

doesn't mean a Pentium-90 guarantees top performance. Factors as mundane as memory configuration and as esoteric as wait states and chipsets affect performance as much as CPU class does. So we've seen such phenomena as a Pentium-66 desktop zipping by its Pentium-90 peers, or a DX2-66 mobile PC outrunning notebooks using the DX4-75.

This Month's Contenders pg. 135 • **Power Desktops** pg. 136 • **Budget Desktops** pg. 144 • **Mobile PCs** pg. 148

Beyond the CPU



1 POWER DESKTOP

DELL DIMENSION XPS PRO: Not Pentium-90 with 1GB hard drive and 16MB RAM.



1 BUDGET MOBILE PC

IBM THINKPAD 500: Big time. Gets yet another mobile winner with a happy 16MB RAM.

price? AT&T's Globalyst 200 (486DX2-50), Diamond's DT 486-66, Dell's Pentium-90, and IBM's ThinkPad 500.

Adding to the confusion, there's a wide variety of processors—16 of them represented in our Desktop and Mobile Top 20s this month. It's easy to see why there's tremendous performance overlap between systems with different CPUs.

The most striking example of the ever-shifting silicon is Intel's DX4-100. More than one-quarter of the systems in

this roundup—six desktops and a notebook—have this processor, and they produced wildly differing test results. Ares's DX4-100 tower performed on a par with a very fast 486DX2-66, while the NEC and MicroTech DX4-100 desktops zipped past most of the 60-MHz and 66-MHz Pentium systems we've reviewed. In fact, NEC's Image 4100es even

• **Complete Rankings** pg. 165 • **By Bryan Hastings** TESTING BY DEAN ANDREWS, ULRIKE DIEHLMANN, AND SUSAN SILVIUS

bested some of the slower Pentium-90s we've tested. This is a stunning power play from a system using a processor originally intended as an affordable alternative to the Pentium-60. Small wonder that half of the dozen DX4-100 desktops we've tested in the last few months appear on our Power and Budget Desktops Top 20s. The Image 4100es falls just one place short of a Power Desktop Best Buy, landing in an area dominated by Pentium-66 and Pentium-90 computers.

You Can't Tell the Players Without a Program

If you can't judge a system's performance by its processor, how *do* you pick a fast PC? A good place to start is with the performance ratings listed in our Top 20 charts. We provide a neat summation of the results of tests that use seven popular Windows- and DOS-based applications.

When it comes to gauging value, an even more important figure in the Top 20 is the overall rating, which takes into account all the critical aspects of the system: price, performance, design, expandability, and service and support. The news in the overall ratings column is especially good. Since we started the Top 20 roundups last February, the overall value ratings of Top 20 PCs in all categories—desktop and mobile, power and budget—have steadily increased. This climb reflects across-the-board improvements in performance and features. For example, for about the same price you would have paid in February, you can now buy a faster system with a larger hard disk and a CD ROM drive.

Best Buy Pentium—On a Budget

Some new faces have appeared among our budget desktop Best Buys. The new king is Diamond's DT 486-66, reviewed this month. This fast 486DX2-66 system comes with just the basics, but where else can you find an expandable PC that outpaces even a few Pentium-60s and costs only \$1699? In addition, a price drop of about \$250 levers the remarkable Austin Power System 60, reviewed in March, to number five on our Budget chart. At \$2258, this Pentium-60 earns our first-ever budget Pentium Best Buy.

Two of this month's notebook entries, AT&T's Globalyst 200 (486DX2-50) and the IBM ThinkPad 500, are our new top power and budget mobile PCs. You get it all with the Globalyst: thoughtful design, solid battery life, great service and support, and blazing speed that surpasses that of Ambra's DX4-75 notebook, the second-place power mobile Best Buy. Among budget portables, Big Blue makes yet another strong showing. Bumping its 486SX-33 sibling down to number two, the ThinkPad 500 subnotebook, based on IBM's own 486SLC2-50 processor, shoots directly to the top with a low \$1798 price and an outstanding feature set. Its performance equals that of the typical 486SX-33 notebook, you get a remarkable 5 hours and 40 minutes of battery life, and the unit has an exceptionally comfortable keyboard for a subnote. Of course, you also get IBM's legendary service and support.

Meanwhile, Dell's Pentium-90 compact holds the top power desktop position for the third month in a row, with a combination of fabulous performance, top-notch components (including a huge

Buying Smart: Consumer Tips

Avoid Orphaned Notebooks

Most mobile PCs sold by smaller companies aren't manufactured by their vendors. Never buy without knowing who made your model. Find out if the notebook maker can provide alternate sources for replacement batteries, converters, and other parts in case your vendor stops supporting the product or goes under. This is especially important if you're buying a used notebook.

Get It in Writing

Before buying a PC, get a written copy of all configuration details from the vendor: RAM, secondary cache, graphics accelerator and memory, and so forth. Use this information to comparison shop with other vendors.

Use a Credit Card

Use a credit card unless you already have a credit arrangement with the vendor. In case of dispute, the credit card company can help mediate or give a refund if you fail to receive a product.

1GB hard drive), and excellent support. Dell dropped the price on the Dimension XPS P90 to \$3828 from an already low \$3999. Austin's P5-66 tower, reviewed this month, zips to a third-place power desktop Best Buy. This Pentium-66 PC outperformed most of the Pentium-90 systems we've reviewed and sells for only \$3298.

Pick a PC, Any PC

If there's a particular desktop or mobile PC you want, chances are we've evaluated it. Now you can quickly track down its review—even if it didn't make the Top 20. This month, starting on page 165, we list all the machines we've reviewed since our Top 20s premiered in February. And that's not all. Reader response to the Top 20 roundups has been tremendous, and we get many calls asking about systems we haven't had a chance to review. Our answer? Starting in October, we'll increase the number of machines we review, putting 35 new systems through their paces every month.

Bryan Hastings is an associate editor for PC World. He can be reached on PC World Outline (see page 10 for contact information). PC World staff members Mike Desmond, Rex Farrance, John Goddard, Anita Hamilton, Caroline Jones, Owen Liinderholm, Melissa Riofrio, and Susan Silvius contributed to this article.

Call 900/903-2972 and use the fax reprint numbers to order an instant fax of up to three individual systems' capsule reviews or one capsule plus features table and test reports (\$4.95). To order a month's complete review (\$9.95 each), enter the number for that month: December 3012; January 3001; February 3002; March 3003; April 3004; May 3005; June 3006; July 3007; August 3008; September 3009. For a list of all systems tested by the PC World Test Center for Top 20s (\$4.95), enter 7. Touch-tone phone required; charges will appear on your telephone bill.

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

This Month's Contenders

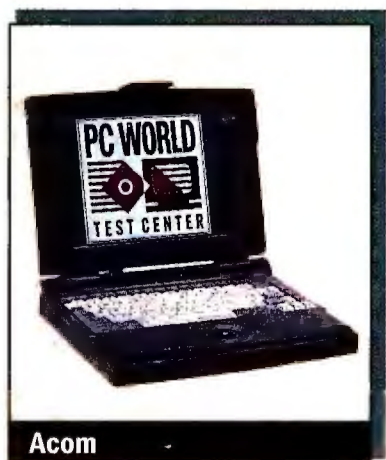
Our look at this month's contenders for the Top 20 Power and Budget Desktops and the Top 20 Mobile PCs. Icons show where systems placed on the Top 20 charts.

Acom Patriot 4000

PROS: Great performance, large hard disk, built-in audio

CONS: Short battery life, dull screen colors, heavy

Acom's 486DX2-66 Patriot 4000 offers tremendous speed, especially for its \$2780 price—this system outperformed the typical DX4-75 notebook. It comes with 8MB of RAM and an exceptionally roomy 330MB hard drive. You also get a PCMCIA Type III slot, plus 8-bit audio and a speaker, which make it simple to add voice and sound to documents. Furthermore, we found both the keyboard and the integrated trackball comfortable to use for extended periods.



Acom

The Patriot is by no means perfect, however. For example, its battery conked out after only 1.75 hours in our run-down tests. Also, the unit's 9.5-inch passive color screen won't be mistaken by anyone for the clearly sharper dual-scan color, and setting the desired contrast and brightness is difficult as well. Finally, this 8.4-pound

system is somewhat larger and heavier than most notebooks these days. Support policies—such as a one-year warranty—are run-of-the-mill, though Acom promises a fast two-day turnaround on repairs.

The very short battery life and slightly washed-out screen colors worked to keep the Patriot off the power side of our Mobile Top 20 list, but you'd be hard-pressed to find more portable power for the money. In fact, if this notebook's price were just a bit lower, it would have been an earnest contender for our Budget Mobile PCs chart. *Acom, 800/898-2665, 408/727-8577 Reader service no. 719*

Ambra D466I/VL

PC WORLD TOP 20
12 BUDGET DESKTOP
PROS: Fast for a DX2-66, inexpensive, convertible to PCI, 24-hour tech support
CONS: None

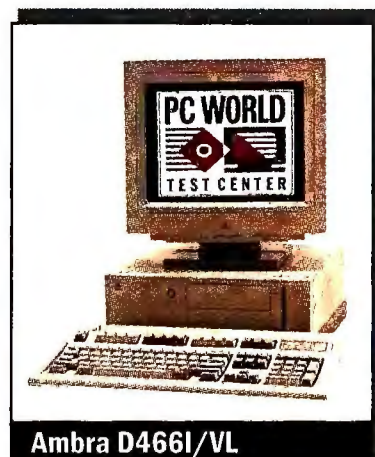
If the D466I/VL is any indication of the company's current direction in desktop equipment, it's clear that Ambra still has the talent for turning out powerful, inexpensive office PCs. Intriguingly, this compact's \$2460 price qualifies it as a budget system, yet in performance it's close to the typical Pentium-60 desktop, especially in our Paradox for Windows benchmark. And the configuration is particularly generous for a budget box: You get 16MB of RAM, 256K of secondary cache, a 540MB hard drive, a 15-inch monitor, and a 2MB VL bus graphics adapter.

The cover slides off to reveal a clutter-free interior instead of the snarl of cables all too common in inexpensive PCs. The D466I/VL also has exceptional expandability for a compact. You get three free drive bays, and since the VL bus video and IDE drive adapters are both integrated, all five expansion slots are free for the filling. Most

unusual is the low-cost option to convert this VL bus system to PCI. The Ambra D4100I/VL's 16-bit and VLB expansion slots are on a riser card that plugs into a slot on the motherboard. Whether you buy this VL bus system or its PCI counterpart, Ambra will sell you a conversion to the alternate bus setup for \$99. This kind of flexibility is a boon that you don't get with many machines. It enables you to choose your setup today without having to worry about future hardware developments rendering your choice obsolete.

Service policies are solid: You get a one-year warranty and a 30-day money-back guarantee, and you pay only \$29 for the first year of on-site service. In addition, the company has a 3-day turnaround policy on factory repairs, and IBM provides nonstop phone tech support. The D466I/VL offers fast performance in a budget compact system that's uncommonly upgradable. It earns its solid position on our Budget Desktops Top 20.

Ambra Computer, 800/252-6272 Reader service no. 720



Ambra D466I/VL

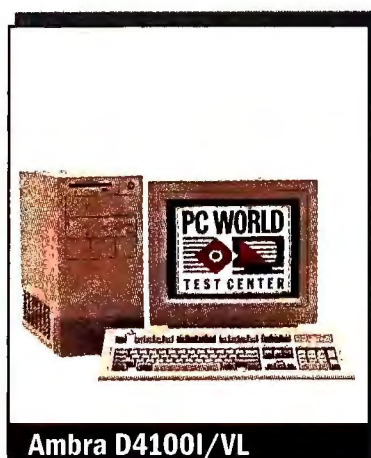
Ambra D4100I/VL

PC WORLD TOP 20
15 POWER DESKTOP
PROS: Fast, upgradable to PCI, 24-hour tech support
CONS: None

Ambra's second entry this month, the D4100I/VL, is priced and configured effectively to appeal to power users. What do you get for the \$3034 this system will set you back? Surprising speed, for one thing. This DX4-100 minitower with 16MB of RAM and 256K of secondary cache emphatically outperforms the typical DX4-100 and Pentium-60 PC.

You also get a solid feature set, including a CD ROM drive, a sound card, and speakers. In addition to the full complement of multimedia trappings, you get a 540MB hard drive, and the system's 15-inch monitor and 2MB VL bus video controller team up nicely for comfortable viewing in super-VGA resolutions.

Moreover, there's all kinds of room inside the case for adding expansion cards: Seven free slots is a generous helping—even for a minitower—and three free drive bays is good for a system that already has a CD ROM drive installed. And as with its budget-priced D466I/VL sibling, reviewed above, the D4100I/VL's



Ambra D4100I/VL

expansion slots are on a riser card; for a reasonable \$99 you can switch from VL bus to PCI bus or vice versa. Finally, this nicely designed system is backed by sound support policies, including a year of on-site service for \$29 and nonstop tech support. If you want a fast multimedia system with a highly flexible upgrade path—at a good price—check out the D4100I/VL. It has the solid value it takes to earn a spot on our Power Desktops Top 20. *Ambra Computer, 800/252-6272 Reader service no. 721*

THE TOP 20

PC WORLD

POWER DESKTOPS



1 Dell Dimension XPS P90
Pentium-90 with 1GB hard disk.

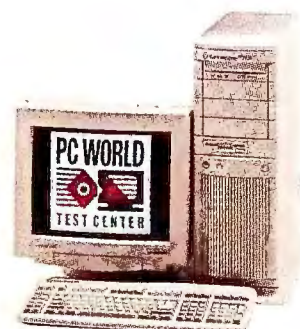
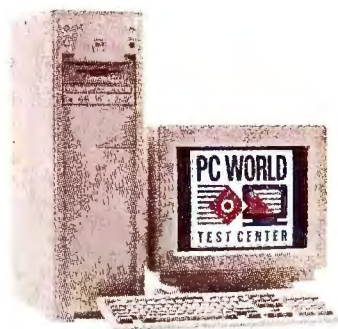
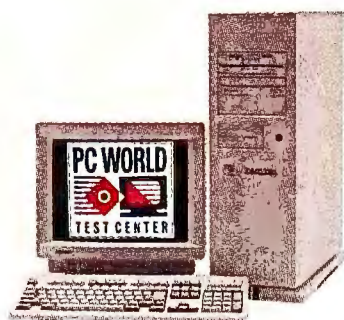
➤ New this month ➤ No change from last month
▲ Up from last month ▼ Down from last month

BEST BUYS

BEST BUYS			Last month	Months on list	Overall rating	Performance rating	Reliability/service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus slots
1	⬅	Dell Dimension XPS P90	1	3	97	93	76/83	\$3828	Pentium-90	16	1080	ISA, PCI
2	⬅	Zeos Pantera 90	2	2	96	102	72/82	\$3595	Pentium-90	16	528	ISA, PCI
3	➡	Austin P5-66	—	1	94	94	70/80	\$3298	Pentium-66	16	520	ISA, PCI
4	⬇	Zeos Pantera 66	3	4	92	89	72/82	\$3395	Pentium-66	16	528	ISA, PCI
5	⬇	Gateway P5-90	4	3	91	92	73/77	\$3830	Pentium-90	16	540	ISA, PCI
6	➡	NEC Image 4100es	—	1	91	88	81/77	\$3813	DX4-100	16	540	ISA, VLB
7	⬇	Gateway P5-66	5	4	90	83	73/77	\$3430	Pentium-66	16	540	ISA, PCI
8	➡	DECpc XL590	—	1	90	97	81/83	\$5098	Pentium-90	16	540	ISA, PCI
9	⬇	IBM PC Company ValuePoint P/60D	6	8	90	80	83/78	\$3849	Pentium-60	16	424	ISA, PCI
10	⬇	Polywell 586-90VIP	9	2	89	99	69/71	\$4089	Pentium-90	16	540	PCI, VLB ²
11	⬇	Micron P90PCI PowerStation	7	2	89	98	65/86	\$4599	Pentium-90	32	540	ISA, PCI
12	⬇	Micron 4100PCI Magnum	8	2	89	80	65/86	\$2599	DX4-100	8	420	ISA, VLB
13	➡	CompuAdd CP60p	—	1	88	76	78/75	\$3407	Pentium-60	8	540	ISA, PCI
14	⬇	Gateway P5-60 Best Buy	10	4	88	70	73/77	\$2545	Pentium-60	8	540	ISA, PCI
15	➡	Ambra D4100I/VL	—	1	88	82	66/70	\$3034	DX4-100	16	540	ISA, VLB
16	⬇	IBM ValuePoint Performance Series	11	2	87	69	83/78	\$4168	DX4-100	16	527	ISA, VLB
17	⬇	Zeos 486DX2-66	12	4	87	67	72/82	\$2537	486DX2-66	8	528	ISA, VLB
18	⬇	ALR Evolution V	14	8	87	81	78/75	\$3761	Pentium-60	16	540	ISA, VLB
19	➡	Insight PCI P66 SCSI	—	1	86	90	60/66	\$3678	Pentium-66	16	1080	ISA, PCI
20	⬇	Micron P60 PCI PowerStation	13	5	86	75	65/86	\$4138	Pentium-60	16	540	ISA, PCI

¹ Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus

features table and test reports (\$4.95); a complete month's review (\$9.95 each; January 3001, May 3005, June 3006, July 3007, August 3008, September 3009); and a list of all systems



2 Zeos Pantera 90
\$3595, super performance.

3 Austin P5-66
\$3298 ultra-hot Pentium-66.

4 Zeos Pantera 66
Balanced price/performance.

5 Gateway P5-90
\$3830 with 17-inch monitor.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number ²	Comments
15"/.28	800/289-3355	July	3112	Pentium-90 with top-notch mix of power, features, and price is a three-time no. 1.
15"/.28	800/554-5220	Aug	3123	The fastest system we've tested—a real number cruncher.
15"/.28	800/752-1577	current	3132	Pentium-66 is full of features; faster than many Pentium-90s.
15"/.28	800/554-5220	June	3091	Fast Pentium-66 is a good blend of power and price.
17"/.26	800/846-2000	July	3114	Powerful graphics workstation with big 17-inch monitor.
15"/.28	800/632-4636	current	3133	Fastest DX4-100 we've ever tested; great all-around machine.
17"/.26	800/846-2000	June	3093	Cheaper but slower 66-MHz version of no. 5 Best Buy.
17"/.26	800/722-9332	current	3134	Fast, high-quality, loaded with features, but expensive.
15"/.28	800/772-2227	Jan	3041	IBM quality, service, and reliability meet in basic Pentium-60. On Top 20 for eight months.
15"/.28	800/999-1278	Aug	3126	Second-fastest system we've tested. Price dropped more than \$100.
15"/.28	800/438-3343	Aug	3124	Third-fastest system we've tested; loaded with RAM; would make a great server.
14"/.28	800/438-3343	Aug	3125	Low-priced DX4-100 is a solid value.
15"/.28	800/627-1961	current	3135	Good Pentium-60 workstation could use more RAM.
14"/.28	800/846-2000	May	3127	Slowest Pentium on Power list is also cheapest.
15"/.28	800/252-6272	current	3136	Loaded DX4-100 at a good price.
17"/.28	800/772-2227	Aug	3128	High-quality DX4-100 has surprisingly high price.
14"/.28	800/554-5220	June	3095	Fastest DX2-66 we've tested; also the cheapest system here.
14"/.28	800/444-4257	Jan	3044	Former top Best Buy is starting to look long in the tooth.
15"/.28	800/998-8011	current	3137	Fast Pentium-66 with huge hard drive makes a good database workstation.
17"/.26	800/438-3343	May	3094	Basic Pentium workstation with a good monitor, but it's not cheap.

tested by the PC World Test Center for the Top 20s (\$4.95). Touch-tone phone required.
Charges will appear on your telephone bill.

² With ISA bus.

AT&T Globalyst 200 (486DX2-50)

PC WORLD TOP 20
1 POWER
MOBILE PC

PROS: Strong performance and support policies, well designed **CONS:** Power management too easy to shut off
Most people know AT&T as the phone company, but that colossus, teamed up with NCR, turns out some pretty classy notebook computers. In fact, the company's Globalyst 200 (486DX2-50) earns our top power mobile Best Buy this month.

This notebook rates very high in nearly all respects. Take its astonishing performance. Configured with 8MB of RAM, the Globalyst breezed by many DX2-66 and even several DX4-75 notebooks. This kind of showing reinforces our contention that picking your PCs based on the system's processor alone can be a huge mistake. Design and implementation are critical, as this AT&T unit demonstrates. But high-powered performance is not all you get with this world-class traveler. The \$4105 Globalyst is a product of thorough, thoughtful design, from its beautiful 9.5-inch active-matrix color screen, to its sturdy sculpted case, to AT&T's excellent online help and complete, well-illustrated manual. The full-travel keys feel solid, and there's space in front of the keyboard for those who like to rest their palms while typing. The trackball is centered in front of the keypad for easy access with either thumb. While many high-performance notebooks have battery lives that run from short to shorter, the Globalyst managed a quite respectable 3.5 hours on its nickel-metal-hydride (NiMH) battery pack. And at

7.4 pounds traveling weight, the Globalyst 200 is easy to carry.

The system's 250MB removable hard drive is decent even by desktop standards, and the 1MB video adapter lets you display images at 1024 by 768 resolution on an external monitor at 256 colors. The notebook comes with PCMCIA Type II and Type III slots; a docking station is optional. AT&T Mail Access Plus E-mail



AT&T Globalyst (486DX2-50)

software and BitFax fax software are preinstalled.

Did we mention service and support? When you pay a high price for a top-quality mobile setup, you have every right to expect fine support. Fortunately, AT&T's policies are very strong, including a one-year warranty with free replacement service and 24-hour toll-free tech support.

In the midst of all this high praise, we have only one quibble. It's all too easy to turn off the power management accidentally—just press the <Fn> and <F3> keys at once. That wouldn't be a problem, but there's no status indicator to tell you whether the feature is active. On the upside, the power management menu is easy to find and set with flexible options aplenty.

Add together this mobile's terrific performance, features, and support, and you get one of the most capable portable packages we've ever seen. If you can afford to part with over \$4000 for a mobile PC, you'd be hard put to find a better system than this number one power Best Buy. Now if only the company offered a convenient plan so owners of other vendors' notebooks could switch to AT&T... AT&T Global Information Solutions, 800/637-2600, 513/445-5000 Reader service no. 722

AT&T Globalyst 200 (486SX-33)

PC WORLD TOP 20
7 BUDGET
MOBILE PC

PROS: Nicely designed, strong support
CONS: Sluggish performance

If the Globalyst 200 (486DX2-50) sounds good but you're on a budget, take heart. For \$2700 you can get many of the same features that make AT&T's DX2-50 notebook so attractive—comfortable keyboard and trackball, stylish case, removable hard drive, and fine service and support.

What do you sacrifice to save \$1400? You get a smaller 170MB hard drive and a passive color screen—also 9.5 inches—with decent but much paler colors than its active-matrix sibling displays. The most dramatic difference is in performance—with its 486SX-33 processor and 4MB of RAM, this Globalyst finished well behind a typical mobile PC of its CPU class. The lower power requirement, however, translates into more than 4 hours of battery life, according to our rundown tests.

This notebook isn't a powerhouse, but the combination of reasonable price, intelligent design, decent battery life, and classy service and support land the Globalyst 200 (486SX-33) in the budget section of our Mobile PCs Top 20. AT&T Global Information Solutions, 800/637-2600, 513/445-5000 Reader service no. 723



AT&T Globalyst (486SX-33)

Austin P5-66

PC WORLD TOP 20
3 POWER
DESKTOP

PROS: Lightning fast, very upgradable
CONS: None

From deep in the heart of Texas comes a *big* machine, imposing in both size and performance. Sure, we expected decent speed from this full-size multimedia tower with its Pentium-66 processor, 16MB of RAM, and 256K of secondary cache, but this giant takes seven-league steps. The Power-66 outscored most Pentium-90s in our tests, climbing to third place on our Power Desktops Top 20 chart.

The system's component lineup is as impressive as its performance. Austin throws in a CD ROM drive and sound card, although no speakers or earphones came with our test unit. The 520MB hard drive should be able to handle a herd of disk-hungry sound and video files. A 2MB PCI video controller and 15-inch monitor cap off the hardware lineup. Austin also provides Microsoft Works for Windows.

There's room left to add to the system: You get one PCI and three 16-bit slots free, along with another slot you can fill with either a 16-bit or a PCI card. The count of free drive bays is a generous five, thanks to the system's size and its space-saving combo floppy drive, which handles both



Austin

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

Circle 203 on reader service card

standard formats in a single half-height unit. Austin's service-and-support policies are good, with a two-year warranty, free on-site service for the first year, and nonstop toll-free tech support—a recent addition. You also get a 30-day money-back guarantee and a 2-day turnaround policy on repairs.

Simply put, the Austin P5-66 system is a big value for power users. With no major shortcomings and an attractive \$3298 price, it earns the number three power desktop Best Buy—and our unre-served recommendation. *Austin Computer Systems, 800/752-1577*

Reader service no. 724

Compaq ProLinea 4/100 Model 525

PROS: Large monitor

CONS: Limited expandability

We found a lot to commend in Compaq's latest compact, including a spacious 530MB hard drive and a 17-inch monitor coupled with an integrated 1MB local bus video controller. And you get TabWorks, a Windows Program Manager interface with a tabbed-notebook metaphor that makes every application easy to access for newcomers and veterans alike.

The test scores of this ProLinea DX4-100 with its 8MB of RAM and 128K of secondary cache provide no surprises. Performance is as solid as you would expect from a 100-MHz PC. But even with the hard drive adapter and video controller integrated into the

motherboard, the ProLinea 4/100 is still crowded inside. Only three expansion slots and one externally accessible drive bay remain available for your use.

Compaq's service and support is excellent. Tech support hold times are relatively short, and you get a three-year warranty, round-the-clock phone support, and free on-site service for the first year.

Respondents to our Service and

Reliability Monitor rate the company very favorably. The online documentation and the manual are both topflight.

So how does this compact stack up overall? \$3548 is a fairly stiff price to pay for a DX4-100 in this configuration. But if a large monitor, great documentation, excellent service and support, and most of all, Compaq's superb reputation are at the top of *your* list, it may not bother you that this system doesn't quite make ours. *Compaq Computer, 800/345-1518, 713/378-8820* Reader service no. 725

CompuAdd C4100D

PROS: Low price

CONS: Lacks expandability

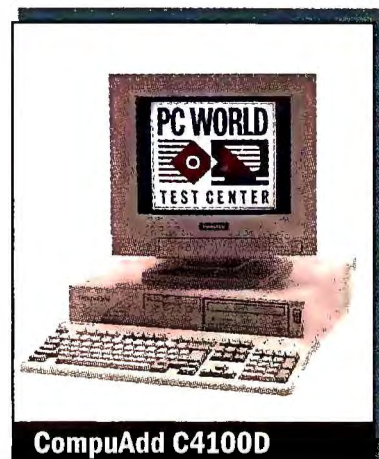
This low-cost, low-profile desktop not only comes with the usual multimedia hardware—CD ROM drive and sound card, pair of speakers, and microphone—it also comes with several CD ROMs, including a dictionary, a home CAD program, and a disk packed with clip art. The \$2691 C4100D has 8MB of RAM, a respectable

340MB hard drive, and a 1MB graphics accelerator. The only thing multimedia users may hanker after is a monitor larger than the 14-inch supplied with the system.

The CompuAdd C4100D is an attractive deal, but it comes up short in two categories. For one, this system's expandability is limited, with only a single free drive bay (externally accessible) and three free expansion slots, two of which are crowded by drive cables. To be fair, one drive bay is already being used for the CD ROM drive, so you won't have to worry about having space to add one. But the C4100D finished our test suite behind the typical

DX4-100 system, so don't expect top performance. Buying the system with a filled-out 256K secondary cache would bump up performance, but only slightly.

For another, CompuAdd's service and support is basic fare. Toll-free phone support is available for a reasonable 15 hours a day but just on weekdays. Feedback to our Reliability and Service Monitor has been generally



CompuAdd C4100D

positive. All in all, CompuAdd's C4100D is a capable multimedia system at a competitive price. It doesn't lead the business computer pack, but it certainly warrants consideration if you're in the market for a high-end home computer. *CompuAdd, 800/627-1961, 512/250-1489* Reader service no. 726

CompuAdd CP60p

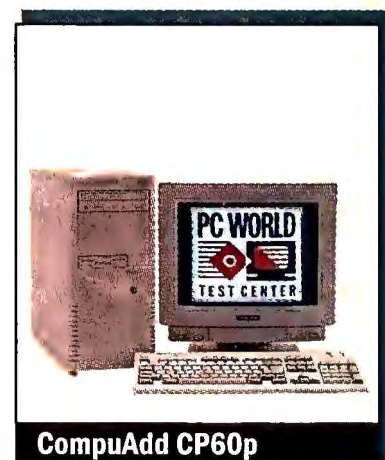
PC WORLD TOP 20
13 POWER DESKTOP

PROS: Fast for a Pentium-60, nice software bundle

CONS: None

If you want more power and high-end features in a CompuAdd system than the company's C4100D DX4-100 provides and you don't mind paying more for them, check out CompuAdd's Pentium-60 offering—in our book it's a much better value for your business dollar. And it provides the same multimedia capabilities its DX4-100 cousin does.

This \$3407 tower is surprisingly speedy, even in a fairly pedestrian configuration of 8MB of RAM and 256K of secondary cache. It decisively outperformed the typical Pentium-60. This tower is also well fortified with peripherals. The CD ROM drive and 16-bit sound are complemented by a roomy 540MB hard drive and high-resolution video. You get a 2MB Diamond Stealth PCI graphics card and a 15-inch monitor. CompuAdd also tosses in a raft of software, including the American Heritage Dictionary on CD ROM, a home design package, several hundred scalable fonts, and thousands of clip art images. The only noticeable omission—speakers and a microphone—are optional. Expandability is quite respectable on this medium tower PCI system—you get four free drive bays and five free expansion slots.



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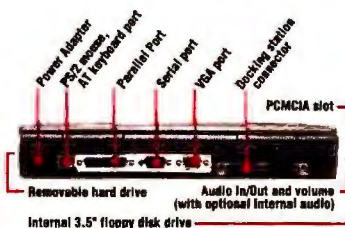


WinBook

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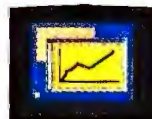
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The 75MHz WinBook XP

The only feature we forgot was the high price tag.



August 1994

WinBook XP DX2/50
4/260 Monochrome

Full of features and plans for a big future—the 75MHz WinBook® XP brings you up to a new height in performance and value. The 32-bit local bus video Rocketchip accelerator boosts your graphics performance level and a ten-cell NiMH 2500mA battery pack lets you run power-hungry programs longer. Plus an LCD indicator lets you monitor functions at a glance. You get the same unique ergonomic features that critics raved about with the original WinBook—full size keys, a sloping wrist rest, and now your choice between the TrackPoint™-like pointing device or an optional 19mm dual-button trackball.

WinBook XP components are upgradable with user-upgradable RAM to 32MB, upgradable screen, removable hard drives to 520MB capacity and PCMCIA capabilities. Options include a 14.4 fax/voice/data modem, internal audio and docking station.

Along with your WinBook XP, you get excellent support, a 30-day money-back guarantee, quick service turn-around, a one-year limited warranty on parts and labor plus toll-free technical support for the life of your computer. Your purchase is backed by 15 years of computer experience and over 2.2 million satisfied customers. Call us toll-free to order your WinBook XP today.

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Circle 197 on reader service card

THE TOP 20

PC WORLD

BUDGET DESKTOPS



1 Diamond DT 486-66
Super-snappy DX2-66 costs just \$1699.

➤ New this month

◀ No change from last month

▲ Up from last month

▼ Down from last month

BEST BUYS

			Last month	Months on list	Overall rating	Performance rating	Reliability/service rating	Price	CPU	RAM (MB)	Hard drive (MB)	Bus slots
1	➤	Diamond DT 486-66	—	1	91	64	69/69	\$1699	486DX2-66	8	270	ISA, VLB
2	▼	CompuAdd C466D	1	5	88	56	78/75	\$2195	486DX2-66	8	425	ISA, VLB
3	◀	Polywell Poly 486-40DX	3	4	88	51	69/71	\$1600	AMD 486DX-40	8	270	ISA, VLB
4	▼	Gateway P4D-66 Best Buy	2	4	88	60	73/77	\$2299	486DX2-66	8	540	ISA, PCI
5	▲	Austin Power System 60	6	2	88	64	70/80	\$2258	Pentium-60	8	420	ISA, PCI
6	▼	ATronics PCI Emerald	4	3	86	59	69/69	\$1995	486DX2-66	8	256	ISA, PCI
7	▼	Dell OptiPlex 450s/L	5	2	86	52	76/85	\$1957	486SX2-50	4	270	ISA
8	▼	Everex Step VL EISA DX2/66	7	5	85	58	83/68	\$2249	486DX2-66	8	240	EISA, VLB
9	▲	Austin Premier 486 System	8	4	84	50	70/80	\$1984	486DX2-66	8	340	ISA, VLB
10	▼	NMC Pro-System 4100	9	2	84	70	69/70	\$2409	DX4-100	8	420	ISA, VLB
11	▲	Acma 486DX2-66 PCMCIA System	14	5	84	54	72/81	\$1995	486DX2-66	8	340	ISA, VLB
12	➤	Ambra D466I/VL	—	1	83	68	66/70	\$2460	486DX2-66	16	540	ISA, VLB
13	▼	Axik 486DX2-66PCI	11	7	83	57	69/70	\$2198	486DX2-66	8	340	ISA, PCI
14	▼	MidWest Micro 486DX2-66	12	3	83	51	69/68	\$1899	AMD 486DX2-66	8	340	ISA, VLB
15	▼	Dell OptiPlex 4100/L	13	4	83	71	76/85	\$2499	DX4-100	8	170	ISA
16	◀	Quantex Q486DX2/66MM-4	16	4	83	55	69/69	\$2259	486DX2-66	8	540	ISA, VLB
17	◀	AST Bravo MT 466d	17	8	82	53	79/79	\$2128	486DX2-66	8	170	ISA
18	▼	DTK Feat-38	15	2	82	44	78/79	\$1900	486DX2-66	4	210	ISA, VLB
19	▼	MicroSource Tempest Premier/PCI	10	3	82	65	69/70	\$2375	Pentium-60	8	340	ISA, PCI
20	▼	MIS M466T	18	8	82	59	69/68	\$1999	486DX2-66	8	240	ISA, VLB

¹ Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus

features table and test reports (\$4.95); a complete month's review (\$9.95 each; January 3001, February 3002, March 3003, April 3004, May 3005, June 3006, July 3007, August



2 CompuAdd C466D
\$2195, DX2-66, 425MB drive.

3 Polywell Poly 486-40DX
DX2-66 speed for \$1600.

4 Gateway P4D-66 Best Buy
Nimble DX2-66, 540MB drive.

5 Austin Power System 60
Low-cost \$2258 Pentium-60.

Monitor size/ dot pitch	Vendor contact number	Issue reviewed	Fax reprint number ¹	Comments
14"/.28	800/989-7253	current	3138	Very fast DX2-66 at an amazingly low price grabs top Budget spot.
15"/.28	800/627-1961	May	3103	Well-rounded DX2-66 with good service and reliability.
14"/.28	800/999-1278	June	3104	Lowest-cost Best Buy gets surprisingly good performance from AMD DX-40.
15"/.28	800/846-2000	June	3098	Generous hard drive for this price point plus PCI bus make this a good choice for heavy-duty work.
15"/.28	800/752-1577	Mar	3062	Best Buy Pentium ties for fifth-fastest on Budget Top 20; cheaper than some DX2-66s.
14"/.28	800/488-7776	July	3120	Low-cost, solid-performing PCI-based 486DX2-66.
14"/.28	800/289-3355	Aug	3130	One of the first SX2-50s is surprisingly fast; would do even better with 8MB of RAM.
15"/.28	800/821-0806	Dec	3105	Price drop keeps EISA system high on budget chart.
14"/.28	800/752-1577	June	3109	Low-priced DX2-66 workstation.
15"/.28	800/424-2983	Aug	3129	Second-fastest budget system.
15"/.28	800/786-6888	May	3106	Price cut moves this system with PCMCIA slot up chart.
15"/.28	800/252-6272	current	3139	Very fast DX2-66 is faster than some Pentiums, has big hard drive for price.
14"/.28	800/234-2945 ²	Mar	3063	Good all-around DX2-66 with PCI bus.
15"/.28	800/728-8582	July	3121	Solid AMD DX2-66 is sound value.
14"/.28	800/289-3355	June	3111	Fastest budget system hurt mainly by poor expandability and small hard drive.
15"/.28	800/288-0566	June	3107	Good-value multimedia system with very large hard drive for the money.
15"/.28	800/876-4278	Feb	3110	Decent DX2-66 hurt by small hard drive; on list eight months.
14"/.28	818/810-0098	Aug	3131	Slow, inexpensive DX2-66 would perform somewhat better with more RAM.
14"/.28	800/848-5161	July	3122	No-frills Pentium system at great price.
14"/.28	800/733-9188	Dec	3052	Bare-bones DX2-66 offers rock-solid performance.

3008, September 3009); and a list of all systems tested by the PC World Test Center for the Top 20s (\$4.95). Touch-tone phone required. Charges will appear on your telephone bill.

² In California call 408/735-1234.

CompuAdd support won't raise eyebrows either in delight or in dismay. Policies are standard fare, with tech support available 15 hours daily except on weekends. Feedback to our Reliability and Support Monitor has been good. Overall, the CP60p is a very capable system and lands firmly on our Power Desktops list. *CompuAdd*, 800/627-1961, 512/250-1489 **Reader service no. 727**

DECpc XL590

PC WORLD TOP 20
8 POWER DESKTOP

PROS: Wonderful performance, 17-inch monitor, very expandable, accepts a second CPU
CONS: Pricey

Here's one for the power hungry who have the budget to support their computing ambitions. DEC's new Pentium-90 rampaged through our test suite, finishing close behind the fastest PC we've ever tested. At \$5089, however, it's the most expensive system on our Power Desktops Top 20.

You get a four-star lineup of components with this tower: 16MB of RAM, 256K of secondary cache, a 540MB SCSI hard drive, and a 2MB 64-bit PCI Diamond Stealth graphics card. Add in the 17-inch monitor, and great video is yours—up to 1280 by 1024 resolution. Unlike many high-end power systems, however, this DEC has no CD ROM drive.

But there's plenty of room to add new devices: You'll find three free drive bays, plus slots for five full-length cards, including two free PCI slots. Should you move to more powerful and resource-demanding operating systems—such as Windows NT or even UNIX—the XL590 is ready. Instead of putting the processor on the motherboard, DEC places it on a removable card along with an extra CPU socket. With this design you can plug in a board carrying a faster processor, when one is released, or you can plug in a second processor next to the original to create a multiprocessor unit. The system is sturdy, and the motherboard is uncluttered; everything important lies within easy reach.

DEC service and support is excellent, with an outstanding three-year warranty and technical support available 24 hours a day, seven days a week. The company also shines in our reliability and service survey. Respondents report a low rate of problems, and a very high proportion of buyers say they are satisfied with the help they received. If the high price doesn't daunt you, this super-fast and amply configured powerhouse gives you a degree of flexibility and upgradability rare in today's market. *Digital Equipment Corp.*, 800/722-9332, 508/493-5111 **Reader service no. 728**



Diamond DT 486-66

PC WORLD TOP 20
1 BUDGET DESKTOP

PROS: Great price, solid performance, good expandability
CONS: Short tech support hours

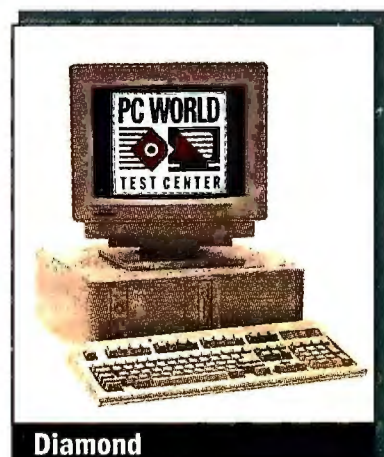
What's the secret to capturing a budget desktop number one Best Buy? For Diamond, the answer is easy: Offer a system that's solid in all respects at an irresistible price. The DT 486-66 has no fancy components, but for a rock-bottom \$1699, you

get great performance for a DX2-66 and plenty of expandability.

The DT 486-66 has basic features: 8MB of RAM and 256K of secondary cache, a 270MB hard drive, and a 14-inch monitor with a 1MB VL bus video adapter. The exception to this run-of-the-mill lineup is the 1MB VL bus caching hard disk controller. But while the system's components aren't that exciting, its performance is terrific for a PC of this CPU class. Not only did the DT 486-66 handily beat out most of its DX2-66 desktop peers, it even nudged past a few Pentium-60s.

The DT 486-66's low price and modest configuration may tempt you to add devices. Fortunately, this system is expandable; surprisingly so for a compact. Four externally accessible drive bays and four expansion slots are available for adding in peripherals.

Diamond offers solid service and support policies to boot. The warranty covers parts for 15 months and labor for two years, and you get a year of free on-site service. The one-day turnaround policy on factory repairs is exceptional. The only drawback is the relatively short technical support hours: Diamond's toll-free line is available just 9 hours a day, and only on weekdays. But the outstanding balance of low price and high performance makes the DT 486-66 this month's best bargain in a budget desktop. *Diamond Technologies*, 800/989-7253, 714/533-9910 **Reader service no. 729**



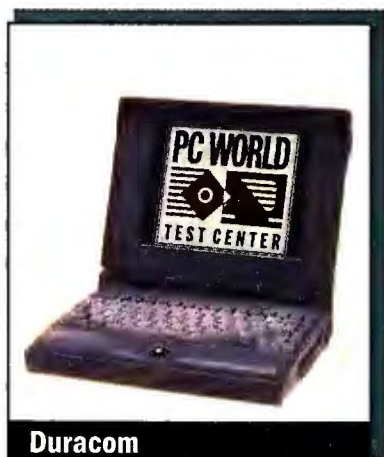
Duracom TravelPro5110

PROS: Excellent performance, removable hard disk, built-in audio

CONS: Short battery life, heavy

The TravelPro5110 sports the DX4-100—the speediest CPU ever tucked into a notebook. So how did it fare in our test suite? This sturdy portable lagged behind half its DX4-75 and even many of its DX2-66 competitors, but most power users will still be satisfied with its performance, as well as with most of its other features. The vivid 9.5-inch active-matrix color screen is a joy, the removable 200MB hard drive is more than decent by mobile standards, and we found the keyboard and trackball very comfortable. The TravelPro also has Business Audio.

The \$4225 price is reasonable for all you get, but there are several drawbacks. At 8.6 pounds, this TravelPro is one of the heaviest notebooks available. Even more inconvenient is its short 2-hour battery life. Finally, Duracom's support package is a bit thin. Most policies are typical, and techs took our calls in less than 2 minutes, but customers are starting to expect more than the 11-hour-per-day, weekday-only support this company offers. These considerations kept the TravelPro 5110 off our Power Mobile list. *Duracom Computer Systems*, 800/551-9000, 214/518-1200 **Reader service no. 730**



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THE TOP 20

PC WORLD

MOBILE PCs



1 AT&T Globalyst 200 (486DX2-50)
Great screen, fine performance.

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

POWER SYSTEMS

		Last month	Months on list	Overall rating	Performance rating	Reliability/service rating	Price	CPU	RAM (MB)	Hard drive (MB)
1	➤	—	1	97	41	74/81	\$4105	486DX2-50	8	250
2	➤	2	2	95	40	62/69	\$3199	DX4-75	8	340
3	▼	1	2	95	41	62/85	\$3495	DX4-75	8	250
4	▼	3	2	94	40	68/81	\$3979	DX4-75	8	340
5	▲	6	2	93	45	62/66	\$5400	486DX2-66	8	540
6	▼	4	3	92	42	62/74	\$5000	DX4-75	8	340
7	▼	5	3	91	33	62/85	\$2995	486DX2-50	8	260
8	▼	7	6	91	35	80/78	\$4549	486DX2-50	8	203
9	▼	8	4	91	38	69/79	\$4999	DX4-75	4	455
10	▲	12	6	91	33	75/83	\$5499	486SL-33	12	170

BUDGET SYSTEMS

1	➤	—	1	98	26	75/83	\$1798	IBM486SLC2-50	4	170
2	▼	1	2	97	29	75/83	\$2099	486SX-33	4	170
3	▼	2	3	94	28	83/89	\$2425	486SX-33	8	171
4	▼	3	4	91	29	80/78	\$2188	486SX-33	8	120
5	▼	4	6	90	24	83/89	\$2428	486SL-33	4	250
6	➤	—	1	89	27	62/85	\$2699	486DX2-40	8	250
7	➤	—	1	87	23	74/81	\$2700	486SX-33	4	170
8	▼	5	2	87	27	62/85	\$2499	486DX2-40	8	130
9	▼	6	6	86	17	67/80	\$1599	486SL-25	4	170
10	▼	7	4	85	19	69/79	\$1800	486SX-25	4	129

Best Buy

¹ CA = color active, CD = color dual-scan, CP = color passive, MP = mono passive.

² Call 900/903-2972 and use the fax reprint numbers to order fax copies of system reviews. You may order an instant fax of up to 3 individual systems' capsule reviews or 1 capsule plus features table and test reports (\$4.95); a complete month's



2 Ambra N47D-340
Quick business color notebook.

1 IBM ThinkPad 500
\$1798 for peppy mono subnote.

2 IBM ThinkPad 355
Fast mono note, great battery life, \$2099.

Weight (pounds)	Battery life (hours)	Screen type/size ¹	Vendor contact number	Issue reviewed	Fax reprint number ²	Comments
7.4	3:33	CA/9.5"	800/637-2600	current	3647	Fast, reliable, powerful, and looks good. An ideal traveling companion.
8	4:46	CD/10.3"	800/252-6272	Aug	3642	Best presenter's notebook with built-in sound, good battery life; the price is right too.
7.2	4:28	CD/10.3"	800/846-2000	Aug	3641	Speedy power notebook with large, quality screen; solid battery life.
8.2	3:20	CA/9.5"	800/848-2237	Aug	3643	Reliable all-around power notebook.
9.2	4:03	CA/9.5"	518/272-0421	Aug	3644	Fastest notebook we've tested; loaded with features like built-in sound, huge hard disk.
8.4	3:20	CA/9.5"	800/632-4636	July	3636	Ultimate in versatility; completely modular design.
7.2	4:29	CD/9.4"	800/846-2000	July	3635	Good balance of performance, battery life, and cost.
8.8	4:02	CA/9.5"	800/334-3445	Apr	3603	One of the ten best power notes six months running.
8	3:02	CA/9.5"	800/527-3500	June	3625	Quality DX4-75 notebook, but pricey.
8.2	3:52	CA/10.5"	800/426-7735	Apr	3601	Wonderful screen and IBM quality, but needs larger hard drive at this price.
6.2	5:40	MP/7.5"	800/426-7735	current	3648	Top-value subnote blends low price with great functionality.
6.6	5:40	MP/9.5"	800/426-7735	Aug	3645	Fastest budget notebook with great battery life.
5	6:18	CP/7.8"	800/345-1518	July	3637	Top-rated budget color subnote has great battery life and performance.
5.8	6:31	MP/8.5"	800/334-3445	June	3627	Fastest mono subnote with amazing battery life.
8.2	6:31	MP/9.5"	800/345-1518	Apr	3602	Flexible pen-based system with fantastically long-lasting battery.
7.2	4:50	CD/9.5"	800/846-2000	July	3638	Price cut makes this dual-scan color unit eligible for Budget list for first time.
7.4	4:11	CP/9.5"	800/637-2600	current	3649	Wonderful design on this color model, but sluggish for the price.
5	5:06	MP/7.8"	800/846-2000	Aug	3646	Price increased on this subnote, but you now get a fax-modem.
6.2	4:16	MP/8.5"	800/553-0331	Apr	3622	Lowest-cost budget subnote is a solid value.
8	4:40	CD/8.2"	800/527-3500	June	3630	Cheapest budget color notebook.

review (\$9.95 each; April 3004, May 3005, June 3006, July 3007, August 3008, September 3009); and a list of all systems tested by the PC World Test Center for the Top 20s (\$4.95). Touch-tone phone required. Charges will appear on your telephone bill.

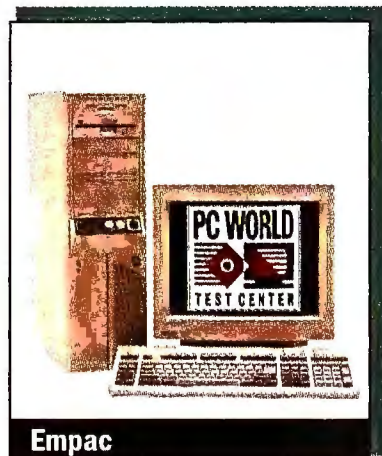
Empac Magnum

PROS: Fast for a Pentium-60, 17-inch monitor

CONS: Skippy support policies

The Empac Magnum comes with a formidable array of components. This Pentium-60 PC's 16MB of RAM, 540MB hard drive, 2MB VL bus caching hard disk controller, and 2MB Diamond Viper VLB bus video card helped it sail past the average Pentium-

60. The video card is an excellent match for the 17-inch monitor, which together provide a comfortable viewing environment for most users even up to 1280 by 1024 resolution. And Empac's system is very upgradable. You get a whopping six free drive bays and five free expansion slots, including a VL bus slot. The tower is attractively priced at \$3500.



Empac

The one place Empac needs shoring up is in service and support. A one-day turnaround policy for factory repairs stands out; otherwise policies are basic or subpar. There's no money-back guarantee, and tech support is available only 9 hours a day, weekdays only, and is not toll-free. Empac's candidate is a lot of machine for the money. If the Magnum were backed by stronger policies, it would be even more attractive. *Empac Int'l, 510/226-4732 Reader service no. 731*

IBM ThinkPad 500

PC WORLD TOP 20
1 BUDGET MOBILE PC

PROS: Light, low cost, excellent battery life, top-notch service and support

CONS: Small monochrome display

The ThinkPad 500 costs \$1798, weighs 6.2 pounds ready to travel, and stands less than 2 inches tall. But despite its small size and price, it produced surprisingly big performance. Based on Big Blue's own 486SLC2-50 processor, this subnotebook turned in nearly the performance of a typical SX-33 mobile PC, and that's with only 4MB of RAM. The system did exceptionally well in the WordPerfect test, beating out many DX2-50 mobile units, although it fared poorly in both of the Paradox tests. Adding another 4MB of RAM (for an extra \$265) would improve overall performance noticeably. We got a marathon 5 hours and 40 minutes out of the NiMH battery.

The ThinkPad 500 is an inch narrower than a typical notebook, but the solid tactile response of the keys plus an ingenious fingertip-controlled pointing device make it surprisingly comfortable to use for hours at a time. Also, its 170MB hard drive is the largest we've seen on subnotes. While the 7.5-inch monochrome screen may be too small for extended work sessions, you can always plug in an external monitor. The ThinkPad 500 supports resolutions on an external display up to 800



IBM

by 600. Like nearly all subnotebooks, the ThinkPad 500 lacks an internal floppy drive, but it comes standard with an external floppy drive, and it has a PCMCIA Type II slot. System RAM upgrades use a separate proprietary slot.

Respondents to our reliability and service fax-back survey rank IBM near the top for product reliability and customer satisfaction. Policies are excellent, too, including a generous three-year warranty and toll-free tech support available round the clock, weekends included. On-site service is available for \$40.

If you're looking for an ultraportable budget mobile PC, put this one at the head of your list. Even with the small monochrome display, the ThinkPad 500's small size, low cost, wonderful battery life, and terrific support earn it the top spot on our Budget Mobile PCs chart. *IBM, 800/426-7735*

Identity Systems Select Series

PROS: Low price, long battery life with second pack

CONS: Screen adjusters hard to use

Most high-tech nomads won't know this company, but it offers a notebook you can warm up to quickly. The Select is a competent, good-looking traveling companion that's comfortable to work with, and the price is a reasonable \$2458.

The machine has solid performance for its class. It zipped through the WordPerfect portion of our tests faster than a typical 486DX2-50 mobile PC. Not bad for a 486DX-33 notebook with just 4MB of RAM. Most users will appreciate the centrally located trackball and comfortable keyboard, and the 200MB hard drive will suffice for the typical Windows traveler. Buy a second battery pack, and you can swap it in for the floppy drive and double battery time. We got 3.25 hours from a single battery in our test. The biggest compromise with the Select Series is the 9.5-inch passive color display. It's certainly big enough, but fine-tuning the contrast and brightness is difficult with the keyboard-based adjusters, a drawback in variable-lighting conditions.

Support policies are basic; Identity Systems offers a one-year warranty and toll-free technical support 11 hours a day, weekdays only. Overall, we found the Select a well-rounded notebook and a good performer for the money—so good, in fact, that it almost made our Top 20 Mobile PCs list. *Identity Systems Technology, 800/888-3475, 214/446-6363 Reader service no. 732*



Identity

Insight PCI P66 SCSI

PC WORLD TOP 20
19 POWER DESKTOP

PROS: Speedy, reasonably priced, very upgradable

CONS: None

Looking for a computer with fearsome speed, a friendly price, and most of the frills? Take a look at Insight's newest tower. This company's PCI P66 SCSI is one of the fastest office computers you can find for \$3678, earning this system a spot on our Power Desktops Top 20 chart.

continued on page 157



everything IS NEW.
nothing IS THE WAY it
WAS.

it's the wake-UP CALL
for a NEW way
of WORKING.

TIME TO rise and shine.

INTRODUCING 1-2-3 RELEASE 5. NOW THE LEGENDARY SPREADSHEET BRINGS MORE PEOPLE TO THE NUMBERS AND THE NUMBERS TO LIFE.

1-2-3® has always helped individuals become more productive. Now it goes to a new realm — workgroup productivity. With strengthened ties to Lotus Notes® and new, sophisticated routing features, workgroups are using 1-2-3 Release 5 to make decisions, reach consensus and explore possibilities.

No other spreadsheet has the features of 1-2-3 Release 5. Features that make everyday spreadsheet tasks easier. Features that help you move from task to task fluidly. Maximum productivity, minimum effort.

freedom
of MOVEMENT,
NOT
chains of COMMAND.

TAP THE POWER OF NOTES WHEN
YOU'RE IN 1-2-3. TAP THE POWER OF
1-2-3 WHEN YOU'RE IN NOTES.

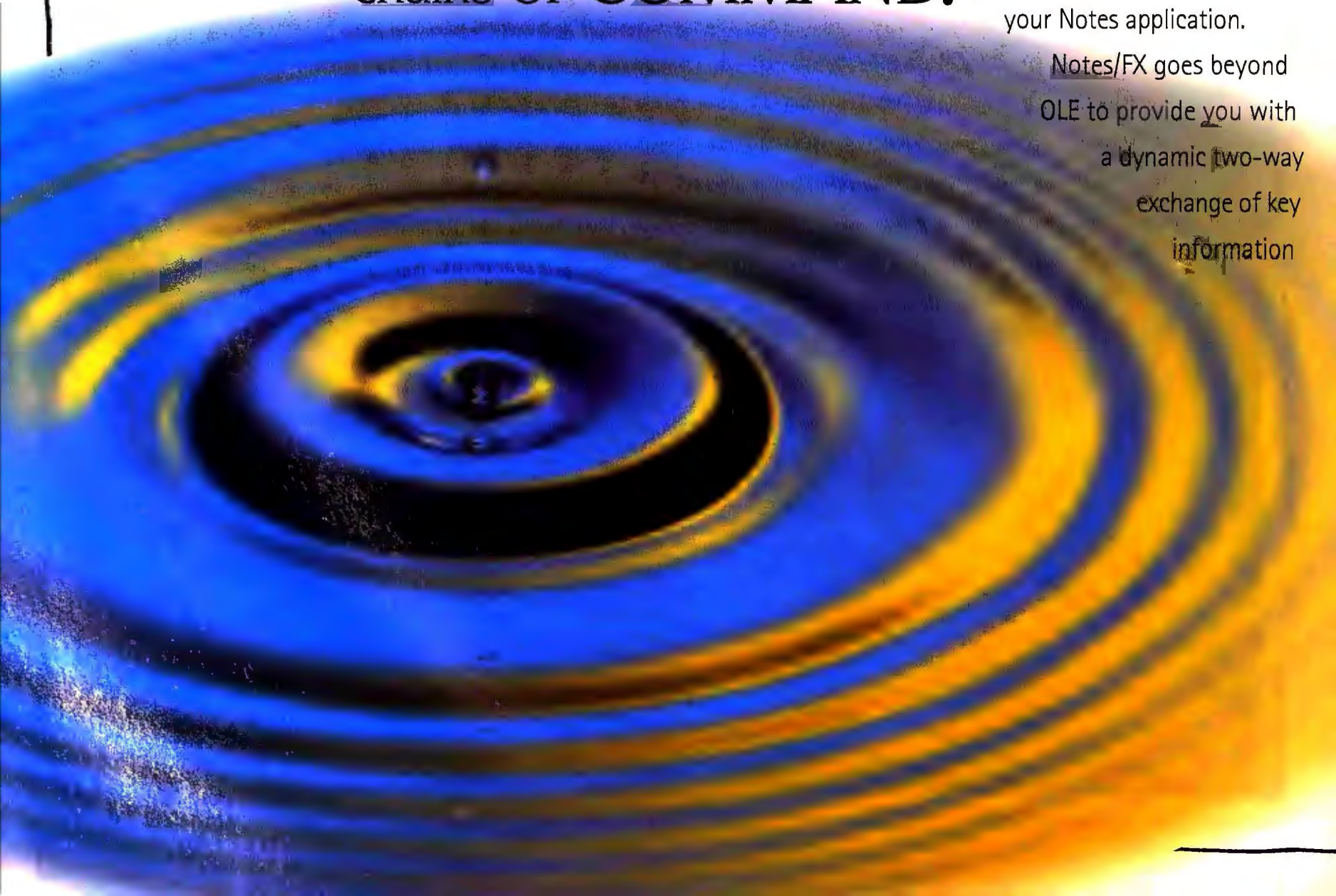
Say you're working on the annual budget in 1-2-3. You can save your spreadsheet in Notes. Then share ideas and information with colleagues working on the same budget at the same time.

Any changes to your spreadsheet are automatically synchronized and distributed thanks to Notes replication technology. Plus Notes' security protects the integrity of your data.



When you're working in Notes and want to crunch numbers, prepare budgets or perform "what-if" analyses, you can launch into 1-2-3 with Notes/FX™ 1.1 — to get the power of 1-2-3 right in your Notes application.

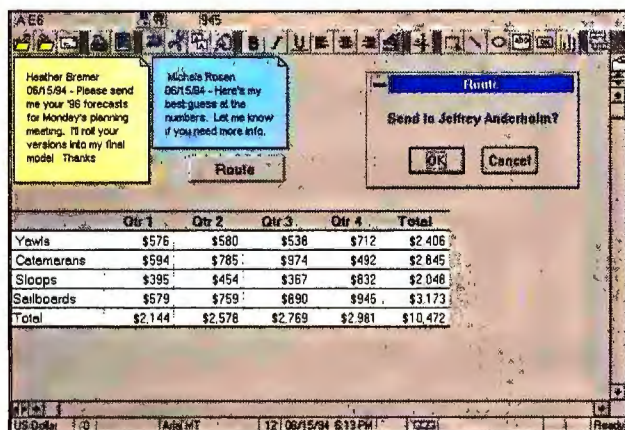
Notes/FX goes beyond OLE to provide you with a dynamic two-way exchange of key information



between Notes and 1-2-3. So you can roll that 1-2-3 information back into any Notes application.

POWERFUL WORKGROUP FEATURES EVEN WITHOUT NOTES.

1-2-3's powerful Version Manager™ lets each person in your workgroup save multiple sets of charts to any name range. So you know the who, what, when and why of every change all the time.



1-2-3's Range Routing lets you share data with colleagues—sequentially or all at once—collecting their comments and input into a single document.

Plus, unlike other spreadsheets, 1-2-3 can designate particular ranges for comment or review by particular users, rather than routing the entire worksheet. Range Routing lets you mail the spreadsheet range to workgroup members for input, track progress, then roll everyone's ideas back into your file, complete with comments and changes tracked as versions.

1-2-3 Release 5 worksheets and ranges can be routed using either VIM or MAPI based e-mail and can be routed either serially or in parallel.

MAXIMUM PRODUCTIVITY, MINIMUM EFFORT.

1-2-3 Release 5 is packed with innovative new features designed to help you get more done with less effort.

SmartMasters™ are predesigned and customizable templates of everyday business forms — like expense reports, invoices and purchase orders — with built-in intelligence to guide you through common tasks

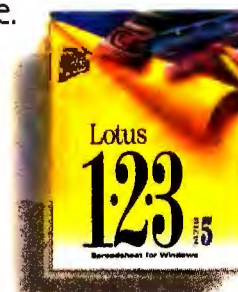
in record time. Or create custom SmartMasters for yourself or your workgroup.

With Lotus Maps you can create instant maps of geographic data. Select a range of data and watch 1-2-3 Release 5 create the appropriate map with color-coding based on data ranges. 1-2-3 Release 5 ships with maps for the world by country, U.S. by state, Canada by province, Europe, Mexico, Japan, Taiwan and Australia.

1-2-3 Release 5 features seamless integration with Lotus Approach® database to easily create data entry forms and generate reports and mailing labels.

With Fast Format you can apply the formatting you've designed for one range to any other range in the worksheet—with one click of the mouse.

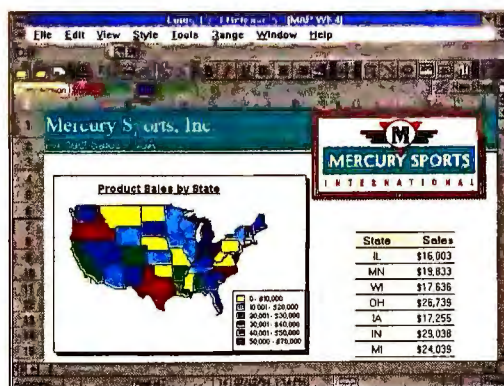
One-Step Charting lets you build a chart complete with labels, titles and legends, all in a single step.



Drag-and-Fill fills in ranges from other documents in just one step. And our improved OLE 2.0 Drag-and-Drop lets you move copy or data across worksheets or files fast.

Multi-page Print Preview lets you view up to nine spreadsheets on your screen before you print.

Taken all together, the new 1-2-3 is loaded with enhancements that make getting the job done a whole lot easier—alone or in a workgroup. And 1-2-3 Release 5 gives you the best compatibility with 1-2-3 for DOS of any spreadsheet. To learn more about 1-2-3 Release 5, visit your Lotus



1-2-3 Release 5 features Lotus Maps. It's the easiest, most effective way to analyze your spreadsheet data geographically.

Authorized Reseller or call **1-800-TRADE-UP, ext. 9971*** for a free demo disk. A 1-2-3 upgrade costs \$119.**

Lotus
Working Together™

NEW SMARTSUITE 3.0. A MAJOR RELEASE TO HELP YOU AND YOUR TEAM WORK TOGETHER.

To work better people need powerful desktop applications, built for both individual and team productivity. SmartSuite® 3.0 is exactly that. It's the best suite for this new way of working because it's the only suite built to optimize Lotus Notes.

The applications that make up SmartSuite have been upgraded in some very important ways—so they work harder and work together better than ever.

1-2-3 Release 5 is packed with new features like SmartMasters spreadsheets templates, Lotus Maps for geographic visuals of data, Smart Assistants to guide you, seamless integration with Approach database, Range Routing for



mailing spreadsheet ranges, OLE 2.0 Drag and Drop, and, of course, Lotus Notes Integration.

The new Lotus Approach 3.0 offers unprecedented ease-of-use, PowerClick™ reporting, X10™ technology (our new, exclusive, speed-optimized architecture) and the easiest-to-design forms, mailing labels and cross-tabs on the market.

Ami Pro® 3.1 offers powerfully fast word processing (49% faster than Word, 103% faster than WordPerfect®), low memory/hard disk requirements (4MB RAM, 15MB for complete installation), with proofing tools, collapsible click and drag outlining, revision marking, powerful macro language and automatic list renumbering. There are over 55 predesigned style sheets for memos, faxes, reports and more. Built-in charting & in-context

drawing tools. Ami Pro also seamlessly imports documents from other word processors.

Freelance Graphics® 2.1 features task and industry specific SmartMasters, a unique 3-step process to create presentations, charting and drawing, presentation management and improved import/export capabilities.

And Organizer™ 1.1 offers easy linking for cross-referencing, flexible printing, group scheduling and nifty integration with Ami Pro so you can create monthly calendars in Ami Pro from Organizer appointments.

SMARTSUITE 3.0 IS A BETTER INTEGRATED SUITE ACROSS THE BOARD.

The integration in SmartSuite begins with a consistent look and feel across applications—they share a common user interface, menus, SmartIcons® and a Live Status Bar.

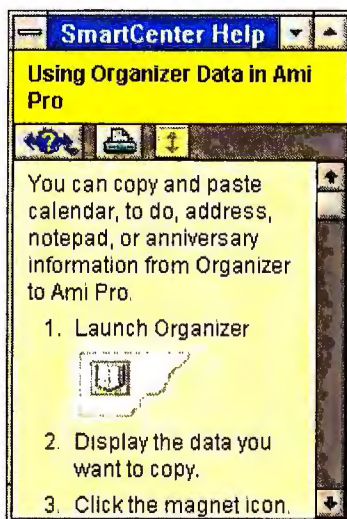
SmartCenter, the headquarters for cross-application services, is always there to help you switch or launch

applications. You can customize its icon palette into the configuration that's most convenient for you.

SuiteAnswers are cross-application help tools which include a SmartSuite Guided Tour and task-oriented Help Cards—plus the new ScreenCam™ for creating audio/visual "screen movies." It's the only help service in Windows™ that stays up as you move between applications.

Smart Assistants are your step-by-step guide through common tasks.

And our powerful 1-2-3/Approach database integration lets you analyze and format 1-2-3 data, taking full advantage of Approach's easy-to-use




Help Card, one of SmartSuite's powerful help tools, guides you through cross-application tasks.



SmartCenter is always there to help you launch applications or switch between them. And Bubble Help is right there for you—all you do is point.





forms and reports,
dynamic crosstabs to
pivot rows and columns
and tools for creating summaries

Lotus Authorized Reseller or for a comprehensive
multimedia overview call 1-800-TRADE-UP,
ext. 9988* for the free Lotus Product Gallery
CD. A SmartSuite upgrade costs \$299.††



SMARTSUITE, THE NOTESREADY
SUITE, EXTENDS THE DESKTOP
TO THE WORKGROUP.

the COMMITTEE
IS dead.

long live
the TEAM.

SmartSuite 3.0 includes powerful workgroup en-
hancements. But for an even higher level of workgroup
capability, just add Lotus Notes and see what happens:

Combined with Lotus Notes, 1-2-3 Release 5 becomes
a model management system that lets team members
search a library of worksheets.

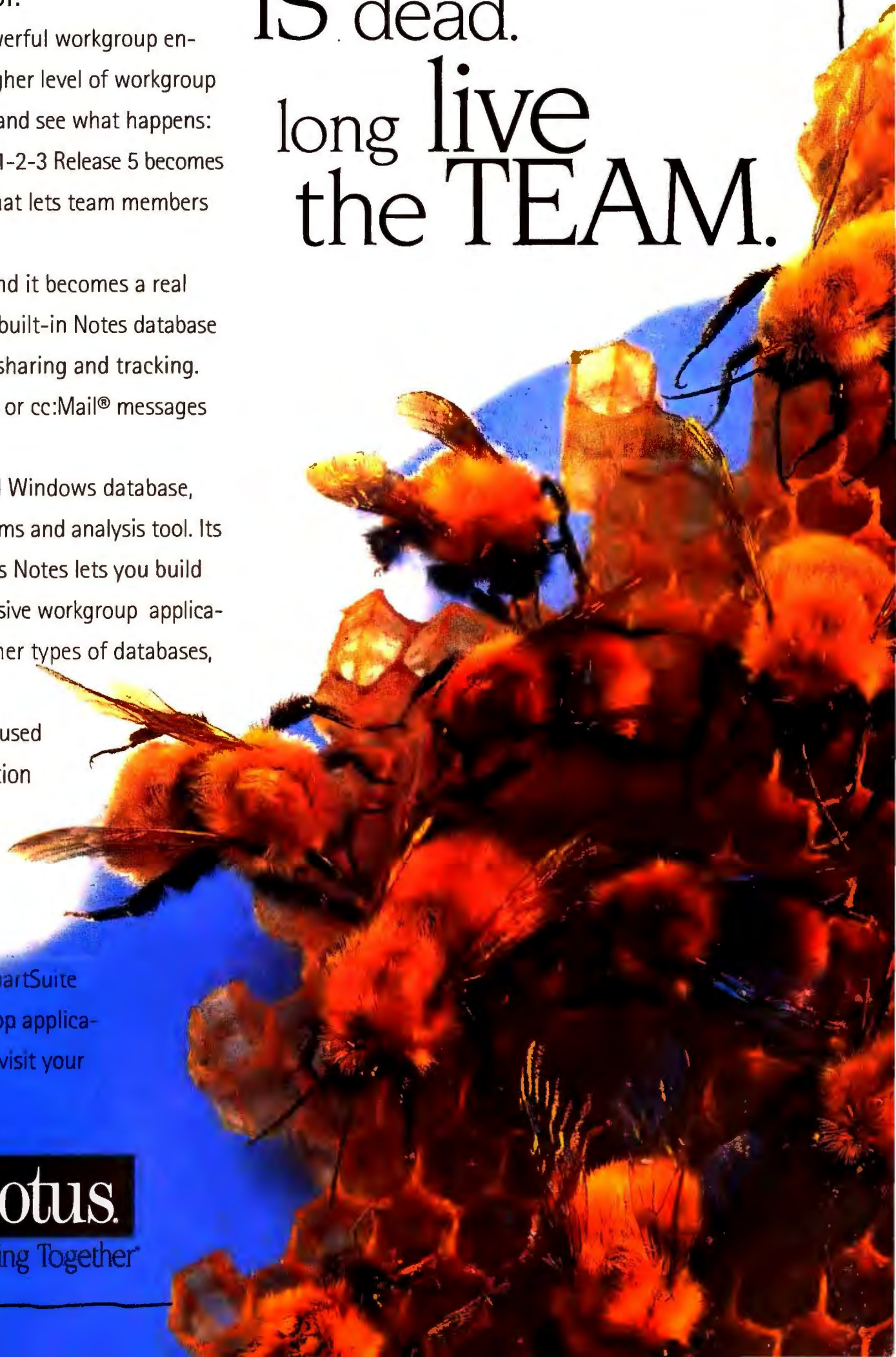
Add Notes to Ami Pro 3.1 and it becomes a real
"workgroup processor." Use the built-in Notes database
for efficient, secure document sharing and tracking.
And you can format your Notes or cc:Mail® messages
directly in Ami Pro.

Approach 3.0, the top-rated Windows database,
becomes a shared reporting, forms and analysis tool. Its
advanced integration with Lotus Notes lets you build
sophisticated, information-intensive workgroup applica-
tions and join Notes data to other types of databases,
from dBASE to SQL.

And Freelance Graphics 2.1, used
with Notes, becomes a presentation
storage system, a library of past
presentations, which a team
can browse and pull from to
create new ones.

For more information on SmartSuite
Release 3.0 and each of the 5 top applica-
tions that make up SmartSuite, visit your

Lotus
Working Together™



SMARTSUITE 3.0

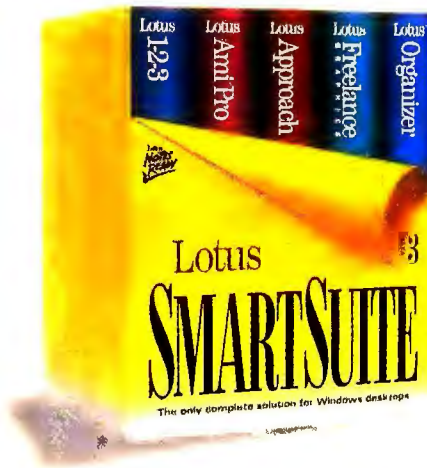
SmartCenter
(to move between applications)

SmartMasters
(for predesigned templates)

Fast Format
(apply styles throughout documents)

ScreenCam
(to put your ideas in motion)

Smart Assistants
(to guide you)



Configurable Single Install
(for easy one-step installation)

Small Footprint On Your PC
(the most efficient suite available)

1-2-3/Approach Integration
(database power in your spreadsheet)



1-2-3 RELEASE 5



SmartMasters
(useful predesigned templates)

Lotus Maps
(geographic visuals of data)

Lotus Approach Integration
(for extra database power)

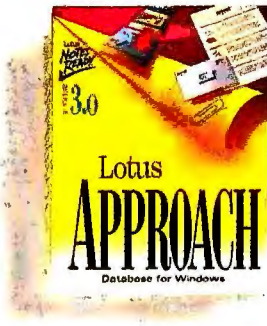
Smart Assistants
(to guide you)

Range Routing
(for mailing spreadsheet ranges)

Direct Access To
Database Files
(open dBASE and Paradox®
files directly into 1-2-3)

OLE 2.0 Drag-And-Drop
(move or copy data, with
visual mouse cues)

APPROACH 3.0



PowerClick Reportwriter
(for wysiwyg design)

Smart Assistants
(to guide you)

InfoBox
(instant on-screen
manipulation)

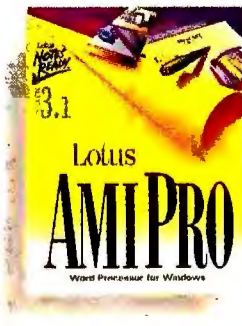
X10 Speed Architecture
(for blazing speed)

Lotus 1-2-3 Integration
(for working with 1-2-3)

PowerKey™ Technology
(for direct access to
existing data)

Dynamic Crosstabs
(for drag-and-drop
analysis)

AMI PRO 3.1



New Proofing Tools
(for easy document proofing)

Collapsible Click-And-
Drag Outlining
(simplifies organization)

Revision Marking
(edit documents without
confusion)

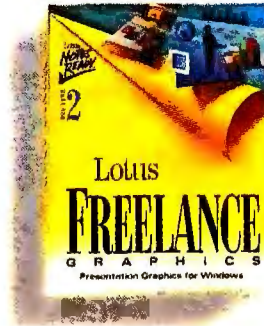
New Style Sheets
(more professionally
designed templates than ever)

Text Styling
(make your e-mail
look better)

WordPerfect Switchkit®
(the move from DOS
is painless)

Stick-It Notes
(add comments and
messages)

FREELANCE GRAPHICS 2.1



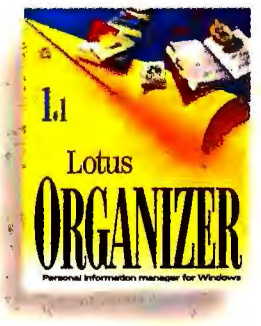
Unique Three-Step Process
(for quick and easy
presentations)

One-Click Charting
(access a library of charts and
drawings with one click)

Page Sorter
(presentation management
at a glance— review and
rearrange with ease)

Import/Export
(more file formats than
ever— including
Harvard/DOS and
PowerPoint® 3.0)

ORGANIZER 1.1



Easy Linking
(makes cross-referencing
simple)

Flexible Printing
(for your manual planner,
mailing labels from your
address book)

Group Scheduling
(use with cc:Mail to set up
meetings with anyone on
your WAN or LAN)

Real Time Access
(instantly view co-workers'
busy and free time)

how the NEW SMARTSUITE 3.0 HELPS workgroups work.

The new SmartSuite 3.0. Featuring major new releases of 1-2-3, Ami Pro, Approach database and Freelance Graphics—plus the popular and powerful personal information manager Organizer—this is the ultimate integration of your most important desktop tools. For more information on SmartSuite Release 3.0 and each of the 5 top applications that make up SmartSuite, visit your Lotus Authorized Reseller or for a comprehensive multimedia overview call **1-800-TRADE-UP, ext. 9988*** for the free Lotus Product Gallery CD. A SmartSuite upgrade costs \$299.**



*In Canada call 1-800-GO-LOTUS. **\$119 suggested retail upgrade price. *NSTL, May 1994. **\$299 promotional price available while supplies last. ©1994 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. Lotus, Lotus Notes, 1-2-3, Approach, Ami Pro, cc:Mail, Freelance Graphics, SmartSuite, SmartIcons and Working Together are registered trademarks and ScreenCam, PowerClick, Notes/FX, Version Manager, SmartMasters, Organizer, PowerKey, X10 and NotesReady are trademarks of Lotus Development Corporation. WordPerfect and Switchkit are registered trademarks of WordPerfect Corporation. PowerPoint is a registered trademark and Windows is a trademark of Microsoft Corporation. Paradox is a registered trademark of Borland International, Inc.

When we saw the configuration—16MB of RAM, 256K of secondary cache, and a 2MB PCI video card—we expected lively performance, but this one's a speed demon. This sturdy PCI tower is one of the fastest Pentium-66s you can find, beating out half the

Pentium-90s we've reviewed. It also has all the makings of a power-user multimedia PC, including an enormous 1GB SCSI hard drive for storing disk-ravenous sound and video files, and a 15-inch monitor. All the makings, that is, except for the CD ROM drive and sound card. Fortunately, there's acres of room to add them. You get 11 free drive bays (4 externally accessible) and 5 free expansion slots, including 1 you use for either a 16-bit or a PCI card.

Insight's support policies are typical, with two exceptions. On the upside, you get toll-free tech support 14 hours each weekday, 12 hours on Saturday, and 8 hours on Sunday. On the downside, you have to live in Arizona to get free on-site service for the first year; otherwise, you can't get on-site service at all from Insight. The PCI P66 SCSI's powerful combination of good price, super speed, and generous expandability help it stake a claim to a chunk of Power Desktops Top 20 real estate. *Insight*, 800/998-8011, 602/902-1176

Reader service no. 733

MicroTech Ultima XVC/100

PROS: Great performance for its class, excellent expandability

CONS: Very expensive for its class

Don't judge MicroTech's Ultima XVC/100 by its processor. This distinctive-looking DX4-100 system, jet black from mouse to monitor case, blew past most of the 60- and 66-MHz Pentium PCs we've tested and even edged by several of the Pentium-90s that we've had on the test bench.

The system's powerful components—including 16MB of RAM and a fast 2MB VL bus graphics accelerator—certainly helped it achieve such speed. The video card, together with a 17-inch monitor, delivers excellent images up to 1280 by 1024 resolution. The 530MB hard drive is spacious.

Inside, the Ultima offers plenty of room to expand, with six free drive bays (three of them externally accessible) and six free slots, including a VL bus slot.

Service policies are thin but don't spring any real surprises. Tech support reps are available only 10 hours a day during the week, but you can also reach them 8 hours on Saturdays. MicroTech doesn't offer any on-site service but will mail replacement parts free overnight during the first year. Company policy is to turn repairs around within three days.

The Ultima XVC/100 turned in outstanding performance for a DX4-100 system. Unfortunately, at \$4167 it's also pretty pricey for

its CPU class. You have your pick of several more-powerful, less-expensive systems that are multimedia ready. *MicroTech Computer*, 800/342-6508, 404/345-6508 Reader service no. 734

MIS M5P/60

PROS: Inexpensive, multimedia ready

CONS: Hard drive minimal for multimedia work

If you're looking for an inexpensive, reasonably powerful multimedia system, MIS has a desktop for you. Not only is the \$2700 M5P/60 one of the cheapest Pentium-60 PCs you can find, it comes nicely decked out with a CD ROM drive, a sound card, a 2MB PCI video card, and a 15-inch monitor.

Sure, there are a few compromises. If you're heavily into multimedia, you may find the 270MB hard drive cramped. Also, the M5P/60's performance falls a little short of its typical Pentium-60 peers, although, considering that it has only 8MB of RAM rather than the 16MB typical in Pentiums, and that it's dealing with memory-hogging multimedia device drivers, it did reasonably well.

Upgrading the M5P/60 shouldn't be a problem—five expansion slots are available, including one dedicated PCI slot and another that will take either a 16-bit or a PCI card. The only time you might feel pinched is if you want to add drives—only one bay is free. Support policies are adequate, and inexpensive \$25-per-year on-site service and a 45-day money-back guarantee are nice pluses. Although this desktop PC is better than many multimedia systems, it's a little too short on speed to make our power Top 20. *MIS Computer*, 800/733-9188, 510/226-9188 Reader service no. 735

MPC 380

PROS: Inexpensive, fast, large hard drive

CONS: Short battery life, a bit heavy

A 486DX2-66 processor, 8MB of RAM, and a 320MB hard drive—we're talking about a desktop PC, right? Well, with the MPC 380, your desktop can be an airline seat-back tray table or your lap on the commuter train. This traveler has many of the specs of last year's power desktop system in an 8.4-pound case you can pop into your carry-on. Performance is good for a notebook; the system keeps up with a typical DX2-66 mobile PC. Not bad for \$2659.

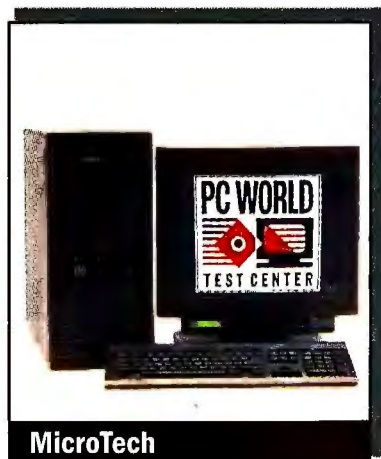
The 380 is well designed. Its 10.3-inch passive color screen is large and the image quality unusually crisp for the genre, and we found the keyboard and trackball comfortable to use. Aside from its heft, the one major drawback is short battery life—only 2.5 hours in our tests. The system provides a PCMCIA Type III slot, and



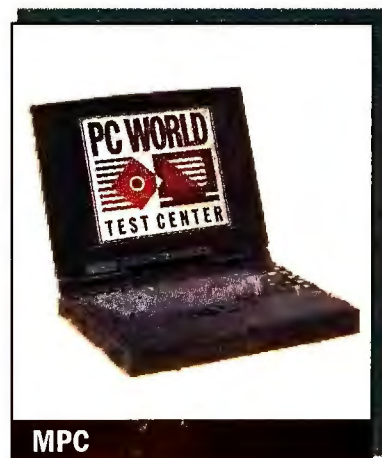
Insight



MIS



MicroTech



MPC

FEATURES COMPARISON: THIS MONTH'S CONTENDERS—DESKTOPS

CD ROM Drives Becoming Standard Issue

● Yes

○ No

n/a = not applicable

Standard features

	Ambra D466i/VL	Ambra D4100i/VL	Austin P5-66	Compaq ProLinea 4/100 Model 525	CompuAdd C4100D	CompuAdd CP60P	DECpc XL590	Diamond DT 486-66
Selling price as of 5/27/94 ¹	\$2460	\$3034	\$3298	\$3548	\$2691	\$3407	\$5098	\$1699
CPU	486DX2-66	DX4-100	Pentium-66	DX4-100	DX4-100	Pentium-60	Pentium-90	486DX2-66
CPU/upgrade socket	238-pin	238-pin	273-pin ZIF	238-pin	238-pin ZIF	273-pin ZIF	320-pin ZIF	238-pin ZIF
BIOS	Phoenix 34381	Phoenix 4.03 4/4/94	AMI 34439	Compaq 03/22/94	Phoenix 0.10	Phoenix 34228	Phoenix 8/28/93	Award 34393
Installed/maximum RAM (MB)	16/64	16/64	16/128	8/100	8/64	8/128	16/128	8/64
30-pin or 72-pin SIMMs	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin	72-pin
SIMM sockets/number free	4/3	4/3	4/2	3/2	4/2	4/2	6/2	4/2
Secondary RAM cache installed/ maximum (K)	256/256	256/256	256/256	128/128	128/256	256/256	256/256	256/1024
Case style	compact	minitower	tower	compact	desktop	tower	minitower	compact
Free externally accessible 3½-inch/ 5¼-inch drive bays	0/2	1/1	2/1	0/1	0/1	0/2	0/2	1/3
Free internal 3½-inch/5¼-inch drive bays	1/0	1/0	1/1	0/0	0/0	2/0	1/0	0/0
Free 32-bit EISA/16-bit ISA/8-bit ISA expansion slots	0/4/0	0/6/0	0/4/0 ²	0/3/0	0/2/0	0/4/0 ²	0/4/0 ²	0/4/0
PCI or VL bus slots/number free ³	1 VLB/1	1 VLB/1	3 PCI/2 ⁴	0/0	1 VLB/1	3 PCI/2 ⁴	3 PCI/2 ⁴	2 VLB/0
Hard disk	WD Caviar 2540	WD Caviar 2540	Seagate ST5660A	Quantum ProDrive LPS	WD Caviar 2340	Conner CFA540A	Seagate ST3610N	Quantum ProDrive LPS
Size (MB)	540	540	520	530	340	540	540	270
Adapter	integrated VLB	integrated VLB	integrated	integrated	integrated	integrated	integrated	1MB Promise DC4030 VL-2
Floppy drives (MB)	1.44	1.44	combo	1.44	1.44	1.44	1.44	1.44
Graphics adapter	integrated VLB	integrated VLB	Diamond Stealth 32	integrated local bus	integrated local bus	Diamond Stealth 32	Diamond Stealth 64	Genoa 8500VL
Installed VRAM/DRAM (MB)	0/2	0/2	0/2	0/1	0/1	0/2	2/0	0/1
Monitor	Ambra BMS-3500	Ambra MPR II	Austin MN2409	Compaq 171FS	CompuAdd TE1464M	CompuAdd TE1564F	DEC VCR 16	CTX 1451
Screen diagonal (inches)/ dot pitch (mm)	15/.28	15/.28	15/.28	17/.28	14/.28	15/.28	17/.26	14/.28
Modem speed for fax/data (kbps)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sound board	○	Media Vision Pro Audio 16	Toptek Micro Golden	○	Diamond	OEM	○	○
CD ROM drive	○	Laser Magnetic Storage CM206	Sony CDU 33A	○	Mitsumi CRMC-FX001D	Mitsumi CRMC-FX001D	○	○
Data transfer rate (K/sec)	n/a	352	300	n/a	300	300	n/a	n/a
Parallel/serial/mouse/SCSI ports	1/2/1/0	1/2/1/0	1/2/0/0	1/2/1/0	1/2/1/0	1/2/0/0	1/2/1/1	1/2/0/0

Service and support

Warranty (years)	1	1	2	3	1	1	3	1.25/2 ⁵
30-day money-back guarantee	●	●	●	● ⁶	●	●	●	●
On-site service first-year price	\$29	\$29	free	free	free	free	free	free
Service center turnaround (days)	3	3	2	2	3	3	2	1
Daily toll-free phone support (hours)	24	24	24	24	15	15	24	9
Weekend support	●	●	●	●	○	○	●	○
BBS	○	○	●	●	●	●	●	○
Fax	○	○	●	●	●	●	●	○

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

² One less ISA slot available when all PCI slots are filled.

³ VL slots also accept 16-bit ISA peripherals.

⁴ One less PCI slot available when all ISA slots are filled.

⁵ Fifteen months parts, two years labor.

⁶ Applies to systems bought through Compaq Direct Plus at 800/888-5881. Dealer guarantee may vary.



Empac Magnum	Insight PCI P66 SCSI	MicroTech Ultima XVC/100	MIS M5P/60	NEC Image 4100es
\$3500	\$3678	\$4167	\$2700	\$3813
Pentium-60	Pentium-66	DX4-100	Pentium-60	DX4-100
273-pin ZIF	273-pin ZIF	238-pin ZIF	273-pin ZIF	238-pin ZIF
AMI 34189	Award 1.00.8.AF2	Phoenix 0.10	Phoenix 1.03	Phoenix 4/19/90
16/128	16/128	16/64	8/128	16/128
72-pin	72-pin	72-pin	72-pin	72-pin
4/2	4/2	4/3	4/2	4/0
256/256	256/256	256/256	256/512	256/256
tower	tower	tower	desktop	compact
0/4	0/4	0/3	0/1	0/2
0/2	7/0	2/1	0/0	0/0
0/4/0	0/5/0 ²	0/5/0	0/4/0 ²	0/2/0
3 VLB/1	3 PCI/1 ⁴	2 VLB/1	3 PCI/2 ⁴	2 VLB/2
Conner CFA540A	Micropolis 4110 Drive-SCSI	Seagate ST3655A	Quantum ProDrive LPS	WD Caviar 2540
540	1080	530	270	540
2MB Promise DC4030 VL-2	OEM	Integrated	integrated	integrated
1.2, 1.44	1.44	combo	1.44	1.44
Diamond Viper VLB	OEM Cirrus Logic PCICL543x	Diamond Viper VLB	STB Nitro PCI	integrated VLB
2/0	0/2	2/0	2/0	0/2
Optquest 4000DC	Mag DX15F	Synco CM-17Gs	CTX CMS- 1561 LR	NEC MultiSync 3V
17/.27	15/.28	17/.28	15/.28	15/.28
n/a	n/a	n/a	n/a	n/a
○	○	○	Gallant Sound Card SC-6000	○
○	○	○	Sony CDU 33A-01	○
n/a	n/a	n/a	300	n/a
1/2/0/0	1/2/0/1	1/2/0/0	1/2/0/0	1/2/1/1

1	1	1	1	3
○	●	●	● ⁷	●
\$100	○ ⁸	○	\$25	free
1	2	3	2	2
9 ⁹	14	10	10	12
○	●	● ¹⁰	○	○
○	●	○	○	●
●	●	●	●	●

⁷45-day money-back guarantee.

⁸Free on-site service in Arizona only.

⁹Not toll free.

¹⁰Saturdays only.

MPC offers an optional docking station. Service policies are typical, except for limited technical support hours—only 9 hours each day, weekdays only. All in all, the 380 is a good portable. With longer battery life, it could well have made it into either the power or budget sections of our Mobile PCs Top 20. *MPC Technologies, 800/672-8088, 714/724-9000* Reader service no. 736

NEC Image 4100es

PC WORLD TOP 20
6 POWER DESKTOP

PROS: Fastest DX4-100 yet, nice monitor

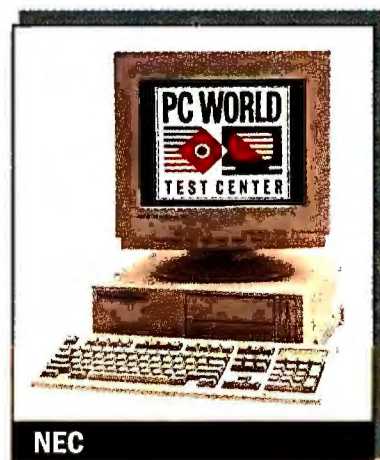
CONS: Limited expandability, flimsy case

Savvy system connoisseurs know that NEC makes excellent systems. But they're just as aware that the company often charges a premium for them. The Image 4100es is a pleasant exception, a member of this month's Power Desktops Top 20, and very nearly a Best Buy. It is true that most DX4-100 desktops are cheaper than this \$3813 compact. But the Image 4100es, with 16MB of RAM and 256K of secondary cache, is phenomenally fast, blasting by all the Pentium-60s, beating out all but two Pentium-66s, and even edging by some of the slower Pentium-90s we've had in the test center.

NEC didn't sacrifice optimum configuration to achieve its enticing price/performance ratio. You get a roomy 540MB hard drive, and the MultiSync 3V monitor, while NEC's low-end 15-inch offering, still sports exceptionally sharp image quality and good brightness and contrast. Furthermore, the monitor is well matched to a 2MB VL bus video adapter to furnish comfortable viewing in super-VGA resolutions. System documentation is superb.

NEC's service and support is better than most. Policy highlights include a three-year warranty and a reassuring year of free on-site service. Adding to this company's appeal, NEC customers responding to our fax-back survey give the company very favorable marks. So what is there to criticize about this machine? The Image 4100es's only real drawback is its low expandability. Two externally accessible drive bays are at your disposal—and that's not bad at all—but only three of the four available expansion slots are usable; the fourth is obstructed by video memory and the CPU's heat sink. On our test unit, all four SIMM sockets were filled with 4MB SIMMs. So if you expect to expand your RAM in the future, it makes sense to ask your dealer to install higher capacity SIMMs and leave you some room to move. Even if you think you may never upgrade, your situation may change, and you'll be grateful you thought ahead. The only other element we can fault is the case, which allows the motherboard to flex a bit if you move the system around with its cover off.

The bottom line? If you don't need lots of room to upgrade, you'll find everything you're looking for in this high-end office PC: great performance, a solid feature set, and the assurance of NEC quality and backing, all in a pleasingly compact, cost-effective package. Small wonder it wound up high up on our Power Desktops list. *NEC Technologies, 800/632-4636, 508/264-8000* Reader service no. 737



NEC

FEATURES COMPARISON: THIS MONTH'S CONTENDERS—MOBILE PCs

New AT&T, IBM Mobiles Shoot Straight to the Top

● Yes
○ No
n/a = not applicable

Standard features

	BEST BUY Acom Patriot 4000	BEST BUY AT&T Globalist 200 (486DX2-50)	AT&T Globalist 200 (486SX-33)	BEST BUY Duracon TravelPro5110	BEST BUY IBM ThinkPad 500	Identity Systems Select Series	MPC 380
Selling price as of 6/6/94 ¹	\$2780	\$4105	\$2700	\$4225	\$1798	\$2458	\$2659
CPU	486DX2-66	486DX2-50	486SX-33	DX4-100	IBM486SLC2-50	486DX-33	486DX2-66
Traveling weight (pounds) ²	8.4	7.4	7.4	8.6	6.2	8.2	8.4
Width x depth x height (inches)	11.3 x 9 x 2	11.3 x 8.8 x 2.3	11.3 x 8.8 x 2.3	11.2 x 8.6 x 2.3	10 x 7.3 x 1.6	11.3 x 8.9 x 1.9	11 x 8.6 x 2
Installed/maximum RAM (MB)	8/32	8/20	4/20	4/36	4/12	4/32	8/20
Secondary RAM cache installed/maximum (K)	0/0	0/0	0/0	128/128	0/0	0/0	0/0
Installed/maximum hard disk (MB)	330/520	250/250	170/250	200/520	170/260	200/720	320/540
Removable hard disk	○	●	●	●	○	○	○
Display type	color passive	color active	color passive	color active	mono passive	color passive	color passive
Screen diagonal (inches)	9.5	9.5	9.5	9.5	7.5	9.5	10.3
Maximum colors or gray shades of LCD	256	256	256	256	64	256	16
Simultaneous LCD and external monitor	○	●	●	●	●	○	○
Highest resolution of external monitor	1024 x 768	1024 x 768	1024 x 768	1024 x 768	800 x 600	1280 x 1024	1024 x 768
Mouse/keyboard ports	0/1	0/1 ³	0/1 ³	0/1	0/0	0/1	1/1
Cursor keys in inverted T	●	●	●	●	●	●	●
Dedicated page control keys	●	●	●	●	●	●	●
All 12 function keys dedicated	●	●	●	●	●	●	●
Standard <Ctrl> and <Alt> layout	○	●	●	○	○	○	○
Built-in pointing device	●	●	●	●	●	●	●
Modem fax/data speed (kilobits per second)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Docking station available	●	●	●	●	●	●	●
PCMCIA slot Type II/III	0/1 ⁴	1/1	1/1	1/1	1/0	0/1 ⁴	0/1 ⁴

Power management

Supports APM	●	●	●	○	●	●	●
Type of battery	NIMH	NIMH	NIMH	NIMH	NIMH	NiCd	NiCd
Suspend button	●	● ⁵	● ⁵	○	●	●	●
Suspends when case closed	●	○	○	○	●	●	○

Service and support

Warranty (years)	1	1	1	1	3	1	1
30-day money-back guarantee	●	●	●	●	●	○	●
On-site/replacement service price for first year	○	free	free	○	\$40	○	○
Turnaround policy (days at service center)	2	2	2	2	3	2	2
Daily toll-free phone support (hours)	11	24	24	11	24	11	9
Weekend support	○	●	●	○	●	○	○
BBS	●	●	●	●	●	●	○
Fax	●	○	○	●	●	●	●

¹ All notebooks priced as configured with DOS 6.0 or later, Windows 3.1, VGA monochrome or better display, and mouse or other pointing device. Selling price is direct or based on vendor estimate.

² Includes computer, adapter, and power cord.

³ Mouse port doubles as keyboard port.

⁴ Alternatively accepts two Type II devices.

⁵ Suspends with key combination.

I don't understand
my new healthcare plan,
Latin,
my parents,
how tofu can be so popular,
why athletes make
more money than doctors,
why everybody makes
more money than me,
and why anyone would buy
an NEC SuperScript™ 610 printer.

Why? Because it's the fastest and easiest personal laser printer you will ever use.

Besides you're smart enough to recognize a good idea when you see one. You're not afraid of new technology. And you're definitely tired of waiting every time you print from Windows.

But still you have your doubts. What exactly is this new technology? And what's in it for you?

Well, it's called GDI printing and it works like this. GDI (Graphical Device Interface) is the native language of Microsoft Windows.™ Because the SuperScript 610 thinks and speaks the same language it doesn't have to translate or reformat your documents before it can print. Which means it's 30% to 300% faster than ordinary printers. And what you see on the screen is truly what you get.

Okay, this is obviously a great Windows printer. But can it print PCL and DOS? Of course. As long as you open the application from within Windows. There's even a \$99 PostScript™ option if you need it.

With all this sophisticated technology, you'd expect the 610 printer to be complicated and hard to use. But it's actually much easier to use than ordinary printers. And it only takes minutes to install.

To achieve this kind of ease we did have to eliminate a few things, however. Like the controller. Why have one when the PC can do the file processing? It's faster and more efficient. It also allows you to print fonts and graphics without any limitations. And every time you upgrade your PC, you automatically upgrade your printer.

We also moved the operator panel to the PC screen — where it belongs. That way graphical displays and animated icons can show you exactly what's going on at all times.

By the way, the SuperScript 610 is extremely compact, 300 dpi, prints 6 pages per minute and it comes with a 2-year overnight replacement warranty.

And it costs under \$500. What's so hard to understand about that? For more information, call 1-800-NEC-INFO or for details via fax, call NEC FastFacts™ at 1-800-366-0476, and request document #SW610.



NOVEMBER 1993

BEST VALUE
GENERAL BUSINESS
PRINTER



\$50 REBATE
1/94 THROUGH 9/30/94

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NEC

Circle 205 on reader service card

System Snapshots

These systems, while very capable, don't match the preceding group for overall value in a business environment. However, many of them present unique and valuable solutions to end-user needs.

Ares DX4-100

PROS: Decent expandability, good support policies

CONS: Sluggish for a DX4-100

For \$3145, Ares offers a nicely decked-out system with a DX4-100 CPU, a 15-inch monitor, a 2MB video board, a 420MB hard drive, and a CD ROM drive. While the system is ready to handle business databases and reference works, if you want a multimedia system, all you need to add is a sound card and speakers. You also have plenty of room in this highly upgradable tower to add other components.

Ares backs its systems with good support policies, including a 60-day money-back guarantee, a two-year warranty, and free labor for the life of the system. You can call technical support 24 hours a day.

Unfortunately, performance is disappointing. Even with 16MB of RAM, the Ares is one of the slowest DX4-100 systems we've seen, running more on a par with a high-performance DX2-66. Those seeking a bargain power PC will find better deals on our Top 20s. *Ares Microdevelopment, 800/322-3200, 810/473-0808 Reader service no. 738*

Compaq Deskpro XE 450

PROS: Streamlined design, strong support

CONS: Slow, small hard drive, no free drive bays

The Deskpro XE 450 is a svelte office system equipped with CD ROM drive, 16-bit audio, and microphone, all for only \$2499. The package includes a 15-inch monitor, a 1MB local bus video controller, 8MB of RAM, and TabWorks, an easy-to-use desktop manager that supplants Windows' program manager. And you get Compaq's excellent service and support.

But the XE 450 has major shortcomings. One is poky performance—it's noticeably slower than the typical DX2-50. Another is its 170MB hard drive, which is on the small side. Furthermore, the system has limited expandability—no free drive bays and only three free expansion slots. These drawbacks keep the system below the level of

our Top 20 lists, but the Deskpro XE 450, backed by one of the leading companies in the PC business, may well attract home buyers. *Compaq Computer, 800/345-1518, 713/378-8820 Reader service no. 739*

DECpc XL560

PROS: Sturdily built, good service and support

CONS: Pricey, sluggish for a Pentium-60

If minicomputer mogul DEC has transferred any expertise to its PC business, it's how to make a sturdy system and support it well. A case in point is the DECpc XL560, a medium tower backed by a company rated exceptionally high in our reliability and service surveys. DEC also offers a long three-year warranty and has tech support reps available 24 hours a day, seven days a week.

Unfortunately, performance is on the slow side for a pricey power system. Despite its 16MB of RAM and 2MB PCI graphics accelerator, this Pentium-60 turned in some of the slowest test scores we've seen in its class. You get a 15-inch monitor and a CD ROM drive but no sound card or speakers. The DECpc XL560 is a robust PC, but for \$4995 we expect more. In fact, several better Pentium-90 packages are available for \$1000 less. *Digital Equipment Corp., 800/722-9332 Reader service no. 740*

Hyundai Neuron Lite 425SX

PROS: Great price

CONS: Slow, poor display quality, short battery life, small hard drive, design flaws

Hyundai's subnotebook has its charms. This tiny 6.4-pound Windows-ready PC is enticing, especially in light of its bargain-basement \$1514 price. However, the 486SX-25 subnote's test results are exceptionally slow even for a mobile computer. Furthermore, the hard disk is a meager 120MB, and the battery runs for less than 2.5 hours on a charge.

System design also left us flat. The monochrome display on our test unit was streaky, the trackball cramped, and key placement nonstandard. While the PC has an 18-month warranty, tech support is free for only the same length of time and for only 9 hours each weekday. The Neuron Lite 425SX merits a look—if you're on a really tight budget and your mobile computing needs are light. *Hyundai, 800/627-7978, 408/473-9200 Reader service no. 741*

Wyse Forté GSV

PROS: Ethernet ready, upgradable to full Pentium, 40-month warranty

CONS: Pricey for a DX2-66

Wyse's entry has two cool features: ethernet connectors and a motherboard with a free Pentium CPU socket, which means you can pump up the system to a true Pentium-60. (Wyse will sell you the CPU for \$549.) Given the 16MB of RAM, it's no surprise the Forté GSV proved to be a fast DX2-66.

However, \$3349 is a steep price for a DX2-66 PC, especially as the rest of the unit is plain vanilla. The 15-inch monitor, 340MB hard drive, and CD ROM drive are good power system components, but the PC's general expandability is unexceptional.

Wyse's 40-month warranty is fantastic—one of the longest in the business—but support policies are otherwise basic. The Forté GSV has several novel and attractive features, but for this much money, you could buy a similarly configured Pentium-60—without having to start with a DX2-66. *Wyse Technology, 800/438-9973, 408/473-1200 Reader service no. 742*

BATTERY LIFE TEST REPORT

IBM ThinkPad Tops This Month's Mobile Contenders

IBM ThinkPad 500	5:40
AT&T Globalyst 200 (486SX-33)	4:11
AT&T Globalyst 200 (486DX2-50)	3:33
Identity Systems Select Series	3:25
MPC 380	2:33
Duracom TravelPro5110	1:55
Acom Patriot 4000	1:47

Best Buys in red

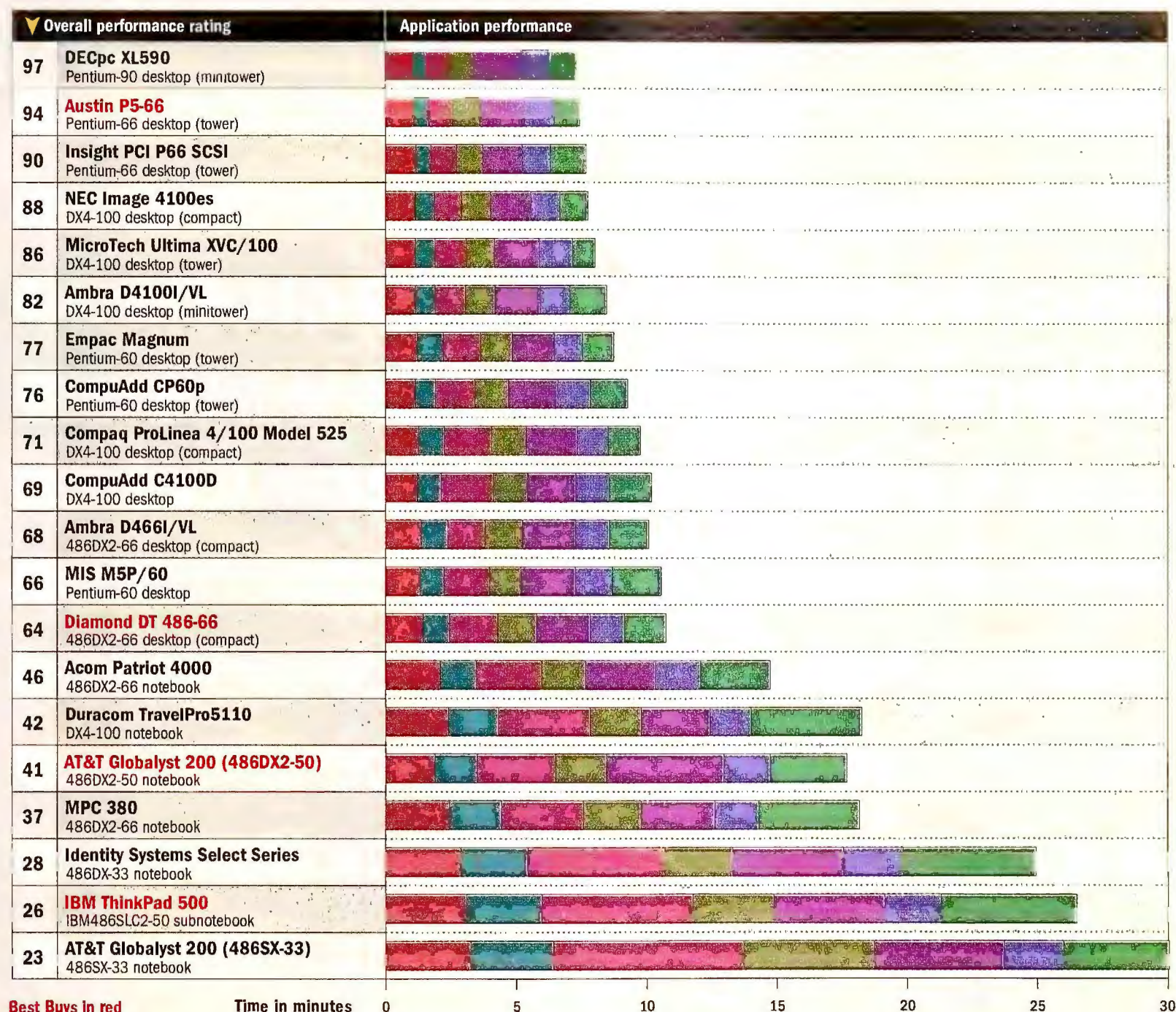
Time in hours:minutes.

Methodology

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

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

DEC's 90-MHz Pentium PC Leads This Month's Pack



Systems are arranged in order of overall performance from best to worst, based on the total of the scores from seven normalized, weighted tests. However, slower performance by a system in one test may cause its overall bar to be longer than that of a system with worse overall performance.

Methodology

We tested each system as supplied by the manufacturer, using the version of DOS supplied. If we installed Windows, we performed 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 number of records to an existing table, performed several queries, and generated a report.

Freelance 1.0 for Windows

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

WordPerfect 6.0 for DOS

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

1-2-3 release 3.4 for DOS

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

Paradox 3.5 for DOS

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

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

If you've ever owned a copy of Norton Utilities®, you know you don't need a super-hero's cape to have magic-like powers.

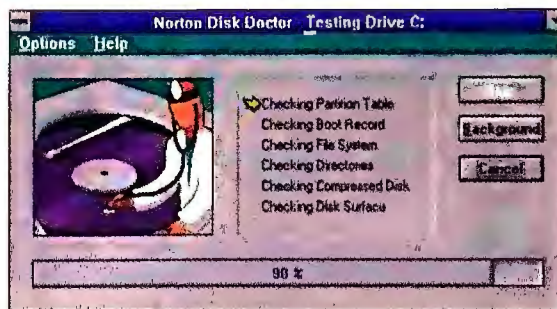
Famous for its daring rescues and recoveries, Norton Utilities is one of the most honored software programs in the history of personal computing. And now there's new Norton Utilities 8.0.

The first software package to combine true Windows recovery

• • • •
Like Speed Disk, Norton Disk Doctor runs in the background.

• • • •
and repair in one great package.

Our new System Watch monitors virtually everything going on within your Windows environment. What's more, it provides real-time crash protection by alerting you to any

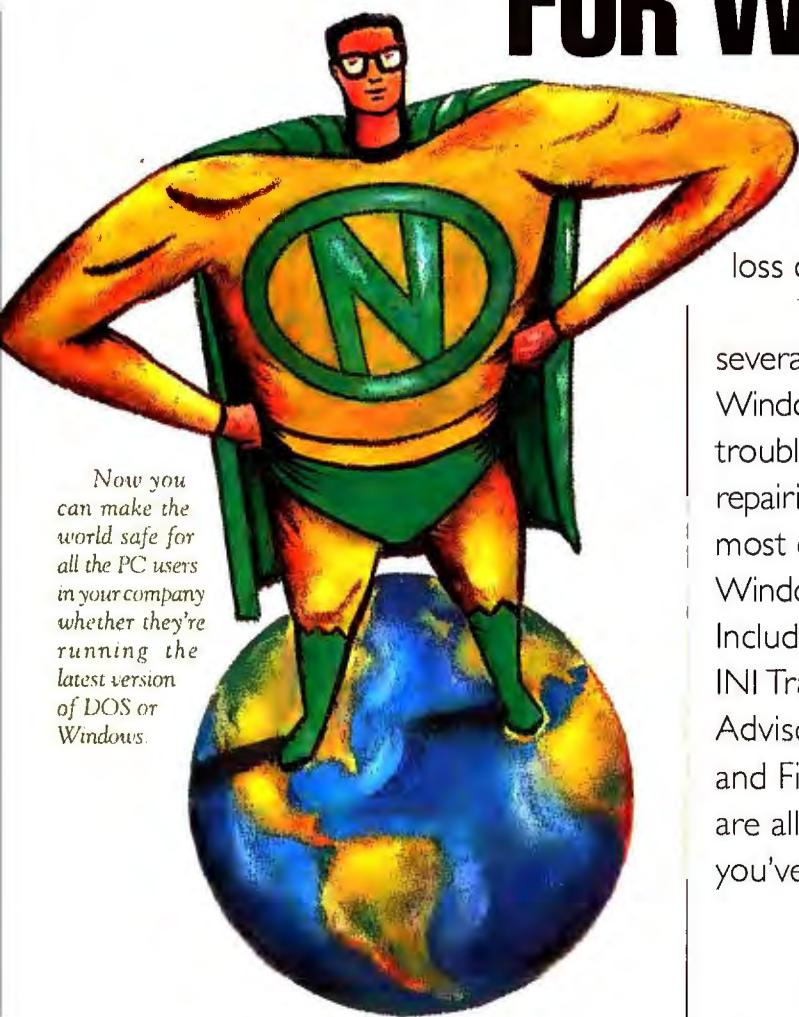


complete diagnostic tool set for analyzing all of your computer's hardware

components from drives to video.

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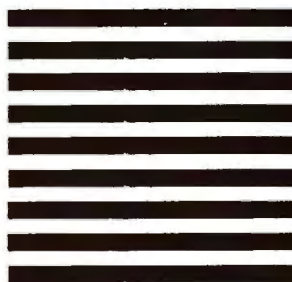
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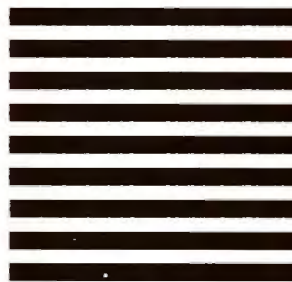
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Beyond the Top 20: Ranking the Rest of the Pack

Considering buying a Rampage 486DX2-66 PC but can't find it on our Top 20 charts? Chances are, we've reviewed it. In the course of testing systems for the PC World Top 20 during the last eight months, we've rated more than 280 machines—desktops and notebooks. The following two charts rank them all, from budget 486SX-25s to the newest Pentium-90s, with the exception of models no longer on the market. We list power and budget ranks, the system's CPU class, its street price, the issue in which it was reviewed, and the vendor's phone number. Simply scan the chart for the computer you're interested in. Check its power rank to see how

it compares to the Top 20 power systems. If it's number 21, it's worth considering; if it's number 121, cross it off your list. Then check the system's budget rank. If no budget rank is listed, the machine exceeds our price ceiling for budget category eligibility: \$2500 for desktops and \$2750 for notebooks. All prices listed are accurate as of mid-June.

Finally, more detail about each PC is available in the issue in which it was reviewed. Consult your back issues or order a reprint by fax. Instructions for ordering fax reprints appear at the bottom of each Top 20 chart in the review.

THE TOP 20 Power and Budget Desktop PCs

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE
Acer AcerPower 9000T	52	—	Pentium-60	\$3629	July 94	800/733-2237
Acer AcerPower Series 9000	50	—	Pentium-60	\$4795	Jan 94	800/733-2237
Acma 486/66/DX2 System	76	—	486DX2-66	\$2595	Jan 94	800/786-6888
Acma 486DX2-66 PCMCIA System	84	11	486DX2-66	\$1995	May 94	800/786-6888
Acma MPC-433 System	149	54	486DX-33	\$1850	Apr 94	800/786-6888
Alaris Leopard EnergySmartPC SLC2/66	162	77	I8M 486SLC2-66	\$1679	July 94	510/770-5700
ALR Evolution IV 4/100	42	—	DX4-100	\$2889	July 94	800/444-4257
ALR Evolution V	18	—	Pentium-60	\$3761	Jan 94	800/444-4257
ALR Evolution V-Q	46	—	Pentium-60	\$5777	Mar 94	800/444-4257
ALR Evolution V ST/66	25	—	Pentium-66	\$4300	June 94	800/444-4257
ALR Flyer VL 4/50d	121	42	486DX2-50	\$2291	Jan 94	800/444-4257
Ambra D4100/VL	15	—	DX4-100	\$3034	Sept 94	800/252-6272
Ambra D466/VL	32	12	486DX2-66	\$2460	Sept 94	800/252-6272
Ambra DP60E/VL	55	—	Pentium-60	\$3365	Mar 94	800/252-6272
Ambra DP60/PCI	63	—	Pentium-60	\$3317	May 94	800/252-6272
Ambra T466/VL	56	—	486DX2-66	\$2510	July 94	800/252-6272
Ares 486-66DX2 EISA/VESA	86	34	486DX2-66	\$2499	Jan 94	800/322-3200
Ares DX4/100	68	—	DX4-100	\$3145	Sept 94	800/322-3200
AST Bravo MT 466d	94	17	486DX2-66	\$2128	Feb 94	800/876-4278
AST Premmia 4/66d Model 343W	62	—	486DX2-66	\$3593	Jan 94	800/876-4278
AST Premmia 4/66d Multimedia	123	—	486DX2-66	\$3955	May 94	800/876-4278
AST Premmia LX P/60	22	—	Pentium-60	\$4098	July 94	800/876-4278
Atronics PCI Emerald	64	6	486DX2-66	\$1995	July 94	800/488-7776
ATS AMI Multimedia 486-66	118	—	486DX2-66	\$3995	Feb 94	619/279-1305
AT&T/NCR 3230 Local 8us	151	68	486SX-33	\$1965	Dec 93	800/637-2600
AT&T/NCR System 3230	128	46	486DX-33	\$2265	Mar 94	800/637-2600
AT&T/NCR System 3333	91	—	486DX2-66	\$2895	Jan 94	800/637-2600
AT&T/NCR System 3333	132	59	486DX-33	\$2465	Feb 94	800/637-2600
Austin Genesis 486DX-33	160	65	486DX-33	\$1499	July 94	800/752-1577
Austin P5-66	3	—	Pentium-66	\$3298	Sept 94	800/752-1577

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE
Austin Power System 60	24	5	Pentium-60	\$2258	Mar 94	800/752-1577
Austin Premier 486 System	89	9	486DX2-66	\$1984	June 94	800/752-1577
Axik 486DX2-66PCI	75	13	486DX2-66	\$2198	Mar 94	800/234-2945
Axik 486DX2-66V	119	44	486DX2-66	\$1998	Dec 93	800/234-2945
Axik AceCache 486DX2-66VG	112	35	486DX2-66	\$1995	Feb 94	800/234-2945
Axik AceCache 586-66PCI/MPC	23	—	Pentium-66	\$3999	June 94	800/234-2945
Axik AcePower 586-90V	27	—	Pentium-90	\$3838	Aug 94	800/234-2945
Blackship 8LK 486DX2/50 L8	139	51	486DX2-50	\$1795	Mar 94	800/531-7447
Blackship 8LK 486DX2/66 L8	116	33	486DX2-66	\$1895	Jan 94	800/531-7447
Blackship BLK 486DX/33 L8	159	70	486DX-33	\$1495	Dec 93	800/531-7447
Blackship 8LK P60 L8	71	—	Pentium-60	\$2795	Apr 94	800/531-7447
CAF Master L737 DX2/66	129	58	486DX2-66	\$2100	Jan 94	818/369-3690
Caliber Aspect Smart Weapon 486-66	95	32	486DX2-66	\$2298	Feb 94	800/348-2773
Canon Innova 486v	170	87	486DX2-66	\$2258	Mar 94	800/848-4123
Compaq Deskpro 5/60M	92	—	Pentium-60	\$7000	Jan 94	800/345-1518
Compaq Deskpro XE 433s	130	55	486SX-33	\$2399	May 94	800/345-1518
Compaq Deskpro XE 450	131	56	486DX2-50	\$2449	Sept 94	800/345-1518
Compaq Deskpro XE 466	73	—	486DX2-66	\$3228	Aug 94	800/345-1518
Compaq Deskpro XE 560	31	—	Pentium-60	\$4189	July 94	800/345-1518
Compaq Presario 425	171	83	486SX-25	\$1449	Dec 93	800/345-1518
Compaq Prolinea 4/100	28	—	DX4-100	\$3548	Sept 94	800/345-1518
Compaq Prolinea MT 4/33s	133	28	486SX-33	\$1995	Aug 94	800/345-1518
Compaq Prolinea MT 4/66	82	—	486DX2-66	\$2765	May 94	800/345-1518
Compaq Prolinea Net1/25s	173	86	486SX-25	\$1400	May 94	800/345-1518
CompuAdd C41000	39	—	DX4-100	\$2691	Sept 94	800/627-1961
CompuAdd C433S	135	25	486SX-33	\$1670	Dec 93	800/627-1961
CompuAdd C4660	36	2	486DX2-66	\$2195	May 94	800/627-1961
CompuAdd C4660 Mini-Tower	60	—	486DX2-66	\$2798	June 94	800/627-1961
CompuAdd CP60p	13	—	Pentium-60	\$3407	Sept 94	800/627-1961
Comtrade EISA VL8 486DX2/66	143	62	486DX2-66	\$1795	Dec 93	800/969-2123

Power and Budget Desktop PCs continued

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE NUMBER
Comtrade VLB WinXpress	127	37	486DX2-66	\$1650	May 94	800/969-2123
Cornell Power Pak	156	74	486DX2-66	\$1595	June 94	800/886-7200
CSP 486 Medium Tower	109	30	486DX2-66	\$1995	Mar 94	800/950-6660
DEC DECpc LPv+ 466d2	80	-	486DX2-66	\$2737	Aug 94	800/722-9332
DEC DECpc XL 466d2	49	-	486DX2-66	\$4968	Feb 94	800/722-9332
DEC DECpc XL560 Medium Tower	59	-	Pentium-60	\$4995	Sept 94	800/722-9332
OEC DECpc XL590	8	-	Pentium-90	\$5098	Sept 94	800/722-9332
Oell Dimension 450SV	122	47	486SX2-50	\$2378	Aug 94	800/289-3355
Oell Dimension XPS P90	1	-	Pentium-90	\$3828	July 94	800/289-3355
Dell NetPlex 433/P	155	79	486DX-33	\$2198	Feb 94	800/289-3355
Dell Dmnpix 590	51	-	Pentium-90	\$7469	Aug 94	800/289-3355
Dell OptiPlex 4100/L	47	15	DX4-100	\$2499	June 94	800/289-3355
Oell OptiPlex 433/LV	124	49	486DX-33	\$2289	June 94	800/289-3355
Oell OptiPlex 450s/L	79	7	486SX2-50	\$1957	Aug 94	800/289-3355
Oell OptiPlex 466/MXV	41	-	486DX2-66	\$3020	Apr 94	800/289-3355
Diamond 486C-40 VL	158	61	Cx486S40	\$1400	Dec 93	800/989-7253
Diamond OT 486-66	40	1	486DX2-66	\$1699	Sept 94	800/989-7253
Diamond DT 486DX2-66 VL-SCSI	104	41	486DX2-66	\$2379	Jan 94	800/989-7253
Diamond OT 586-90	26	-	Pentium-90	\$2815	Aug 94	800/989-7253
Dolch A-Pac 586-60C	153	-	Pentium-60	\$9995	May 94	800/538-7506
OTK Feat-33	154	60	Am486DX2-50	\$1595	Mar 94	800/289-2385
OTK Feat-38	110	18	486DX2-66	\$1900	Aug 94	800/289-2385
OTK Grafika-4V2D-S2	161	69	486SX-25	\$1599	Dec 93	800/289-2385
Duracom Multimedia DeskSaver 486/66DX2V	125	-	486DX2-66	\$3223	Apr 94	800/551-9000
Eltech Splendor III	115	53	IBM BL 25-75	\$2499	May 94	510/438-0990
Empac Magnum	35	-	Pentium-60	\$3500	Sept 94	510/226-4732
Epson Endeavor WG 4DX2/66	111	29	486DX2-66	\$2158	Feb 94	800/374-7300
Everex Step VL EISA DX2/66	61	8	486DX2-66	\$2249	Dec 93	800/821-0806
Gateway P4D-66 Best Buy	21	4	486DX2-66	\$2299	June 94	800/846-2000
Gateway P5-60 Best Buy	14	-	Pentium-60	\$2545	May 94	800/846-2000
Gateway P5-66	7	-	Pentium-66	\$3430	June 94	800/846-2000
Gateway P5-90	5	-	Pentium-90	\$3830	July 94	800/846-2000
Hertz 486/D66X2e	140	-	486DX2-66	\$2700	May 94	800/232-8737
Hertz 486/O66X2e Multimedia System	85	-	486DX2-66	\$3995	Feb 94	800/232-8737
Hewlett-Packard Vectra 486/33VL	150	78	486DX-33	\$2298	Mar 94	800/322-4772
Hewlett-Packard Vectra VL2 4/100	37	-	DX4-100	\$2859	July 94	800/322-4772
Hewlett-Packard Vectra VL2 4/50	136	40	486DX2-50	\$1969	June 94	800/322-4772
IBM PS/1 Consultant DX2-66	103	21	486DX2-66	\$2315	Feb 94	800/772-2227
IBM ValuePoint 433DX/Si	168	84	486DX-33	\$1730	Feb 94	800/772-2227
IBM ValuePoint P/60D	9	-	Pentium-60	\$3849	Jan 94	800/772-2227
IBM ValuePoint Performance Series	16	-	DX4-100	\$4168	Aug 94	800/772-2227
Image Microsystems 486DX-33VLB	157	64	486DX-33	\$1495	Mar 94	800/729-3400
Immac Insignia 450SL Home/Office	165	75	IBM 486SLC2-50	\$1598	Apr 94	800/547-5444
Insight PCI P60 CD	54	-	Pentium-60	\$3490	May 94	800/998-8011
Insight PCI P66 SCSI	19	-	Pentium-66	\$3678	Sept 94	800/998-8011

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Insight VL 486DX2-66 MM	107	-	486DX2-66	\$3195	Mar 94	800/998-8011
Intergraph TD-3	105	-	Pentium-90	\$9500	Aug 94	205/730-8301
International Instrumentation Blue Max Business Partner	106	48	486DX2-66	\$2398	Mar 94	800/543-3475
Micro Express MicroFlex-PCI/66	69	23	486DX2-66	\$2480	Apr 94	800/989-9900
Micro Express MicroFlex-VL/Pentium	38	-	Pentium-66	\$4495	June 94	800/989-9900
Micron 4100PCI Magnum	12	-	DX4-100	\$2599	Aug 94	800/438-3343
Micron 466 VL Powerstation CD	43	-	486DX2-66	\$3479	Mar 94	800/438-3343
Micron P6D PCI PowerStation	20	-	Pentium-60	\$4138	May 94	800/438-3343
Micron P90PCI PowerStation	11	-	Pentium-90	\$4599	Aug 94	800/438-3343
MicroSource Tempest 486 PCI	83	-	486DX2-66	\$2685	May 94	800/848-5161
MicroSource Tempest Premier/PCI	66	19	Pentium-60	\$2375	July 94	800/848-5161
Microtech Ultima XVC4/100	34	-	DX4-100	\$4121	Sept 94	404/345-6508
MidWest Micro 486DX2-66	102	14	Am486DX2-66	\$1899	July 94	800/728-8582
MIS M486-33	164	80	486DX-33	\$1750	Feb 94	800/733-9188
MIS M466 PCI	108	43	486DX2-66	\$2373	July 94	800/733-9188
MIS M466T	74	20	486DX2-66	\$1999	Feb 94	800/733-9188
MIS M5P/60	45	-	Pentium-60	\$2700	Sept 94	800/733-9188
MIS Promis SL-66V	96	-	486DX2-66	\$4195	Dec 93	800/733-9188
NEC Image 4100es	6	-	DX4-100	\$3813	Sept 94	800/632-4636
NEC Image 466es	53	-	486DX2-66	\$2998	Jan 94	800/632-4636
NEC Image P60 Pentium	67	-	Pentium-60	\$5395	Mar 94	800/632-4636
NEC PowerMate 466	99	39	486DX2-66	\$2398	Dec 93	800/632-4636
Netis N433VL	138	26	486DX-33	\$1500	Dec 93	800/577-7526
Netis N466VG	97	45	486DX2-66	\$2498	Mar 94	800/577-7526
Netis N486VL Power Station	120	27	486DX2-66	\$1800	Feb 94	800/577-7526
NMC Pro-System 4100	29	10	DX4-100	\$2409	Aug 94	800/424-2983
NMC Pro-System PCI 466	44	-	486DX2-66	\$2750	Apr 94	800/424-2983
NMC Universal Pro-System 466	100	-	486DX2-66	\$3065	Jan 94	800/424-2983
NMC Universal Win-Station	141	38	486DX-33	\$1659	Dec 93	800/424-2983
NuTek Ouet 486DX2/66	142	-	486DX2-66	\$3195	Mar 94	408/973-8799
Packard Bell 486SX/33	169	81	486SX-33	\$1459	Dec 93	800/733-4411
Packard Bell Pentium Computer	33	-	Pentium-60	\$2995	July 94	800/733-4411
Polywell Poly 486-40DX	88	3	Am486DX-40	\$1600	June 94	800/999-1278
Polywell Poly 486-66EV	78	-	486DX2-66	\$3995	Mar 94	800/999-1278
Polywell Poly 486-66VC	101	-	486DX2-66	\$3475	Jan 94	800/999-1278
Polywell Poly 486-66VR	90	22	486DX2-66	\$2095	Dec 93	800/999-1278
Polywell Poly 586-66VLB	30	-	Pentium-66	\$3495	May 94	800/999-1278
Polywell 586-90VIP	10	-	Pentium-90	\$4089	Aug 94	800/999-1278
Quantex Q486DX2/66MM-4	77	16	486DX2-66	\$2259	June 94	800/288-0566
Samsung PowerMaster S0966L	117	36	486DX2-66	\$2159	May 94	800/446-0262
Shasta Prestige Desktop	113	24	486DX2-66	\$1795	Apr 94	510/249-9900
Solmicro Arena IV466	145	72	486DX2-66	\$2199	July 94	510/656-5440
Tagram Concerto HiNote 486DX2-66	114	31	486DX2-66	\$1999	Jan 94	714/258-3222
Tagram HiNote 14	147	57	486DX-33	\$1999	Mar 94	714/258-3222
Tagram TopNote 15	134	66	486DX2-50	\$2349	Apr 94	714/258-3222

September Top 20 systems



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Power and Budget Desktop PCs continued

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE NUMBER
Tandy 3100 Model 10	172	85	486SX-33	\$1479	Mar 94	817/390-3011
Tandy Omni II	144	—	486DX2-66	\$2685	Feb 94	817/390-3011
Tangent Pentium P560	57	—	Pentium-60	\$3043	July 94	800/800-5550
Tangent VL 466	146	63	486DX2-66	\$1895	Feb 94	800/800-5550
Tri-Star 486DX2/66 VL Station	93	—	486DX2-66	\$3159	Jan 94	800/800-2690
Tri-Star 486DX2/66 Tower MPC	98	—	486DX2-66	\$3786	Mar 94	800/800-2690
Unisys PW2 Advantage Plus Model 4666	81	—	486DX2-66	\$5698	Jan 94	800/874-8647
VTech Platinum 486DX2/66	48	—	486DX2-66	\$2995	June 94	800/815-0070

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE NUMBER
Wyse Forte GSV	65	—	486DX2-66	\$3349	Sept 94	408/473-2013
Xinetron X/LAN Station 316 486DX2-50	137	52	486DX2-50	\$1775	Apr 94	800/345-4415
Xinetron X/LAN Station 486DX2/50	163	76	486DX2-50	\$1725	Feb 94	800/345-4415
Xinetron X/LAN Station DX2/66	126	67	486DX2-66	\$2450	Feb 94	800/345-4415
ZDS Z-Station 500	70	—	486DX2-66	\$3048	Aug 94	800/553-0331
Zeos 486DX2-66	17	—	486DX2-66	\$2537	June 94	800/554-5220
Zeos Ambra Model 486SX-25	166	73	486SX-25	\$1391	Mar 94	800/554-5220
Zeos Pantera 66	4	—	Pentium-66	\$3395	June 94	800/554-5220
Zeos Pantera 90	2	—	Pentium-90	\$3595	Aug 94	800/554-5220

THE TOP 20

Power and Budget Mobile PCs

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE NUMBER
Acer AcerNote 780cx	4	—	DX4-75	\$3979	Aug 94	800/848-2237
Acer AcerPower 9000T	—	31	Am486DX2-66	\$2000	July 94	800/848-2237
Acom Patriot 4000	20	—	486DX2-66	\$2780	Sept 94	800/898-2665
Acom VESA-4000	22	—	486DX2-66	\$4250	July 94	800/898-2665
Ambra N/50-340	2	—	DX4-75	\$3199	Aug 94	800/252-6272
Aquiline Hurricane	5	—	486DX2-66	\$5400	Aug 94	518/272-0421
Arche NP-602	59	24	486SLC-33	\$1499	May 94	800/437-1688
Aspen 486 Color SubNote	58	27	486SX-25	\$2295	May 94	800/472-3273
AST Bravo N8 4/33s	36	12	486SX-33	\$2335	June 94	800/876-4278
AT&T 3150 *	64	—	486SX-25	\$2860	Apr 94	800/637-2600
AT&T Globalyst 200 (486DX2-50)	1	—	486DX2-50	\$4105	Sept 94	800/637-2600
AT&T Globalyst 200 (486SX-33)	23	7	486SX-33	\$2700	Sept 94	800/637-2600
AT&T Safari 3180 *	42	—	486SL-33	\$4530	Apr 94	800/637-2600
AT&T Safari 3181 4/50s	14	—	486DX2-50	\$4798	Aug 94	800/637-2600
Austin 466T	15	—	486DX2-66	\$4099	Apr 94	800/752-1577
Blackship 8LK 486/33A NB	48	—	486DX-33	\$3375	May 94	800/531-7447
CAF Aquilite 4SX/120	53	19	486SX-25	\$1396	Apr 94	818/369-3690
Compaq Concerto 4/33 Model 250	29	5	486SL-33	\$2428	Apr 94	800/345-1518
Compaq Contura Aero 4/33C Model 170	12	3	486SX-33	\$2425	July 94	800/345-1518
Compaq LIFE Lite 4/25E	37	—	486SL-25	\$3259	June 94	800/345-1518
Dell Latitude 433C-170	32	—	486SX-33	\$2999	Aug 94	800/289-3355
Dual Group SKD 486 Notebook	52	23	486DX-33	\$1820	Apr 94	800/214 9467
Duracom TravelPro 5110	24	—	DX4-100	\$4050	Sept 94	800/551-9000
Epson ActionNote 4000	62	26	486SLC-33	\$1499	Apr 94	800/374-7300
Ergo SubBrick 486	61	21	Cx486SLC25	\$1579	Apr 94	800/633-1925
Gateway ColorBook DX2-40	13	6	486DX2-40	\$2699	July 94	800/846-2000
Gateway ColorBook DX2-50	7	—	486DX2-50	\$2995	July 94	800/846-2000
Gateway ColorBook DX4-75	3	—	DX4-75	\$3495	Aug 94	800/846-2000
Gateway HandBook DX2-40	35	8	486DX2-40	\$2499	Aug 94	800/846-2000

SYSTEM	POWER RANK	BUDGET RANK	CPU	PRICE	ISSUE REVIEWED	PHONE NUMBER
Hyundai Neuron Lite 425SX	50	14	486SX-25	\$1514	Sept 94	408/894-9764
IBM ThinkPad 355	11	2	486SX-33	\$2099	Aug 94	800/426-7735
IBM ThinkPad 500	16	1	IBM 486SLC2-50	\$1798	Sept 94	800/426-7735
IBM ThinkPad 750C	10	—	486SL-33	\$5499	Apr 94	800/426-7735
IBM ThinkPad 750Cs	17	—	486DX-33	\$3899	June 94	800/426-7735
IBM ThinkPad 750P	30	—	486SL-33	\$4654	May 94	800/426-7735
IBM ThinkPad 750P	34	—	486SL-33	\$3749	July 94	800/426-7735
Identity Select Series	28	11	486DX-33	\$2458	Sept 94	210/820-3070
Intelligent EchoPad 486SX-25	54	16	486SX-25	\$1425	July 94	408/748-9781
Micro Express NB8266	31	—	486DX2-66	\$4449	Apr 94	800/989-9900
MPC 380	18	13	486DX2-66	\$2659	Sept 94	714/724-9000
NEC Versa 75EC	6	—	DX4-75	\$5000	July 94	800/632-4636
NEC Versa E	38	—	486DX2-50	\$5199	Apr 94	800/632-4636
Packard Bell Statesman 200C	55	20	Cx486SLC-33	\$2000	Apr 94	800/733-5858
Packard Bell Statesman 200M	56	17	486SLC-33	\$1495	Apr 94	800/733-5858
Sharp PC-8150	40	15	486DX-33	\$2499	Apr 94	800/237-4277
TI TravelMate 4000E WinDX2/50 Active	19	—	486DX2-50	\$3399	Apr 94	800/527-3500
TI TravelMate 4000E WinDX2/50 Dual	21	—	486DX2-50	\$2800	June 94	800/527-3500
TI TravelMate 4000E WinDX4/75 Active	9	—	DX4-75	\$4999	June 94	800/527-3500
TI TravelMate 4000E WinSX/25 Color	47	10	486SX-25	\$1800	June 94	800/527-3500
Toshiba Portégé T3400	26	4	486SX-33	\$2188	June 94	800/334-3445
Toshiba Portégé T3400CT	25	—	486SX-33	\$3399	Apr 94	800/334-3445
Toshiba Satellite T1950CS	51	22	486DX2-40	\$2499	Apr 94	800/334-3445
Toshiba T4700CT 486 Notebook	8	—	486DX2-50	\$4549	Apr 94	800/334-3445
Tri-Star DesignBook	27	—	486DX2-66	\$4000	June 94	800/800-7668
Twinhead SlimNote 486E 4DX2/66T	43	—	486DX2-66	\$4399	May 94	800/995-8946
Twinhead SlimNote 486E 4SX/33S	44	18	486SX-33	\$2500	Apr 94	800/995-8946
ZDS Z-Lite 486-25	49	9	486SL-25	\$1599	Apr 94	800/553-0331

September Top 20 systems

* Tested but not reviewed.

Paul - Manager/Parent :

"I needed a performance boost for my PC. It took a long time for my charts and presentations to appear on the screen. The colors were flat and limited. And my son's games ran slowly. But, I wasn't ready to buy a whole new system.

"Fortunately, I got great advice.

For just \$299**, I got ATI's GRAPHICS XPRESSION. It revived my whole system.

"My friend had one.

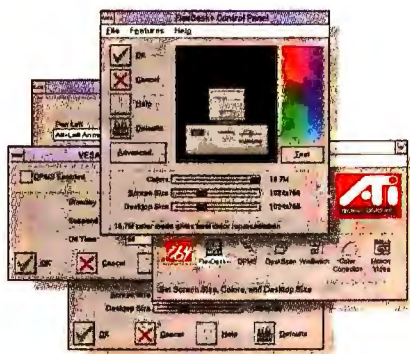
Windows snapped open quickly. Charts popped up on his screen. The *blazing speed*, 37M Winmarks*, was incredible. He said it offered *best value for price/performance*. And the improvement in color graphics and detail were most impressive.



WinSwitch changes color and resolution without leaving Windows

"Then, he showed me the features. WinSwitch allowed him to switch between true color mode or high resolution mode without exiting Windows.

And ATI's FlexDesk+ software gave him *total control* over color, desktop size, resolution and even motion video acceleration.



FlexDesk+ easy control of desktop settings

"Finally, he told me it was the only affordable 64-bit accelerator for my ISA system. I rushed out to buy one.

Installation was easy. There were no switches to set and the software guided me through the installation process. And I was amazed, it even came with a complete set of drivers for Windows, Windows NT, OS/2, CAD and DOS.

"*Best of all, my PC now runs much faster in Windows, DOS and games.* I almost never see that Windows hour-glass. GRAPHICS XPRESSION. At only \$299, it is still great advice."



64-bit Accelerator



Perfecting the PC

ATI TECHNOLOGIES INC.
33 Commerce Valley Drive East
Thornhill, Ontario Canada L3T 7N6
Telephone: (905) 882-2600 ext. 4551
Facsimile: (905) 882-2620
CompuServe: GO ATITECH
76004,3656

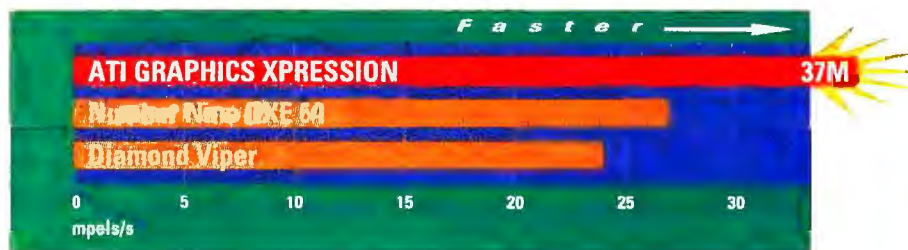
"I got the advice I needed."

GRAPHICS XPRESSION™

- Affordable 64-bit Accelerator
- Fast 37M Winmarks (4.0)
- Best Price / Performance Value
- Instant Windows Mode Switching

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Outperforms other accelerators in Windows and DOS

- Resolutions up to 1280x1024 non-interlaced
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- Comes with enhanced driver support for Windows, OS/2 PM, Windows NT, CAD and DOS
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June 1994
May 1994



June 1993
February 1993
October 1992
November 1992

All ACMA systems listed below come with a 210MB hard drive, 3.5" floppy drive, 14" Non-interlaced SVGA monitor, MS-DOS 6.21, MS-Windows for Workgroups, mouse, 101 enhanced keyboard, ACMA mousepad and more! Call for details.

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A new generation of graphics accelerators promises to kick-start Windows, multimedia, and video. We review 33 boards priced from \$135 to \$599.



SPEED DEMONS

Top Windows Accelerators



Let's face it, Windows is a dog—and not a well-behaved one at that. It sheds megabytes of files onto your hard disk and gobbles up as much RAM as you throw its way. Worst of all, it needs constant attention from your CPU for even the most basic graphics tasks, slowing a fast 486 to a crawl when displaying images, formatting text, and closing application windows. With everything from graphical spreadsheets and word processors to CD ROM-based multimedia titles making greater demands on your system, Windows is definitely a dog in need of a few new tricks.

Now a new generation of graphics accelerators promises to put some sizzle back in your Windows. How? The accelerators take the load off your CPU when you do processor-intensive tasks, such as scrolling through font-filled documents or moving graphic objects across the screen. Best of all, these boards offer better performance than ever, thanks to new hardware technology that opens the pipes for Windows graphics.

If you do a lot of basic Windows work, like word processing and E-mail, a variety of boards costing less than \$200 can put some zip back in your system. Real Windows junkies—those who go further afield into graphical spreadsheets, desktop publishing, and image editing software—will find impressive power for less than \$300 on the street. And for the hard-core graphics hounds—engineers using computer-aided design (CAD) programs and designers working with 24-bit image editors and page layout programs—the new high-end boards boast unprecedented performance.

To help you determine which graphics accelerator is right for your system, we've tested 33 boards using our application-based graphics benchmark—the *PC World* Windows Integrated Test Suite. Developed in conjunc-

By Michael Desmond and Fred Dunn

tion with Jon Peddie Associates, WITS performs real-world tasks using popular Windows applications to reveal the effect these boards have on system-level performance. We installed the boards in a 66-MHz 486DX2 system and ran them under Word 2.0 for Windows, Excel 4.0 for Windows, CorelDraw 3.0, PhotoStyler 1.1, QuarkXPress 3.11, and Freelance Graphics 2.01. Each board's total WITS score lets you compare overall performance, while the application scores let you see which boards work best in the types of programs you use most. Since our March issue, we've used WITS scores to create our ongoing list of the Top 10 graphics boards, which is updated monthly.

But performance isn't everything. Convenience and ergonomic features like simple installation, graphics tools, and easy-on-the-eyes refresh rates can save you plenty of time and aggravation. Some of these boards go further still, adding enhanced video playback that smooths and expands tiny video windows, turning your system into a multimedia powerhouse.

The New Hardware

At the heart of every graphics board is the graphics coprocessor. So when chip makers like ATI, Cirrus Logic, Matrox, S3, Tseng Labs, and Weitek introduced new graphics chips, the performance of accelerator boards jumped. Many of the boards reviewed here use a wide 64-bit path for moving graphics data; the last time we reviewed these products ("Turbocharging Windows," October 1993), only the \$599 Matrox MGA Ultima VL board boasted a 64-bit design. Others employ a technique called interleaving to boost performance of 32-bit chips. Whatever the means, these boards continue to excel at taking over common Windows operations—drawing lines, scrolling text, applying colors to shapes, and moving icons and graphics—so that the system's CPU can spend more time with other tasks. The net results are faster screen redraws and better system performance.

But improved performance costs money. To achieve their speed, all the 64-bit and 32-bit interleaved boards need 2MB of memory—twice what was standard a year ago. As a result, many mainstream boards run at least \$200 on the street.

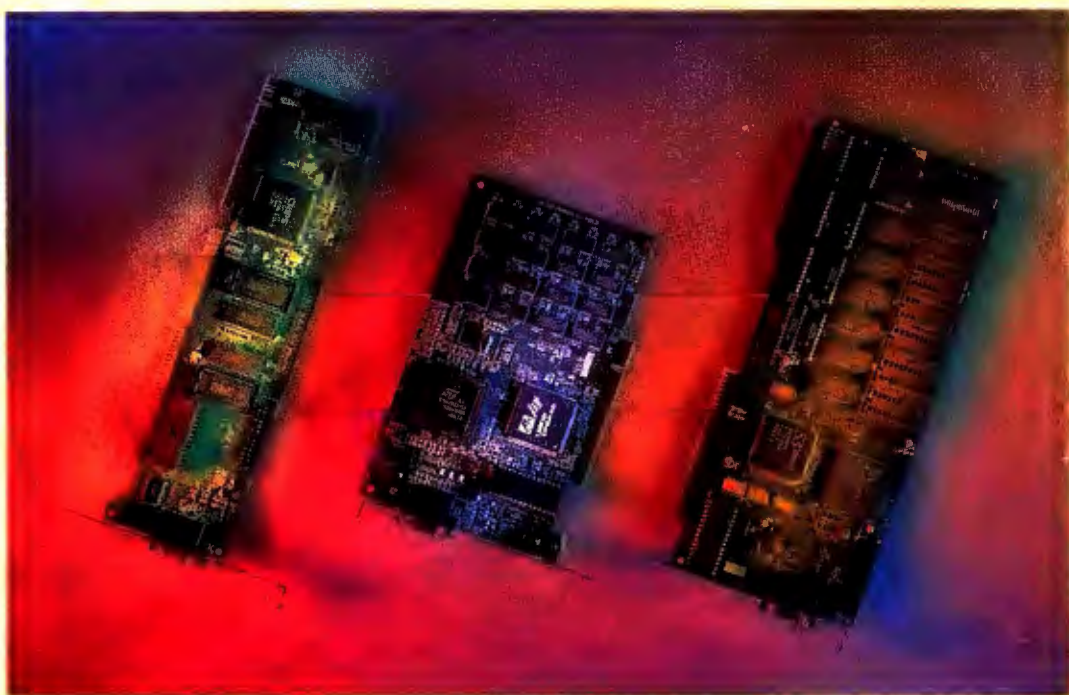
Aside from speed, what will that extra megabyte get you? All but four of the 2MB boards can display 24-bit color (16.8 million colors) at 800-by-600-pixel resolution and 16-bit color (65,000 colors) at 1024 by 768 resolution. That means that everything from image editing programs to multimedia titles can benefit from the more realistic display of photos and images the extra memory offers. By contrast, 1MB boards are limited to 24-bit color operation at 640 by 480 resolution and can't match the speed of their 2MB counterparts.

But there's more to memory than just quantity. Graphics boards use two different types of memory—dynamic RAM (DRAM) and

Best Buys



At the low end, the overachieving Boca Voyager runs away with the prize. Its features are competitive with those of its price peers, yet it performs on a par with boards costing \$100 to \$200 more. For mainstream users, we recommend the ATI Graphics Xpression, which soundly bested its midrange peers and even some expensive VRAM competition. With strong software, good documentation, and built-in enhanced video playback, the Graphics Xpression leapt past the Diamond Stealth 32. For professionals, the Diamond Stealth 64 edges out the Number Nine #9GXE64 Pro and the ATI Graphics Pro Turbo, thanks to its balance of speed, features, and low street price.



BEST BUYS Boca Voyager, ATI Graphics Xpression, and Diamond Stealth 64.

video RAM (VRAM)—that determine capabilities such as performance and refresh rates. The DRAM on a graphics card is essentially the same as the RAM used in your system. It's plentiful and relatively cheap, but it suffers when handling graphics tasks because it has only one port for accepting and releasing data. In intensive operations, DRAM must delay redraws of graphics while it releases data to refresh the screen. High-end boards use the pricier VRAM; it has two ports, so it can accept data from the graphics coprocessor while simultaneously refreshing the screen. Because of this, VRAM boards can more easily deliver very high resolutions and refresh rates, which are vital for professional design, CAD, and document imaging applications.

Finally, we come to the bus question. If you're upgrading, there's really no question at all, since ISA machines take ISA boards, VL machines take VL, and so on. But if you're looking at a new system—and trying to choose between VL and PCI, for example—our testing of identical ISA, VL, and PCI boards shows that PCI models enjoy a slight performance advantage over VL boards. While individual performance varied, PCI boards turned in about a 5 percent lead in system-level performance over VL boards when tested at 1024 by 768 resolution, with a 72-Hz noninterlaced refresh rate, and using 256 colors. ISA trailed VL performance by about 10 percent. The margins varied by application—in our test suite, Freelance and Excel scores varied the most among the different buses. Keep in

mind that higher resolutions and greater color depths increase the data load, causing ISA and VL to lag further behind PCI.

Right Before Your Eyes

All the talk about performance can obscure a key issue: ergonomics. As people spend more time in front of PCs, working with larger 15-inch and 17-inch monitors, the problems associated with screen flicker—fatigue, eyestrain, and headaches—can become more severe. Graphics boards determine the monitor’s vertical refresh rate, which is the number of times per second the monitor’s electron gun repaints the screen.

The Video Electronics Standards Association (VESA), an organization that sets industry standards, recommends a 72-Hz refresh rate (72 repaints per second) at 1024 by 768 resolution, because it makes the display appear stable to most people (though some may perceive flicker at rates as high as 90 Hz). At rates below 70 Hz, many users notice screen flicker—particularly on bright, white backgrounds. In general, people working with larger monitors—17 inches and above—and those who work long hours in front of a display should seek boards offering high refresh rates. While all the graphics boards we examined in this review handle at least 70-Hz

refresh at 1024 by 768 resolution, some go as high as 126 Hz. But remember, your graphics board can do only as much as your monitor lets it: An older 14-inch VGA monitor will simply be incapable of handling 1024 by 768 resolution and 90-Hz refresh. So do yourself a favor—make sure that your hardware is up to snuff before committing to a board.

Not Just Stupid Pet Tricks

Many of the new boards provide sophisticated features. Most products reviewed include Windows-based utilities for point-and-click changes to resolution, color depth, and refresh rate; others offer more sophisticated software. Virtual display utilities store a picture of elements not visible on the screen in board memory, letting you quickly pan over to another spreadsheet or open application. Other features, such as keyboard controls to position and size the monitor’s display, assignable hot keys for enabling graphics functions, and point-and-click zooming, can be especially useful for switching among various apps and screen resolutions.

Some graphics boards cross the line into video by adding hardware enhancement of full-motion video playback. All ATI boards include hardware for expanding video windows and smoothing pix-

TOP 10 Windows 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						Bus type	RAM (MB/type) ¹	Chip/ driver date	Reader service number
					Windows	Excel 4.0 for Windows	CoreDraw 3.0	PhotoWor 1.1	QuarkXpress 3.11	FreeSpace Graphics 2.01				
1	➤	ATI Graphics Xpresslon 905/882-2600	93	\$250	13.4	16.6	13.2	11.6	15.6	4.8	PCI	2 / D	88000CX 4/11/94	684
2	▼	Diamond Stealth 32 800/380-0030	91	\$249	13.6	15.5	13.3	11.5	12.2	6	PCI	2 / D	ET4000/W32p 12/29/93	685
3	➤	Diamond Stealth 64 800/380-0030	90	\$315	13.3 13.5	17.6 17.9	13.9 13.1	11.8 11.2	13.3 12.9	7.6 8.5	PCI VL	2 / V	Vision964 4/1/94	696
4	▼	Boca Voyager 407/997-6227	90	\$145	12.6	13.8	12.8	11.6	14.1	4.6	VL	1 / D	F64300 3/22/94	678
5	▲	Number Nine #9GXE64 Pro 800/438-6463	89	\$356	13.7	16.8	12.9	11.9	15.6	8	PCI	2 / V	Vislon964 4/26/94	700
6	➤	STB LightSpeed 800/234-4334	89	\$259	12.5	14.5	12.6	11.4	14.7	5.9	VL	2 / D	ET4000/W32p 4/10/94	692
7	▼	ATI Graphics Pro Turbo 905/882-2600	88	\$380	13.6	17.9	13.6	11.6	16.2	6.7	PCI	2 / V	88000GX 4/11/94	694
8	▼	Number Nine #9GXE64 800/438-6463	88	\$275	12.8	14.7	10.3	11.5	14.3	6.5	PCI	2 / D	Vision864 4/26/94	690
9	➤	STB Nitro 800/234-4334	87	\$219	12.2	13.4	13.1	12.6	14.7	4.1	PCI	2 / D	GD5434 2/18/94	693
10	▼	Hercules Dynamlite Power VL 800/532-0600	86	\$237	12.7	14.2	12.8	11.3	14.4	5.5	VL	2 / D	ET4000/W32p 12/1/93	687

Methodology Boards were tested on a 486DX2-66 system with 16MB of RAM and 256K of secondary cache. Application scores are the factor by which a board exceeds our baseline system, an unaccelerated ET4000-based VGA adapter on a 386DX-25 with 16MB of RAM. The overall value score combines ratings of overall performance, estimated street price, and product features. For all scores, higher is better.

¹D = DRAM, V = VRAM.

For more information about all products in this table, circle reader service no. 903.

els. The VideoLogic 928Movie goes even further, putting a graphics accelerator chip, a video playback chip, and 16-bit sound capability on a single board. While the 928Movie is unique among products in this roundup, many of the boards will offer video-ready configurations by year-end (see "The Next Step: Full-Motion Video").

In keeping with the "green" movement, all but six of these boards comply with VESA's energy-saving power-down standard, known as the Display Power Management Specification (DPMS). Several boards meeting the DPMS standard include Windows utilities that let you set an interval of inactivity before the board tells the monitor to enter sleep mode. Just be sure your monitor is DPMS ready, since you risk damaging it if your graphics board supports DPMS and your monitor does not.

Driven to Distraction

If you're wondering how similar boards can offer such a wide range of performance and features, look no further than the software that controls them. Graphics boards use highly optimized software programs called *drivers* to handle all communication between your system and the board. Drivers manage resolutions and colors and tell Windows which tasks to dump to the graphics chip.

In general, the better the driver, the better the board. Though chip manufacturers write their own drivers, many board vendors fine-tune them to squeeze out more performance. For example, the STB LightSpeed, based on Tseng Labs' popular ET4000/W32p chip, was a shoo-in for second place in the midrange performance rankings. But its STB-customized driver conflicted with our Freelance test, which kept the board from finishing the test. When STB provided a fixed version of the driver, which the company did not have an opportunity to fine-tune, the board's performance fell to third, behind that of the Diamond Stealth 32. No doubt future versions of the STB board's driver will improve its performance. But poor drivers can result in slow performance, minor glitches, and even system crashes. A bad driver can ruin your whole day.

How can you tell if a vendor has solid, stable drivers for its boards? Get online and ask.

In general, the better the driver, the better the board. Though chip manufacturers write their own drivers, many board vendors fine-tune them to squeeze out better performance.

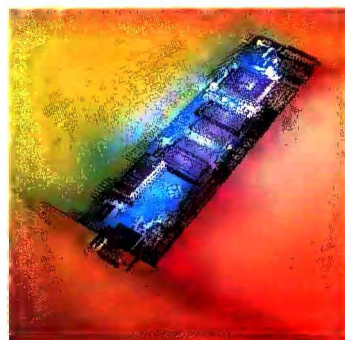
Go to the graphics forums of CompuServe, America Online, and other services and solicit users' experiences with these products. You're likely to see some patterns emerge. Also, keep in mind that larger companies generally have more resources to commit to writing and maintaining drivers, and almost all board vendors release new drivers on a quarterly basis—some even do so weekly or, it seems, daily—to tweak performance, fix bugs, and address hardware and software updates. So chances are, by the time you buy a new graphics board, the drivers inside the shrink-wrap are already one or two revisions old. Our advice: Before you even install the board, log on to the vendor's BBS or online forum and download the latest drivers. If you don't have a modem, you can usually have the vendor send you a free set of update disks.

What's Best for You?

We reviewed 33 boards with street prices under \$600, breaking them into three groups that address the needs of various Windows users. For less demanding users, we tested 5 boards with street prices under \$200. Mainstream business users should check the 14 boards in our roundup that cost between \$200 and \$300 and use inexpensive DRAM. Finally, anyone working with high-resolution, 24-bit color should look at the 14 high-end boards, which rely on fast VRAM and generally cost more than \$300 on the street.

Because each group of boards addresses a different need, we picked Best Buys from each of the three groups. We also added the data from this review to our ongoing Top 10 list of graphics boards, updating previously reviewed products and adding new ones to the list. The Top 10 chart represents our picks of the best all-around boards, as opposed to more specific judging within each group.

Under \$200 Put Some Fire Under Your Text



Best Buy

Boca Voyager (VLB)

Not everyone needs an expensive graphics board. If you do basic Windows word processing and other text-based tasks, any of the DRAM-based 1MB boards in this group will pack enough punch to speed 256-color

displays running at 800 by 600 resolution. But when it comes to performance, the low-end winner is the \$145 Boca Voyager, hands down. It's the best all-around board in this price range, offering outstanding performance, good software, and the lowest price of any board that has broken into our Top 10.

Based on Chips and Technologies' F64300 chip, the Voyager uses a 256K cache to handle most screen refresh duties, freeing its 1MB of DRAM (expandable to 2MB) for updating graphics data. Not only did the Voyager soundly beat its competition with an overall WITS score of 69.42, its biggest leads came in mainline business apps—Excel, WinWord, and Freelance. For business users working with no more than 256 colors, the Voyager is an excellent option.

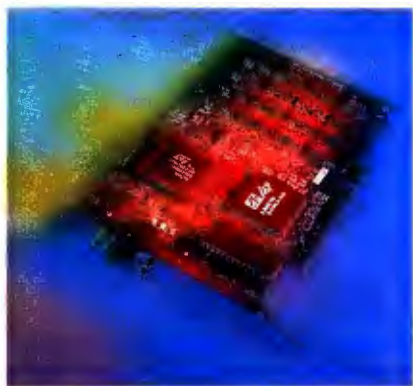
Well behind the Voyager came the STB Express PCI, with a WITS score of 62.41. Based on Avance Logic's ALG2301 accelerator chip, the \$139 Express PCI performed ably under CorelDraw and PhotoStyler but posted a Freelance score of just 1.9, among the worst we've seen. Western Digital's \$139 Paradise VL Plus followed with a WITS score of 60.42. The VL Plus tended to lag in business-related applications. Miro Computer Products' miroCrystal 10SD and Elsa Computer's Elsa Winner 100VL, both based on S3's aging 86C805 chip, simply could not keep pace.

These products also vary in sophistication. While the Boca Voyager's Windows-based installation was simple and intuitive, the routine for selecting a monitor and refresh rate demanded some trial and error. This is not an uncommon problem: Many of these boards left us guessing when it came to selecting monitors and display set-

tings. Both the Paradise VL Plus and the STB Express PCI offered basic installation routines, with Windows-based software for changing resolutions and other settings. And while the miroCrystal 10SD intrigued us with its power-saving DPMS capability, color tint controls, and uninstall feature, we found its toggle switches for setting refresh rates an unacceptable nuisance, particularly since most boards handle refresh setting in software.

\$200 to \$300

Mainstream Boards for Almost Any Task



Best Buy

ATI Graphics Xpression (PCI)

Honorable Mention: Diamond Stealth 32 (PCI and VLB)

What if your computing demands are more eclectic than basic word processing or E-mail? Graphical spreadsheets, low-end CAD, and affordable

paint programs (including those embedded in word processors and spreadsheets) are raising the graphics bar. Fortunately, for less than \$300, users can find boards that deliver high-resolution color, fast refresh rates, and outstanding performance.

All boards in this midrange category use inexpensive DRAM to store graphics data but feature wider data paths to boost performance. Seven of the 14 midrange products we tested employ true 64-bit designs using chips from S3, Cirrus Logic, and ATI. The remaining seven boards rely on 32-bit interleaving—using Tseng Labs' ET4000/W32i and W32p chips—to boost graphics performance by timing accesses to the board's RAM. This scheme lets the boards pour more data down the same pipes.

Our overall pick in this pack is the PCI-based ATI Graphics Xpression. With software tools second only to the Number Nine #9GXE64's, and an aggressive \$250 street price, the Graphics Xpression roared to the top with the best DRAM-based WITS performance we've ever seen. The Graphics Xpression scores in our Top 10 as well, seizing the number one spot from the incumbent—the Diamond Stealth 32 PCI—with an unprecedented value score of 93. The Diamond Stealth 32 still earns mention with its potent combination of performance, software, and price.

When it comes to pure performance, the ATI Graphics Xpression PCI board towers above its midrange competition with a WITS score of 75.07. This board posted the best graphics-oriented score (from CorelDraw, PhotoStyler, and QuarkXPress) and the second best business-oriented score (from WinWord, Excel, and Freelance) in the midrange group and even outran leading VRAM boards such as the Diamond Viper Pro and Matrox MGA Ultima. The other standout was the Diamond Stealth 32 PCI, with a WITS score of 72.23 and the highest overall business-application score of any board in this range. Those with VL systems should consider the Diamond Stealth 32 VL, the STB LightSpeed, or the Hercules Dynamite Power VL, all of which have WITS scores above or near 70 (the Stealth 32 VL scored 69.49).

While most boards fell within 10 percent of the ATI Graphics Xpression in performance, the Hercules Dynamite Pro ISA, Actix GraphicsEngine 64, and miroCrystal 20SD fell just behind the rest. The Dynamite Pro ISA, based on Tseng Labs' W32i chip, no doubt fell victim to its slow bus, but the subpar performance of the Actix and Miro boards (both based on S3's Vision864 chip) is probably the result of unoptimized driver software.

With sufficient performance almost assured, what's to set these boards apart? In a word: features. A foolproof installation routine, intuitive display controls, and useful software (such as pan and zoom capability) can easily save more time than a slightly speedier board. And don't overlook fast refresh rates. If you want to run much higher than 72 Hz at 1024 by 768, check out the PCI- and

The Next Step: Full-Motion Video

Graphics board vendors aren't caught in freeze-frame: Over the next six months, they will embrace full-motion video, offering affordable, enhanced video playback and capture as an installed feature or upgrade on many of their graphics cards. The same companies that build the graphics accelerator chips are creating the video hardware. S3, Weitek, Tseng Labs, and others are touting their chip designs as affordable, ready-made remedies to jerky, postage stamp-size video display. Boards using these chips will be able to expand video to full screen and handle complex color conversions without compromising CPU performance. Best of all, most of these designs are modular, so users can buy a graphics-only board with an open socket and later plug in a chip to add video acceleration.

In general, expect video-capable boards to run \$75 to \$150 more than their graphics-only counterparts.

Emerging standards also promise to add power and functionality. Industry standard maker VESA has developed the VESA Media Channel (VMC), which enables up to 15 simultaneous data sources to connect into a graphics system—a boon for multi-point desktop teleconferencing and complex multimedia presentations. While the VideoLogic 928Movie is the only board in this review to offer VMC capability, VMC-compliant graphics boards, video capture cards, and other peripherals

are under development. Another standard, called the VESA Advanced Feature Connector (VAFC), improves on the current 8-bit, 8-MHz feature connector that's now found on most cards by widening the data path and boosting speed.



VL-based Genoa Phantom 32i and the PCI-based miroCrystal 20SD, which offer refresh rates in excess of 80 Hz.

At the top of the feature heap is the PCI-based #9GXE64 from Number Nine Computer; this board includes the best suite of software we've seen. Its virtual desktop tools let you work with multiple applications and screens, its zoom capability offers detailed views of images, and its programmable hot keys provide useful shortcuts for adjusting the display. Installation was a piece of cake. The #9GXE64 is street priced at \$275.

Not far behind are the PCI and VL versions of the Diamond Stealth 32 and the PCI-based ATI Graphics Xpression, which offer sensible installations, handy graphics tools, and excellent documentation. Finally, the PCI and VL versions of the Orchid Kelvin 64 earn special mention for their network-aware installation routine.

The mainstream boards were easy to install and came with useful software, though some products were rough around the edges. The Actix GraphicsEngine 64's installation suffered from annoying bugs, and the documentation could use proofreading. While several boards include jumpers and switches, their use is limited to rare adjustments such as disabling VGA capability or changing an IRQ.

Over \$300

VRAM Boards Boast Speed and More



Best Buy

Diamond Stealth 64 (PCI and VL)

Honorable Mentions: Number Nine #9GXE64 Pro (PCI), ATI Graphics Pro Turbo (PCI and VL)

For all the performance and features offered by midrange boards, those who rely on 24-bit color

graphics need more—the better performance, higher resolutions, greater color depths, and faster refresh rates of high-end boards. We reviewed 14 boards that cost more than \$300 on the street and use fast, dual-ported VRAM to ensure a steady flow of graphics data to your screen. One exception: The \$290 ATI Graphics Ultra Pro is included here because it's a VRAM card and has been one of the most popular high-end boards over the last two years.

Eight of these products use 64-bit accelerator chips to eliminate performance-sapping bottlenecks. The Number Nine #9GXE64 Pro and Diamond Stealth 64 boards use S3's Vision964 chip, while the ATI Graphics Pro Turbo and Matrox MGA Ultima boards rely on their own 64-bit coprocessors. While we saw some new 32-bit chips—such as the interleaved Weitek P9100 found on the Diamond Viper Pro, and the IIT AGX-016 found on the Hercules Graphite Power VL and VidTech GraphMax L12—they failed to deliver performance on a par with their 64-bit competition.

Our high-end Best Buy is the Diamond Stealth 64, thanks to its low price, fast performance, and strong software. In our test suite, the PCI and VL versions of the Stealth 64 offered nearly identical performance. While both the ATI Graphics Pro Turbo and Number Nine #9GXE64 Pro posted slightly better numbers in the speed

category, neither could match the \$315 Stealth 64 in overall value. After the ATI Graphics Ultra Pro, it's the least expensive board in this group, and it's the highest-ranked VRAM board in our Top 10, slipping into third place just behind the Diamond Stealth 32 PCI.

The \$380 ATI Graphics Pro Turbo, meanwhile, is *the* fastest board we've ever seen. How fast? The PCI version blazed through our WITS test with a remarkable 79.65 score. It clocked the fastest Excel and QuarkXPress times in the review and enjoyed the best graphics-oriented performance of any board we tested. (The VL version of the ATI Graphics Pro Turbo fell about 4 percent behind its PCI twin, for a WITS score of 76.6; its performance in business applications lagged about 7 percent.)

Hot on the ATI board's heels, the Number Nine #9GXE64 Pro posted an overall WITS score of 78.78. Street priced at \$356, the #9GXE64 Pro is

a surprisingly versatile performer, finishing in a second-place tie in business-oriented performance and third in graphics. A top PhotoStyler and third-place QuarkXPress finish make it a good choice for desktop publishers. The Diamond Stealth 64 PCI and VL settled in behind the #9GXE64 Pro with WITS scores of 77.34 and 77.05, respectively. One interesting note: The VL version of the Stealth 64 outperformed its PCI counterpart in mainline business applications.

There were also some losers among the high-end boards. The aging ATI Graphics Ultra Pro boards both suffered in performance; the VL version fell about 20 percent behind the leader, while the ISA version fell about 30 percent. The poor showing of the Graphics Ultra Pro boards—which even lagged behind almost all the midrange boards—is an indication of how much graphics accelerator performance has improved. Just ahead of the ATI boards were the \$340 Hercules Graphite Power VL, the \$320 VidTech GraphMax L12, and the \$500 Matrox MGA Ultima ISA—all of which lagged about 15 percent or more behind the leader.

These boards need to deliver high refresh rates and competitive tools for tasks such as image editing and CAD. Leading the group here is the Number Nine #9GXE64 Pro, with comprehensive display utilities, top-notch documentation, and smooth installation. ATI boards also grabbed our attention with their Windows-based FlexDesk controls and enhancement of full-motion video playback, while Diamond's InControl Tools were powerful as well. Matrox boards, meanwhile, offer an enhanced 8-bit color mode that produces 24-bit-like images, even at 1280 by 1024 resolution. This mode slows performance, but it lets users display high-quality images with just 2MB of VRAM.

If you need the highest refresh rates, consider the ATI Graphics Pro Turbo, Diamond Stealth 64, Diamond Viper Pro, or Number Nine #9GXE64 Pro. All these boards offer at least 100-Hz refresh at 1024 by 768 resolution. The ISA version of the Matrox MGA Ultima also boasts a refresh rate over 100 Hz, though other versions do not. Other boards in this group deliver at least 75 Hz at 1024 by 768.

Fred Dunn is a principal officer of Jon Peddie Associates, a consulting firm specializing in PC graphics technology. Michael Desmond is an assistant editor for PC World.

**The ATI Graphics Pro Turbo
blazed through our tests. It's the
fastest board we've ever seen.**

A dramatic, high-contrast photograph of a cowboy riding a bucking horse at night. The scene is illuminated by a strong, warm light source, likely a spotlight, which creates a bright glow on the horse's back and the cowboy's hat, while the rest of the scene is in deep shadow. The cowboy is leaning forward, holding onto the horse's mane. The horse is in a powerful, bucking motion, with its front legs lifted. A white metal fence is visible in the background, and the ground appears to be dirt. A red rectangular box with white text is overlaid on the lower left side of the image.

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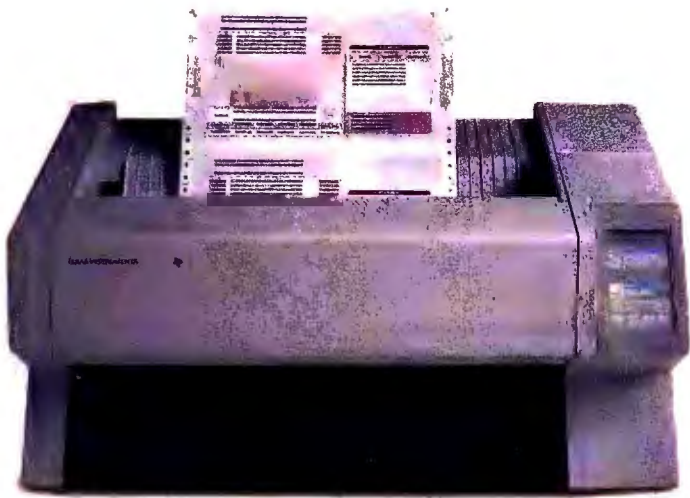
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INSTRUMENTS**

FEATURES COMPARISON

Boca, ATI, and Diamond Dazzle the Windows Desktop

Low-End Boards

Midrange Boards

- Yes
○ No
n/a = not applicable

Standard features

	BEST BUY Boca Voyager	Eisa Winner 100VL	10SD microCrystal	Paradise VL Plus	PCI STB Express
Street price	\$145	\$169	\$135	\$139	\$139
Bus	VL	VL	VL	VL	PCI
Graphics coprocessor	Chips and Technologies F64300	S3 86C805	S3 86C805	Western Digital 90C33	Avance Logic ALG2301
RAM type	DRAM	DRAM	DRAM	DRAM	DRAM
Installed/maximum RAM (MB)	1/2	1/1	1/2	1/2	1/1
Maximum horizontal scan rate (kHz)	60	100	80	58	60
Bit path of chip	32-bit ³	32-bit	32-bit	32-bit	32-bit

	BEST BUY ATI Graphics Xpression	Diamond Stealth 32
Street price	\$250	\$249
Bus	PCI	PCI, VL
Graphics coprocessor	ATI 88000CX	Iseng Labs ET4000/W32p
RAM type	DRAM	DRAM
Installed/maximum RAM (MB)	2/2	2/2
Maximum horizontal scan rate (kHz)	80	80
Bit path of chip	64-bit	32-bit ⁴

Maximum noninterlaced refresh rate (Hz) at

640 x 480	75	75	80	72	75
800 x 600	75	75	80	72	75
1024 x 768	75	75	80	72	75
1280 x 1024	n/a	60	60	n/a	n/a

105	75	90
92	75	90
86	70	75
75	70	75

Maximum colors (bits per pixel) at

640 x 480	16	16	24	24	24
800 x 600	8	16	16	16	16
1024 x 768	8	8	8	8	8
1280 x 1024	n/a	4	4	4	4

32	24	24
16	24	24
16	16	16
8	8	8

Software utilities

Virtual desktop	○	●	●	○	○
VAFC/VMC	○/○	○/○	○/○	○/○	○/○
Full-motion video acceleration	○	○	○	○	○
Windows resolution utility	●	●	●	●	●
DPMS capability	●	●	●	○	●

○	●	●
○/○	○/○	○/○
○	●	○
○	●	●
●	●	●

Non-Windows drivers

OS/2	●	●	●	●	●
NT	●	●	●	●	●
WordPerfect	●	○	○	●	●
Word	●	○	●	●	○
WordStar	○	○	○	○	○
1-2-3	●	○	●	●	●
AutoCAD	●	●	●	●	●
MicroStation	○	●	●	○	○

●	●	●
●	●	●
●	●	●
●	●	●
○	○	●
●	○	●
●	●	●
●	●	●

Service and support

Warranty (years)	5	3	2	3	lifetime
Toll-free technical support	○	●	●	●	●
Fax-back service	●	○	○	●	○
BBS number	407/241-1601	415/615-5862	415/855-9944	714/753-1234	214/437-9615
CompuServe forum	●	●	○	○	●
Phone number	407/997-6227	800/272-3572	800/862-5678	800/568-9272	800/234-4334
Fax number	407/997-0918	415/588-0113	415/855-9004	714/932-6498	214/234-1306
Reader service number	678	679	680	681	682

2	5	5
○	○	○
○	●	●
408/970-3719	905/764-9404	408/730-1100
●	●	●
800/927-5557	905/882-2600	800/380-0030
408/986-1647	905/882-2620	408/730-5750
683	684	685

¹ Street price of VL version \$245.

² Street price of VL version \$260.

³ Cached.

⁴ Interleaved.

FEATURES COMPARISON

Boca, ATI, and Diamond Dazzle the Windows Desktop continued

High-End Boards

● Yes
○ No
n/a = not applicable

	BEST BUY Diamond Stealth 64	Diamond Viper Pro	Hercules Graphite Power VL	Matrox MGA Ultima	Number Nine #9GXE64 Pro	Videologic 928Movie	ViaTech GraphMax L12
Standard features							
Street price	\$315	\$599	\$340	\$442 ¹	\$356	\$449	\$320
Bus	PCI, VL	PCI	VL	ISA, PCI, VL	PCI	VL	VL
Graphics coprocessor	S3 Vision964	WeiTek P9100	IIT AGX-016	Matrox MGA 64	S3 Vision964	S3 86C928	IIT AGX-016
RAM type	VRAM	VRAM	VRAM	VRAM	VRAM	VRAM	VRAM
Installed/maximum RAM (MB)	2/4	4/4	2/2	2/2	2/2	2/2	2/2
Maximum horizontal scan rate (kHz)	82	82	84	82	89	77	78
Bit path of chip	64-bit	32-bit ²	32-bit	64-bit	64-bit	32-bit	32-bit
Maximum noninterlaced refresh rate (Hz) at							
640 x 480	120	120	150	120	150	75	120
800 x 600	120	120	120	120	150	75	100
1024 x 768	100	100	90	90 ³	126	75	80
1280 x 1024	75	80	80	76 ⁴	76	72	72
Maximum colors (bits per pixel) at							
640 x 480	24	24	24	24	32	24	24
800 x 600	24	24	24	24	32	24	24
1024 x 768	16	24	16	16	16	16	16
1280 x 1024	8	24	8	8	8	8	8
Software utilities							
Virtual desktop	●	○	●	●	●	●	○
VAFC/VMC	○/○	○/○	○/○	○/○ ⁵	●/○	●/●	○/○
Full-motion video acceleration	○	●	●	●	●	●	●
Windows resolution utility	●	●	●	●	●	●	●
DPMS capability	●	●	○	●	●	○	○
Non-Windows drivers							
OS/2	●	●	○	●	●	○	●
NT	●	●	●	●	●	○	●
WordPerfect	●	○	○	○	○	●	●
Word	●	○	○	○	○	●	○
WordStar	○	○	○	○	○	○	○
1-2-3	●	○	○	○	○	●	○
AutoCAD	●	●	●	●	●	●	●
MicroStation	●	●	○	●	●	○	●
Service and support							
Warranty (years)	5	5	2	2	5	1	5
Toll-free technical support	○	○	●	○	○	○	●
Fax-back service	●	●	○	●	●	●	○
BBS number	408/730-1100	408/730-1100	510/623-7449	514/685-6008	617/862-7502	617/494-4960	612/633-3301
CompuServe forum	●	●	●	●	○	●	○
Phone number	800/380-0030	800/380-0030	800/532-0600	800/361-1408	800/438-6463	800/578-5644	800/752-8033
Fax number	408/730-5750	408/730-5750	510/623-1112	514/685-2853	617/674-2919	617/494-0534	612/633-9164
Reader service number	696	697	698	699	700	701	702

¹ Street price of ISA version \$500; street price of PCI version \$400.

² Interleaved.

³ ISA version supports 120-Hz refresh.

⁴ ISA version supports 90-Hz refresh.

⁵ PCI version includes VAFC connector.

⁶ Includes separate video chip and audio chip.

For more information about all products in this table, circle reader service no. 904.

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PCI Boards Have the Speed Edge

	Bus type	Word 2.0 for Windows	Excel 4.0 for Windows	3.0 CorelDraw	1.1 PhotoStyler	3.11 QuarkXPress	Freelance Graphics 2.01	Total WITS score
ATI Graphics Pro Turbo	PCI	13.59	17.94	13.61	11.56	16.23	6.72	79.65
Number Nine #9GXE64 Pro	PCI	13.67	16.82	12.91	11.85	15.55	7.98	78.78
Diamond Stealth 64	PCI	13.27	17.59	13.86	11.75	13.26	7.61	77.34
Diamond Stealth 64	VL	13.52	17.88	13.07	11.22	12.86	8.5	77.05
ATI Graphics Pro Turbo	VL	13.57	17.16	13.33	11.07	15.28	6.19	76.6
ATI Graphics Xpresslon	PCI	13.36	16.56	13.17	11.6	15.62	4.76	75.07
Diamond Viper Pro	PCI	13.76	16.72	14.85	11.48	14.33	3.43	74.57
Matrox MGA Ultima PCI	PCI	13.61	17.26	12.66	11.56	14.55	3.69	73.33
Diamond Stealth 32	PCI	13.64	15.54	13.29	11.54	12.21	6.01	72.23
STB LightSpeed	VL	12.53	14.47	12.57	11.35	14.68	5.9	71.5
Hercules Dynamite Power VL	VL	12.72	14.2	12.76	11.34	14.44	5.45	70.91
Genoa Phantom 32i 8900PCI	PCI	12.79	13.38	12.61	11.65	14.79	5.54	70.76
Matrox MGA Ultima VLB	VL	13.41	16.62	11.79	10.93	14.09	3.67	70.51
Genoa Phantom 32i 8900VL	VL	12.4	13.78	12.5	11.44	14.39	5.75	70.26
STB Nitro	PCI	12.23	13.44	13.08	12.55	14.71	4.14	70.15
Number Nine #9GXE64	PCI	12.81	14.74	10.3	11.47	14.27	6.49	70.08
Orchid Kelvin 64 PCI	PCI	11.75	13.45	13.1	12.61	14.58	4.19	69.68
Diamond Stealth 32	VL	13.44	14.19	13.11	11.22	11.99	5.54	69.49
Boca Voyager	VL	12.64	13.77	12.77	11.56	14.05	4.63	69.42
Hercules Graphite Power VL	VL	12.59	13.4	12.37	11.58	14.04	4.32	68.3
Orchid Kelvin 64 VLB	VL	11.8	13.15	13.17	11.7	14.11	4.17	68.1
VidTech GraphMax L12	VL	12.4	13.46	12.54	11.5	13.72	4.26	67.88
Hercules Dynamite Pro ISA	ISA	12.27	13.06	12.55	10.48	13.5	5.25	67.11
Matrox MGA Ultima ISA	ISA	12.69	14.66	11.31	10.98	13.2	3.21	66.05
Actix GraphicsEngine 64	PCI	11.84	13.71	8.84	11.72	13.19	6.33	65.63
ATI Graphics Ultra Pro	VL	12.62	13.4	10.61	11.22	13.17	4.03	65.05
miroCrystal 20SD	PCI	11.92	11.72	8.91	12	12.74	5.46	62.75
STB Express PCI	PCI	11.8	10.78	12.89	11.76	13.28	1.9	62.41
VideoLogic 928Movie	VL	11.83	11.42	10.35	10.94	13.19	4.17	61.9
Paradise VL Plus	VL	11.44	10.54	11.07	11.54	13.13	2.7	60.42
miroCrystal 10SD	VL	10.74	10.25	8.89	11.73	12.12	2.62	56.35
ATI Graphics Ultra Pro	ISA	10.59	11.14	9.44	9.55	11.11	3.64	55.47
Elsa Winner 100VL	VL	10.28	9.83	9.42	10.5	11.57	2.14	53.74

Best Buys in red

Methodology

Boards were tested on a 486DX2-66 system with 16MB of RAM and 256K of secondary cache. Application scores are the factor by which a board exceeds our baseline system, an unaccelerated ET4000-based VGA adapter on a 386DX-25 with 16MB of RAM. WITS scores are the sum of the application scores. Larger is better.

Data based on tests designed by the PC World Test Center in conjunction with Jon Peddie Associates and conducted by Jon Peddie Associates. All rights reserved.

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14355 T4700CS Passive Color w/320MB 3449.
14347 T3400 Mono Subnotebook 1739.
14348 T3400CT Active Color Subnotebook 3419.

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12618 28.8 FM (ext.) 239.95 12619 (int.) 219.95

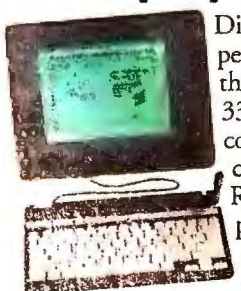
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15364 FaxModem VFX 28.8K (external) ... 229.95

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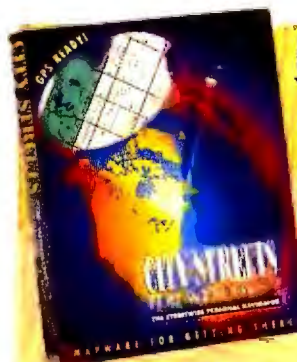
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CONNECTIONS

High-speed fax-modems let you connect to colleagues, hop onto online services, and send faxes in a flash. Our reviewers choose the best of 23 models, with prices as low as \$110.

No business is an island. But if your office isn't well equipped with tools for data and fax communications, you might as well be headquartered in Bora Bora. You already have a phone, and probably a fax machine as well, but have you considered getting a fax-modem?

As more businesses and services get wired, and as electronic mail vies with the phone as the best way to reach busi-

ness contacts, the data functions of fax-modems are expanding exponentially. A fax-modem lets you connect to online services, like CompuServe and America Online; hop onto the information superhighway via the Internet; and hook up to any of the thousands of electronic bulletin board systems that are currently in operation.

In addition to transmitting data, fax-modems also allow you to send and

receive fax transmissions directly from your computer—saving time, paper, and hassle. Instead of first printing out a document and then feeding it through a fax machine, you can send an electronic copy without leaving your desk. Want to send a fax to 20 people? No need to stand at the fax machine feeding and refeeding sheets of paper. A fax-modem can send a document to 20 people as easily as it can to just

BY JEFFREY GORDON ANGUS

1 person. And your recipients get a much clearer copy of the original, even if they have traditional fax machines.

A Multitude of Modems

This review covers 23 fax-modem solutions, complete with hardware and software. All but two are internal cards that fit into a slot in your computer (the Hayes Accura 28.8 V.FC + Fax and the Microcom DeskPorte Fast ES 28.8 connect externally to your computer via the serial port). Most of the internal models are also available in external versions. Of the two external units we reviewed, the Microcom device lacks an internal counterpart, but an internal version of the Hayes Accura 28.8 V.FC + Fax should be available later this year.

All the fax-modems we reviewed can transmit faxes and data at 14.4 kilobits per second (kbps), and eight support data transmission speeds of 19.2 kbps or 28.8 kbps. The 14.4-kbps devices should suffice in most situations, because your transmission speeds will only be as fast as those supported by the fax machine or fax-modem on the other end—and relatively few devices currently support higher speeds. None of the major online services and few BBSes do, and most business fax machines still transmit and receive at 9600 kbps only.

Your initial investment in a 19.2-kbps or 28.8-kbps fax-modem will probably be higher than what you would pay for a 14.4-kbps device. However, these higher-speed units can shuttle the same amount of data in as little as half the time, saving you money on long-distance phone bills—in theory, anyway. The reality is that it can be

difficult to establish higher-speed connections. Because manufacturers have failed to implement the 19.2-kbps and 28.8-kbps speeds uniformly, these fax-modems are sometimes incompatible with each other. The 14.4-kbps devices are more reliable at their top speeds because they are based on the V.32bis specification established by the International Telecommunications Union (ITU), an international standards committee—whereas the 19.2-kbps and 28.8-kbps units adhere to loosely defined protocols

Because manufacturers have failed to implement the 19.2-kbps and 28.8-kbps speeds uniformly, these fax-modems are sometimes incompatible with each other.

(such as V.32terbo and V.fc) established by the individual chip makers.

Despite the numerous drawbacks of high-speed fax-modems, they will serve you well on the Internet and in distributed work groups with remote offices. In a distributed work group, you probably know exactly what kind of fax-modem you're connecting to on the other end; this virtually eliminates compatibility problems and transmission errors. If you want speeds higher than 14.4 kbps for your work group but need to keep costs under \$200 per unit, check out one of the 19.2-kbps models. Street-priced at \$199 and \$135 respectively, the ATI 19200 ETC-I and the Cardinal MVP 192I give you

higher-speed data transmission when communicating with similar V.32terbo units. You may not always succeed in establishing 19.2-kbps connections, but at least you're not shelling out the \$30 to \$165 premium the average 28.8-kbps device commands.

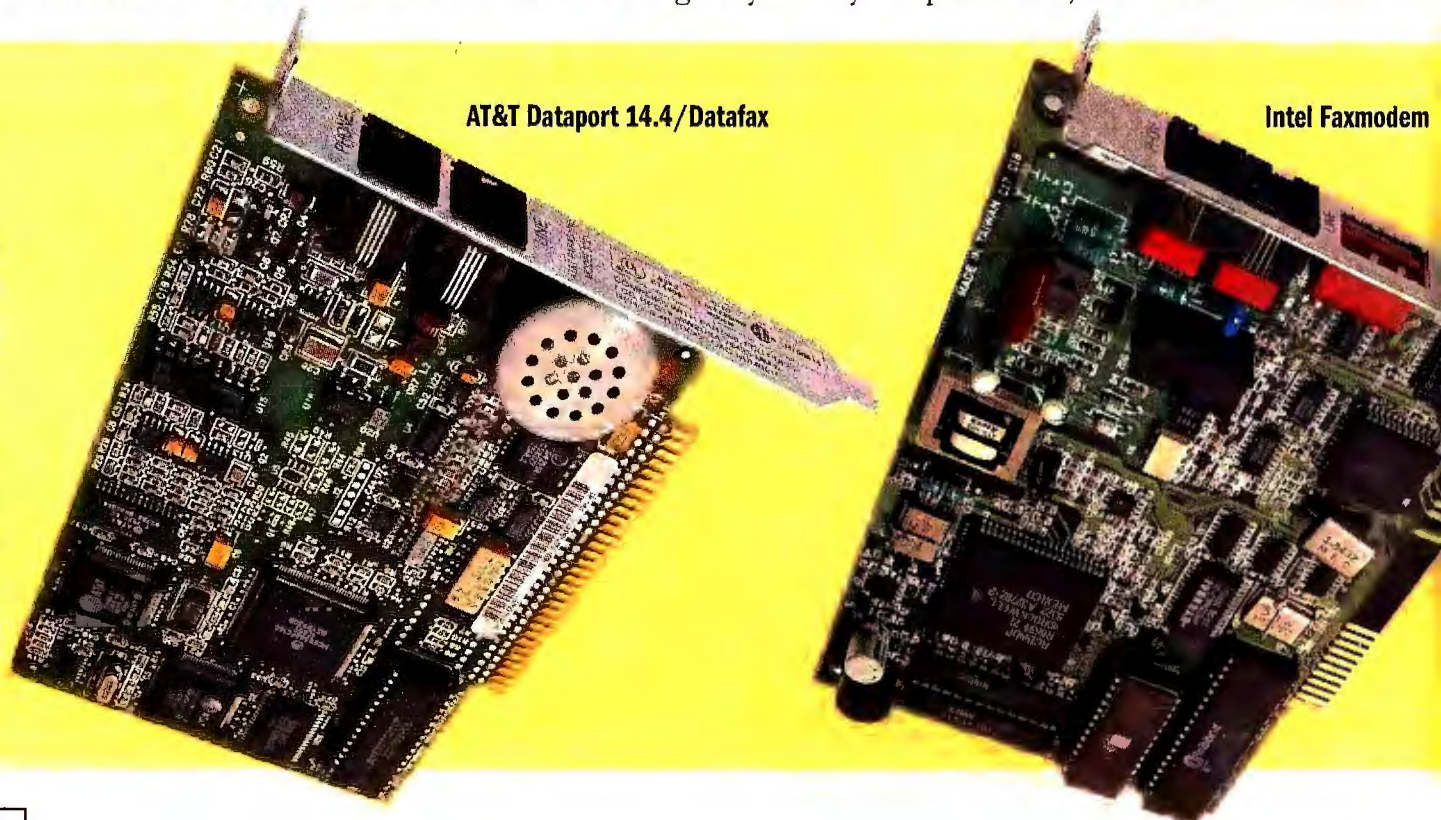
The Internet is so huge that it's hard to know how many of its nodes or local-access providers send and receive data at 19.2 or 28.8 kbps. But there are good reasons to think the faster speeds will quickly be adopted: With an estimated 25 million people currently using the Internet, the number of data transfers is enormous. Also, the most popular front-end software for the Internet, Mosaic, runs best with these higher-speed connections.

All six of the 28.8-kbps fax-modems in this review achieve their high speeds using the V.fast class (V.fc) protocol. However, by the time you read this article, several fax-modem makers, including Motorola, MultiTech, and U.S. Robotics, will be selling fax-modems that adhere to the new V.34 data transmission standard. (A standard is a set of rules for transmission agreed upon by a committee of industry leaders, implemented uniformly by manufacturers to ensure compatibility.)

Like V.fc, V.34 has a maximum speed (without compression) of 28.8 kbps. But since V.34 is a standard, we expect it to supersede the less-robust (and less-than-standard) V.fc protocol. V.34 will also have powerful features that allow it to establish high-speed transmissions more successfully. At press time, few vendors indicated

Best Buys

While many of the fax-modems in this review are good values, only three earn a Best Buy: The AT&T Dataport 14.4/Datafax, Intel Faxmodem, and U.S. Robotics Sportster 14,400 all have low prices, are easy to install and use, and are excellent values overall. All three are 14.4-kbps internal cards.



they would charge a premium for V.34 devices; this fact, combined with V.34's technological advances over V.fc, makes us wary of recommending any of the V.fc devices in this review. Wait and buy a V.34 unit instead—you'll be much happier in the long run. (See the sidebar "V.34—This Fall's Hot Ticket" for more details.)

Getting the Most From Your Modem

All fax-modems come with industry-standard error-control and data-compression features that improve the quality and speed of your transmissions. For

data, they all support V.42 error checking and V.42bis and MNP-5 data compression.

V.42bis compression speeds your data's throughput as much as four times, depending on the type of files you send. Unfortunately, some implementations of V.42bis are incompatible with each other. If you see gibberish on your screen when your machine is receiving data from another modem with V.42bis, you may have to turn off your V.42bis compression.

All the fax-modems in our review also conform to the group III standard used by most fax machines and fax-modems today. This means they can communicate with virtually any other fax device.

Bargains Abound

You'll be glad to know that even the fast fax-modems are relatively cheap. All mod-

Installing an Internal Fax-Modem

Before installing an internal fax-modem, make sure to take the following steps.

✓ **Choose the right COM port and IRQ (interrupt request) line before you install the fax-modem card. You don't have to understand the nuances of these terms, but there are a few rules to follow: Read the installation instructions, don't automatically ac-**

cept the vendor's default, and choose a COM port and, ideally, an IRQ that are not being used by another device. Normally, the COM1 and COM3 ports share IRQ 4, and COM2 and COM4 both use IRQ 3.

✓ **In the Windows Control Panel, open Ports, then the COM port to which you've assigned the fax-modem. You need to confirm that the port's baud rate setting is at 19.2**

kbps (if your machine supports this) or at 9600 bps.

✓ **When you install the bundled software or use your existing fax and data communications programs, check to see that their fax-modem and port settings match those of your equipment. If the software lets you change the initialization string, consider looking through the documentation to figure out what might work better.**

els in this review were selling for \$300 or less on the street at press time—and will probably cost even less by the time you read this article. Internal cards tend to be least expensive; among these, the 14.4-kbps fax-modems are generally the most economical, starting as low as \$110 for the Digi-com Systems Connection 14.4 DF. The 28.8-kbps devices go for \$219 to \$300.

If you're willing to spend the extra \$20 to \$80 vendors charge for external versions of the internal fax-modems in this review, you'll get a few benefits, such as easier installation (since the external units simply plug into the serial port) and the ability to move the device easily among computers—an important consideration for work groups in which not every user has a fax-modem. Also, external units have lights and LEDs that can provide useful information about the status of your transmissions.

But before you buy an external, check to see if your PC has the 16550 UART (Universal Asynchronous Receiver Transmitter), a serial device component that converts the incoming fax and data transmissions into a format the computer is capable of understanding, and that allows fast transmission through the serial port.

Look to the Future

Another factor you should consider before selecting a fax-modem is its compatibility with software. While all products in this review come with bundled software, the packages tend to be stripped-down versions of their full-featured retail counterparts. If you use your fax-modem often, you may eventually find yourself shopping for more-robust stand-alone software. (See our August review of fax software, "PC Faxing: Convenient, but...", for the best stand-alone packages.)

Before you buy a new software package, make sure it's compatible with the fax-modem you already own. The relevant classifications for fax-modem and software compatibility are Class 1, Class 2, and CAS. Class 1 fax-modems rely on your system's CPU to negotiate connection speeds, repaginate files for transmission, and perform many other functions. Class 2 devices perform most functions without involving the CPU, allowing smoother background operations in Windows. CAS, a protocol developed by Intel and used in its SatisFaction Modem/400, takes even more of the processing burden off the CPU. While Intel is the main company using this standard, you'll have no trouble finding software that supports CAS.

The Best of the Bunch

We selected our Best Buys based on a balance of price, speed, ease of use, features, and service and support policies. Three products stood above the rest: AT&T's DataPort 14.4/Datafax, Intel's Faxmodem,

U.S. Robotics Sportster 14,400



and U.S. Robotics' Sportster 14,400. Both the AT&T and the Intel devices were extremely easy to install and use. The reasonably priced \$149 AT&T DataPort model comes with a lifetime warranty, toll-free technical support, and a very good feature set, including small niceties such as a speaker that automatically lowers its volume after establishing a connection so you don't have to listen to modem hisses.

The \$129 Intel unit stands out for its low price and easy installation, which even novices can perform without a hitch, thanks in part to its ability to automatically find an available COM port and IRQ setting (IRQ stands for *interrupt request*, a signal from a device requesting the CPU's attention). The \$119 U.S. Robotics device offers a low price, excellent ease of use, and an intelligently customized software bundle.

Two other products deserve honorable mention. Cardinal's MVP 192I, with its great warranty (\$20 after the first year to extend it to lifetime), 19.2-kbps data speed, and \$135 street price, is an excellent value for distributed work groups. The unit's complicated setup kept us from awarding it a Best Buy, but its price-and-performance ratio is hard to beat. Computer Peripherals' Viva 14.4i Internal Modem, aggressively

priced at \$119, offers terrific ease of use but lacks Windows data comm software.

The Slings and Arrows of Installation

Installing an internal fax-modem may not seem complex at first—just plug in the card, run a cable from the card to your phone outlet, and optionally plug your phone into the card so you can use one line for both voice and data. Sounds simple, eh?

It's not. An internal fax-modem needs a designated COM port and uses an IRQ to communicate with the computer and software. Over 99 percent of the computers sold today already have a COM port installed (which the machine thinks of as COM1), and about 80 percent have a second one (COM2). Many users have a serial mouse plugged into one of the COM ports.

Many fax-modem vendors assume you haven't already dedicated your second port, so their products come with a factory default to COM2—you may have to change this default. The GVC 14.4 kbps Fax Modem assigns COM1 as the default port—quite an illogical assumption, considering that virtually every computer's COM1 is

already assigned to a mouse or other device.

Installing these products can be difficult for less experienced users. Documentation often doesn't explain the installation procedure adequately. For example, while the manual for the Zoltrix Platinum Internal 14.4 had some beautiful explanations of COM and IRQ, it fumbled on the one-yard line, with a table that transposed the switch

Installing these fax-modems can be difficult, thanks to documentation that often doesn't explain the procedure adequately.

assignments of COM2 and COM3. Such inaccuracies often lead to trial-and-error methods of installation.

Ideally, the installation procedure should have clear instructions, with explanations and illustrations of COM and IRQ settings that you can read on the fax-modem card itself. And the vendor should provide an installation utility that automatically senses which COM ports are occupied and suggests one for your fax-modem card. Of the 23 devices we reviewed, just one—the Intel

Faxmodem—met our standards for clear installation instructions. The runners-up in this area were AT&T's DataPort 14.4/Datafax, Boca Research's Boca-Modem V.Fast Class Internal, U.S. Robotics' Sportster 14,400, and Computer Peripherals' Viva 14.4i Internal Modem.

Installation of the 28.8-kbps V.fc fax-modems requires some forethought. These units can outrun some of the newest high-speed computers and cause a veritable core meltdown of the fragile communications driver (COMM.DRV) that Microsoft includes in Windows. And the two external 28.8-kbps models from Hayes and Microcom both require a serial port equipped with a 16550 UART, which enables your system to keep up with their astronomical data speeds. If your PC doesn't already have a 16550-controlled serial port—and about half the

V.34—This Fall's Hot Ticket

Both V.34 and V.fc send and receive data at 28.8 kbps—the fastest uncompressed data speed currently available. But V.34 promises to provide more-reliable high-speed transmissions than V.fc.

First, V.34 is soon to become an official standard approved by the International Telecommunications Union, a committee that is made up of representatives from many modem companies. As a result, V.34's specifications are more rigorously defined than those of V.fc, which reduces the risk of incompatibility among devices from different manufacturers.

The second advantage of V.34

is its technological superiority. V.34 devices will have the ability to test for line conditions both before and during transmission—dynamically adjusting transmission rates as needed.

By the time you read this article, V.34 devices should be available from Motorola, Multi-Tech, and U.S. Robotics. Street prices for units from these early birds will be relatively high—probably between \$400 and \$500, according to the vendors' estimates.

You'll save money if you wait a little longer for the second wave of V.34 devices before the end of the year. Best Data, Cardinal, Microcom, Supra, and Zoom all are planning to sell V.34 de-

vices, with street prices starting at \$200. PCMCIA fax-modem maker Megahertz also plans to ship a V.34 device this fall; at press time, the company had not set a price.

So why not just buy a V.fc device now and upgrade to V.34 later? Because while all the V.fc devices in this review offer upgrade paths to V.34 for less than \$100, you can wait until later this year and buy a V.34 unit without having to bother with an upgrade or pay a premium. Unless you absolutely need a low-cost 28.8-kbps device right now, you're much better off waiting for V.34. • *Multi-Tech; 612/785-3500.*

—Anita Hamilton

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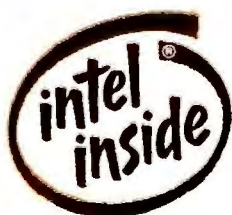
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Circle 83 on reader service card

Before You Buy a V.fc Modem—A Checklist

Follow these general guidelines if you're converting to a 28.8-kbps V.fc fax-modem and want to feel the wind in your hair on a regular basis.

✓ You should use your fax-modem only on a 486DX-33 PC or better. Overwhelmed systems often freeze up and have to be rebooted.

✓ Either use an internal fax-modem or make sure your external model is connected through a serial port that uses a 16550 UART. About 50 percent of even the high-speed 486DX and Pentium systems sold today use the lower-end 8250 UART, which will almost certainly fall with a 28.8-kbps fax-modem working at its normal speed. You can buy a serial port that's equipped with a 16550.

To see which UARTs your system has, invoke the DOS program MSD (Microsoft Diagnostics) from the directory that DOS

resides in. Press C (for COM ports), and the UART type for each port appears near the bottom of the screen. Once you have the right UART installed and running, make sure you include the line COMx FIFO = 1 in your SYSTEM.INI file, substituting for x the number of the serial port in which your fax-modem is located.

✓ Consider using DOS-based fax and data programs. They often work better at high speeds than those based on the high-overhead Windows environment. If you're committed to Windows, buy a third-party serial port driver to replace the fragile native Windows driver. The most lauded replacements are TurboCom/2 from Pacific CommWare, and the same company's higher-end TurboCommander, which combines the 115.2-kbps drivers with serial diagnostic utilities. • Pacific CommWare; 503/482-2744. Reader service no. 789

486 and Pentium systems currently sold don't—you can buy one at any computer store for \$65 and up.

You Ain't Doin' Much Without Software

Most performance variables for fax-modems fall into two areas—your software and your phone line, both of which affect data throughput and, far more significant, your productivity. While you can't do much to change the phone lines, you can pick the right software. All the units come with bundled fax software, and all but two have a data communications package. Windows packages are most common, although many modems come with DOS software.

QuickLink II Fax from Smith Micro Software, WinFax Lite from Delrina, and FaxWorks from SofNet are the most common bundled fax packages; QuickLink II Fax and Comit are the most prevalent data communications programs.

Fax Software

All the fax software bundles let you create and send a quick fax memo, add a cover sheet with address information, receive a fax and turn it into a bit-map file in a common (or convertible) format, store frequently dialed fax numbers, and send the same

fax to several people in one step. You can also send a fax from within an application, transmit it at a scheduled time, and manage incoming and outgoing fax files by sorting and filtering them.

QuickLink II Fax is bundled with the fax-modems from AT&T, Best Data, CMS Enhancements, Computer Peripherals, Practical Peripherals, U.S. Robotics, and Ven-Tel. This package may be the best of the lot for those planning to use both data and fax capabilities. While it is not particularly feature-rich, versions 1.3 and later are easy to use and include the most critical features for handling both fax and data communications.

QuickLink II Fax's interface is set up with large, easy-to-understand buttons that replicate the key features of the menu command set. The program does a good job of keeping the data and fax functions separate. Each has its own phone book, which is fairly easy to set up. The phone books support simple sending groups (for example, click once to send the same fax to a defined set of numbers), but they offer no search function and no multiple-sort capabilities—you

can sort only alphabetically by first word.

QuickLink II Fax's fax-management capabilities are rudimentary, but they work, once you get used to the odd naming conventions for the bit-map files. You can view a fax image either from the program, or by using an external module that has its own icon. During transmission, a small window shows your fax's progress. It tells you how much time has passed and flashes LED indicators as though you were using an external fax-modem.

Delrina's WinFax Lite is bundled with the Computer Peripherals, Digicom Systems, GVC, Intel, and Zoom units. WinFax Lite is the junior version of WinFax Pro, the most popular fax program in the world and winner of a Best Buy in August's fax software review. As a dedicated fax program, it has more fax features than QuickLink II Fax. Its smart installation process automatically recognizes which COM port holds a fax-modem. But unless specially configured by the device's manufacturer, it doesn't automatically install the right model; you have to choose this from a list.

Sending a fax and scheduling transmissions is fairly simple with WinFax Lite. Although the array of choices may confuse novices, experienced users will appreciate the added flexibility. An easy-to-understand button-based module, the Administrator, acts as your fax control panel. WinFax's



THE 14.4-KBPS MODEMS, such as the Viva 14.4i from Computer Peripherals, are hot sellers, according to industry analyst Lisa Pelgrim of Dataquest.

phone books are robust, allowing you to add comments to each name, group names in multiple ways, and import ASCII files.

Managing unsent and received faxes is straightforward. The program's list of one-line abstracts will usually suffice, but you can attach additional details by double-clicking an entry. While WinFax Lite is a



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SideBar eliminates the last bit of DOS clunkiness from MS Windows.

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idea incorporated in Microsoft Office, but we've taken it to its obvious conclusion.

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Circle 189 on reader service card

Online Services Edge Into the 14.4-kbps World—Slowly

You thought you'd be able to race along the information superhighway—but think again. At press time, only CompuServe had a significant number of 14.4-kbps connections for subscribers. Here's what the rest of the services offer, and what they plan in the coming year:

America Online (AOL)

AOL has 9600-bps access almost nationwide and plans to have limited 14.4-kbps service by the end of the year. • *America Online*; 800/827-6364. Reader service no. 801

CompuServe

At press time, this giant offered 14.4 kbps in over 70 locales, including most major

metropolitan areas. Normal connection is at 9600 bps; users can connect at 2400 bps without a surcharge. • *CompuServe*; 800/848-8990. Reader service no. 802

Delphi Internet Services

Delphi's normal connect speed is 9600 bps; callers in the Boston area can connect at 14.4 kbps. By early fall, Delphi expects to have 14.4-kbps service in New York, Los Angeles, Chicago, and Atlanta. • *Delphi Internet Services*; 800/695-4005. Reader service no. 792

GEnie

GEnie's customers are split between 9600 bps and 2400 bps. The company claims to

be looking into higher-speed connections, but won't commit to any specifics. • *GEnie*; 800/638-9636. Reader service no. 793

MCI Mail

Unlike most services, MCI Mail charges by the byte, so high-speed connections won't shrink your bill. The highest connect speed available to most users is 9600 bps. • *MCI Mail*; 800/444-6245. Reader service no. 794

Prodigy

Prodigy offers about 90 percent of its users 9600-bps lines. The company expects to introduce 14.4-kbps lines this year in certain areas yet to be specified. • *Prodigy*; 800/776-3449. Reader service no. 804

good offering, serious fax users will probably want to upgrade to Delrina's higher-end WinFax Pro.

FaxWorks, the ease-of-learning champ from SofNet, comes bundled with the fax-modems from ATI, Boca Research, Cardinal, Data Race, Hayes (the Accura 144B +), and Microcom. The more advanced version, FaxWorks Pro, won a Best Buy in our August review of fax software. But ease of learning doesn't necessarily imply ease of

make of the device and checks the phone line for a dial tone. FaxWorks' detailed setup screen may send users to the product's excellent online help.

FaxWorks' "cue cards"—informative pop-up descriptions of functions—make sending a fax easy. Whenever your mouse cursor rests momentarily over an action area (such as a button), a big, colorful cue card pops up. It's easy and straightforward to schedule or repeat a fax transmission, though there's

no simple way to edit an existing fax to send to another person. And FaxWorks' phone books conveniently let you enter many details.

The package really shines in adding annotations, such as lines, circles, rectangles, and text, to a fax. The built-in viewer function contains all the drawing tools you'll need, so you can receive a fax, mark it up, and send it back in minutes. FaxWorks also has a gray-scale display option that makes faded transmissions more readable.

FaxTalk, from Thought Software, comes with the Motorola and Supra. It's a solid package with good documentation that makes it relatively easy to use. Bit Software's BitFax, which comes with the Zoltrix model, is rather ordinary. While it competently does everything the other programs do, neither its interface nor its documentation are particularly good. Bit-

Fax's higher-end counterpart, BitFax Professional for Windows (reviewed in August's fax software review), is a solid upgrade.

Hayes's SmartCom Fax, bundled with the Hayes Accura 28.8 V.FC + Fax in this review, gives you excellent tools to improve the readability of incoming faxes.

Data Communications Software

For data communications, Tradewind Software's Comit competes with QuickLink II Fax as the most common offering. It's bundled with devices from ATI, Boca Research, Cardinal, Data Race, GVC, Intel (Faxmodem only), Supra, and Zoom. Comit is an unimposing and fairly easy-to-learn program that makes data communications as reliable as possible. It comes with the usual features—such as phone and configuration lists and the ability to alter settings—and its data communications features are better than those found in QuickLink II Fax.

Hayes's Smartcom LE is a serviceable product with basic online and BBS features. Mustang Software's DOS-based Qmodem, bundled with the Digicom Connection 14.4 DF, is designed for experienced modem users. If you're not interested in learning modem configurations, you'll want to avoid it. But if you're willing to learn, you'll find Qmodem a highly reliable package that can get you working faster than the more user-friendly Windows offerings.

DCA's Crosstalk Communicator for DOS



MODEMS THAT ARE CAPABLE OF transmitting data at 19.2 kbps, such as this ATI 19200 ETC-I device, are called V.32terbo modems.

use—you may figure out this product more quickly than the others, but it isn't any simpler to use on a daily basis.

FaxWorks has the most intelligent installation process of all the programs: It not only tries to find out which port the fax-modem is on, but it attempts to identify the

THE FIRST RULE OF WINDOWS IS REAL ESTATE, REAL ESTATE, REAL ESTATE.



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is bundled with Intel's SatisFax-tion Modem/400. It offers a few aesthetic bells and whistles (literally—you can have it play Beethoven's Fifth as an alarm), but it's no piece of cake to learn. Still, Crosstalk is more program-mable than other comm pack-ages—an ability you'll appreci-ate over time.

Performance: Not by the Numbers

To test performance and data compression on each class of fax-modem (14.4, 19.2, and 28.8 kbps for data; 14.4 and 19.2 kbps for fax), we sent five types of data files and two types of fax transmissions across normal phone lines. The 28.8-kbps devices transferred data at a rate about twice as fast as that of the 14.4-kbps units, and the 19.2-kbps devices were about 20 percent speedier than the 14.4-kbps units. Actual throughput depended on the type of file sent; database files (in dBASE format) were the most compressible, followed by text files, executable files (in DLL format), image files (in TIFF), and ZIP files. Since ZIP files are already compressed, the modems were unable to compress them much further.

Our tests showed that the most successful compression occurred with the 14.4-kbps devices, which compressed files down to as



THE 28.8-KBPS V.FC DEVICES, such as this Hayes Accura, face some stiff competition from the new V.34 devices that are just hitting the market.

little as one-quarter of their original size, depending on the type of file (in some cases compression did not change file size at all). At maximum compression, the 19.2-kbps devices squeezed files to one-third their

Modems to Go

Notebook users, despair not: You have plenty of options. The portable cousin of the internal desktop model is a PCMCIA fax-modem card, and the external equivalent is the pocket fax-modem. There are 28.8-kbps V.fc pocket units, and many 14.4-kbps pocket and PCMCIA fax-modems.

As its name implies, a pocket fax-modem can fit into your pocket and weighs less than a pound. Pocket units are durable and travel well, but require external power. Several companies in this comparison sell

pocket fax-modems: Boca Research, Computer Peripherals, Megahertz, and U.S. Robotics all offer 14.4-kbps units with street prices in the \$240 to \$340 range, and Microcom and Practical Peripherals sell 28.8-kbps models from about \$400 on the street.

The early promise of PCMCIA has been darkened by its fragility and compatibility problems: Standard PCMCIA cards don't all work in manufacturers' standard slots, and the cards often fail. PCMCIA fax-modems compound the fragility concerns, because the connection be-

tween the credit-card-size fax-modem and the wall socket is tenuous. But people will trade these problems for PCMCIA's terrific portability. You can buy a 14.4-kbps PCMCIA card from Boca Research, GVC, Hayes, Intel, Megahertz, Motorola, Supra, Ven-Tel, or Zoom for a street price of \$250 to \$300. Smart also plans to sell a 28.8-kbps V.34 PCMCIA card for a street price of \$425, to be available by the time you read this article. • Megahertz; 800/527-8677. Reader service no. 796 • Smart Modular Technologies; 800/536-1231. Reader service no. 797

original size, and the 28.8-kbps units to just under one-third. The fastest effective throughput, which we attained sending a dBASE file on a 28.8-kbps device, was just 80 kbps—nearly one-third slower than the 115.2-kbps peak speeds (four-to-one compression) claimed by many vendors of 28.8-kbps fax-modems.

As for fax capabilities, the 14.4-kbps units took 1 minute to send either one and a half pages of text or one page of mixed text and graphics. The ATI 19200 ETC-I is the only unit we tested that can send faxes at 19.2 kbps, which translates into 2.1 pages of text per minute, according to our tests.

We also conducted informal tests to see whether these devices could reliably achieve their claimed data speeds in real-world situations. To test data transmission on the 14.4-kbps models, we logged on to a local BBS that supports that speed. For the 19.2-kbps and 28.8-kbps models, we made long-distance calls into PC World BBSes set up at those speeds. While all the 14.4-kbps units connected at their

claimed speeds, results on the 19.2-kbps and 28.8-kbps devices were inconsistent. Of the six 28.8-kbps units, four connected at 28.8 kbps and two at 21.6. The 19.2-kbps ATI connected to our 19.2-kbps BBS at just

14.4 kbps, but the 19.2-kbps Cardinal Technologies unit lived up to its claimed speed.

One reason for the varying performance among both the 19.2-kbps and 28.8-kbps units is the inconsistent matchup of configuration options. If different modems are configured to take advantage of different features, they may not always work together at their highest speed.

In all fax-modems, the software sends a message, called an *initialization string*, that configures how the modem establishes connections with other modems. Software designers show varying levels of aggressiveness in what they put into the initialization strings. Some simply use the factory defaults, while others configure every aspect of communications.

If you think your initialization string may be causing a performance problem, call the fax-modem maker's tech support line for an alternative string. If you think the problem lies in the configuration of the modem at the other end, ask its owner how it's configured and try to match your configuration settings to those. A warning, however: Implementation of the standard Hayes command set varies, so an identical command set sent to two modems can result in different configurations.

There are other reasons you may not obtain vendors' claimed speeds on 19.2-kbps and 28.8-kbps devices. For example,



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Circle 132 on reader service card

FEATURES COMPARISON

Low-Cost Fax-Modems: A Myriad of Choices

	ATI 19200 ETC-I	BEST BUY AT&T DataPort 14.4/Datafax	1442F The Smart One	Best Data Products V-Fast Class Internal	Boca Research BocaModem	Cardinal Technologies MVP 192I	CMS Enhancements FM-144HVBis	Computer Peripherals Viva 14.4i Internal Modem	Data Race RediCard	14.4 DF Digicom Systems Connection	GVC 14.4 kbps Fax Modem
Standard features											
Type	internal	internal	internal	internal	internal	internal	internal	internal	Internal	internal	internal
External model available	●	●	●	●	●	●	○	●	●	○	●
Estimated street price as of 5/1/94	\$199	\$149	\$118	\$229	\$135	\$169	\$119	\$189	\$189	\$110	\$129
Speed											
Fax (kbps)	19.2	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
Data (kbps)	19.2 V.32terbo	14.4	14.4	28.8 V.fc	19.2 V.32terbo	14.4	14.4	14.4	14.4	14.4	14.4
Bundled software											
DOS											
Fax	none	QuickLink II Fax	QuickLink II Fax	FaxWorks	FaxWorks	QuickLink II Fax	QuickLink II Fax	FaxWorks	none	DOSFax Lite	
Data	none	QuickLink II Fax	QuickLink II Fax	Comit	Comit	QuickLink II Fax	QuickLink II Fax	Comit	Qmodem	Comit	
Windows											
Fax	FaxWorks	QuickLink II Fax	QuickLink II Fax	FaxWorks	FaxWorks	none	WinFax Lite	FaxWorks	WinFax Lite	WinFax Lite	
Data	Comit	QuickLink II Fax	QuickLink II Fax	Comit	Comit	none	none	Comit	none	Comit	
Upgradability											
Software	○	○	○	○	○	○	○	○	○	●	○
Hardware	○	●	●	●	○	○	○	●	○	○	○
Replacement	○	●	○	○	○	○	○	○	○	○	○
Fax operation class											
Class 1	●	●	●	●	●	●	●	●	●	●	●
Class 2	○	●	●	●	●	●	●	●	○	●	●
Service and support											
Warranty (years)	5	lifetime	5 ¹	5	lifetime ²	1	5	5	5	5	5
30-day money-back guarantee	○	●	●	○	○	○	○	○	○	○	○
Toll-free technical support	○	●	●	○	○	○	○	○	○	○	○
Weekday support hours	9a.m.-7p.m. ET	8a.m.-8p.m. ET	8a.m.-5p.m. PT	8a.m.-6p.m. ET	8a.m.-5p.m. ET	8a.m.-5p.m. PT	7a.m.-5p.m. PT	9a.m.-6p.m. ET	7a.m.-6p.m. PT	9a.m.-5p.m. ET	
Weekend support	○	○	○	○	○	○	○	○	○	○	○
Average turnaround on repairs (days)	5	3	3	1 to 2	5	3	3 to 5	1 to 2	10	7	
Contact											
Reader service number	641	642	643	644	645	646	647	648	649	650	

¹Two-year warranty can be extended to five years for \$29.95.

²One-year warranty can be extended to lifetime after first year for \$20.

³30-day money-back guarantee available only if modem is purchased direct from Supra.

you may not get the speed that you paid for if you install the fax-modem without reading the instructions on how to configure it for the highest performance. Even if you do follow the configuration instructions, you may still end up in that situation, because the manufacturer didn't configure the bundled software before shipping it out. This lack of customization is unfortunately the

industry norm rather than the exception.

Most bundled software requires you to tell it during installation what kind of fax-modem you have. The Practical Peripherals PC144HC and the CMS Enhancements FM-144HVBis, which are both 14.4-kbps devices, ship with software that assumes you have a 2400-bps fax-modem. If you buy these devices, make sure that you change

the default setting, or your transmissions will be very slow.

The external models from Hayes and Microcom pumped data at a rate that overwhelmed the Austin 486-66 PC we used as a test machine in our informal testing. The results were frequent freeze-ups in Windows and occasionally even in DOS-based software. (These happen more often in

BEST BUY		BEST BUY		BEST BUY		BEST BUY		BEST BUY		BEST BUY		BEST BUY	
Accura 144B *	Hayes V.FC + Fax	Hayes Accura 28.8	Intel Faxmodem	Intel Satisfaxtion Modem/400	Microcom DeskPorte Fast ES 28.8	Motorola UDS FastTalk II 14.4	PC144HC Peripherals	Practical Peripherals PM288HC II	Supra 288i FaxModem	U.S. Robotics Sportster 14,400	Ver-Tel PCM144Fax	Zoltrix Platinum Internal 14.4	Zoom Fax VFP 28.8
internal	external	internal	internal	external	internal	internal	internal	internal	internal	internal	internal	internal	internal
●	n/a	●	●	n/a	●	●	●	●	●	●	●	●	●
\$150	\$300	\$129	\$285	\$259	\$178	\$200	\$260	\$269	\$119	\$200	\$139	\$219	
14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
14.4	28.8 V.fc	14.4	14.4	28.8 V.fc	14.4	14.4	28.8 V.fc	28.8 V.fc	14.4	14.4	14.4	14.4	28.8 V.fc
none	none	DOSFax Lite	Faxability	none	FaxTalk	QuickLink II Fax	QuickLink II Fax	FaxTalk	QuickLink II Fax	QuickLink II Fax	BitFax	DOSFax Lite	
none	none	Comit	Crosstalk Communicator	none	none	QuickLink II Fax	QuickLink II Fax	Comit	QuickLink II Fax	QuickLink II Fax	BitCom	Comit	
FaxWorks	Smartcom Fax	WinFax Lite	Faxability Plus	FaxWorks	FaxTalk	QuickLink II Fax	QuickLink II Fax	FaxTalk	QuickLink II Fax	QuickLink II Fax	BitFax	WinFax Lite	
Smartcom LE	Smartcom LE	Comit	none	none	none	QuickLink II Fax	QuickLink II Fax	Comit	QuickLink II Fax	QuickLink II Fax	BitCom	Comit	
○	○	○	○	○	○	○	○	○	○	○	○	○	○
○	●	○	○	●	○	○	●	●	○	○	○	○	●
○	●	○	○	○	○	○	○	●	○	○	○	○	○
●	●	●	○	●	●	●	●	●	●	●	●	●	●
○	○	●	○	○	●	●	●	●	○	●	●	●	●
5	5	5	5	5	2	lifetime	lifetime	5	5	5	5	7	
●	●	●	●	○	○	○	●	○ ³	●	○	○	○	○
●	●	○	○	○	●	○	○	●	○	●	○	○	○
8a.m.-6p.m. ET	8a.m.-6p.m. ET	8a.m.-5p.m. PT	8a.m.-5p.m. PT	8a.m.-7p.m. ET	7a.m.-6p.m. CT	8a.m.-11p.m. PT	8a.m.-11p.m. PT	8a.m.-430p.m. PT	8a.m.-6p.m. CT	8a.m.-5p.m. PT	8a.m.-5p.m. PT	9a.m.-11p.m. ET	
○	○	○	○	○	○	8a.m.-5p.m. PT	8a.m.-5p.m. PT	○	○	○	○	9a.m.-5p.m. ⁴	
1	1	10	10	1	7	1	1	3	2 to 5	7 to 10	4	7	
404/441-1617	404/441-1617	800/538-3373	800/538-3373	800/822-8224	800/451-2369	800/442-4774	800/442-4774	800/727-8667	800/762-6163	800/538-5121	510/657-1188	800/666-6191	
651	651	652	652	653	654	655	655	656	657	658	659	660	

⁴ Saturday hours only.

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

Windows because it demands more of the CPU's attention than DOS does, and the processor can't always keep up.) Surprisingly, this occurred much less frequently with the internal models, although all had at least one Windows freeze-up.

Finally, speed isn't always measurable in actual transmission rates. The Intel Satisfaxtion Modem/400 has its own micro-

processor and memory to take on computing tasks that the CPU would normally handle, such as converting graphics and text to bit maps. While the \$285 Satisfaxtion board costs more than the other 14.4-kbps units, it returns control of your computer to you faster and handles data buffering better, so you get improved throughput when sending and receiving faxes.

Making Your Modem Last a Little Longer

The vendors in this review offer three different kinds of upgrades: a hardware upgrade, in which you send your fax-modem back to the manufacturer to have a chip or two changed; a software upgrade, in which you download new capabilities to the device's memory; or a trade-in, in which the manufacturer takes back your fax-modem

PC WORLD TEST CENTER REPORT

dBASE and Text Files Compress Best, Move Fastest

Data throughput (kbps)

Modem type	Text	dBASE	ZIP	TIFF	DLL	Average
V.fc 28.8	60.1	80	30.9	45	45.2	52.2
V.32terbo 19.2	38.1	54.9	20.7	27.2	29.4	34.1
V.32bis 14.4	29	56.1	15.7	20.5	22.2	28.7

Methodology We selected two modems from each class and installed them in a pair of Compaq Deskpro/i 486DX2-50 computers. Under normal telephone-line conditions, we measured the time required to transfer a series of files using V.42bis compression (up to 4:1) and Procomm Plus for Windows' Zmodem protocol. We set DTE rates to 115.2 kbps (DTE represents the serial connection between a computer and its modem).

Fax throughput (pages per minute)

Modem type	Formatted text	Formatted text and graphics
19.2 kbps	2.1	1.3
14.4 kbps	1.5	1
9600 bps	0.9	0.6

Methodology For each test, except the 9600-bps test (in which the receiving unit was a conventional fax machine), we installed two fax-modems in a pair of Compaq Deskpro/i 486DX2-50 computers. Under normal phone-line conditions, we measured the time required to transfer a high-resolution (200-dpi) image of a two-page Word for Windows document, using WinFax Pro. The first page consisted mainly of formatted text, and the second page was three-quarters formatted text and one-quarter graphics (a chart).

and gives you a discount on a new model.

You can upgrade about half the models we reviewed in some way; all the V.fc devices can be upgraded to the V.34 standard with hardware that costs less than \$100. But having to return your old fax-modem to get a replacement—as is required for the CMS, Computer Peripherals, Hayes Accura 28.8 V.FC + Fax, and Supra units—can be unappealing because of the downtime you'll face while waiting for the new model. Hardware upgrades that can be done only at the factory present the same problem; either option may deprive you of your fax-modem for a week or more.

Microcom has an interesting upgrade for do-it-yourselfers. For \$39, the company sends the new chip, a chip-removal tool, and a floppy disk—everything you need to upgrade its fax-modem. And Supra offers a fast exchange with no downtime: You give the company your credit-card number as a deposit, it sends you a new fax-modem, and you send the old one back. Digicom has the most attractive upgrade option of all: You can upgrade its Connection 14.4 DF to V.32terbo capability with an upgrade disk for \$39.95—the software is not complicated,

and it works. Still, it's a better deal, and much simpler, just to buy the \$135 Cardinal V.32terbo unit.

At Last, a Pleasant Surprise

Service and support policies are important for any product, but they're even more critical for fax-modems, because communications is an area in which users frequently need help, especially when it comes to installation. Unless you or someone in your office has telecommunications or modem expertise, you'll want your fax-modem vendor to offer strong technical support.

A five-year warranty is pretty standard for most fax-modems, but Zoom gives seven; and AT&T, Cardinal, and Practical Peripherals offer lifetime coverage. Motorola provides just two years, while CMS offers a measly one year of coverage. AT&T, Best Data, Hayes, Intel, Practical Peripherals, and U.S. Robotics all offer 30-day money-back guarantees.

Most vendors provide technical support for 9 to 11 hours a day, weekdays only. Exceptions are Practical Peripherals and Zoom, which offer longer hours and weekend support. The specific times are more

critical than the sheer number of hours. All else being equal, look for a vendor in your time zone, since its hours are more likely to overlap with yours. If you start your workday early, consider a vendor in an eastern time zone; if you work late, you may want one in a western time zone. Toll-free support lines are rare these days—only AT&T, Best Data, CMS, Data Race, Hayes, Motorola, Supra, and Ven-Tel offer them.

With Windows 4.0, also known as Chicago, and Plug and Play—Microsoft's new procedure for installing Windows peripherals—due out by the end of the year, modem installation promises to be simplified immensely. With luck, you will never again have to call your modem maker's tech support lines in confusion and despair. But until these promises come to fruition, make sure you buy from a company that gives you the support you're sure to need.

Jeffrey Gordon Angus is a management and computer consultant based in Seattle, Washington. Martin Marshall, a writer and product usability consultant, and Anita Hamilton, an assistant editor for PC World, also contributed to this article.

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HERE'S OUR ADVICE.

Whether it's large or small, we've all got a nest egg we're looking to grow into a retirement fund big enough to support us in the golden years. We all want a richer return on our savings than the measly interest offered by a savings account or CD. But how do you sort out the options? And how do you keep track of your financial empire to make sure you don't wind up living on a park bench?

In the past, you had few options: You could take advice from a full-service—read expensive—broker or financial planner, or you could listen to your brother-in-law Bernie's counsel on mutual funds. But now you have an additional choice: your computer. Software programs suited to every level of investor, from the bewildered beginner to the hotshot hobbyist, are replacing or supplementing the services of brokers—not to mention old big-mouth Bernie.

There are software packages to manage every aspect of your finances—programs that track your monthly finances, offer expert investment advice, help plan investment strategies for retirement, research specific investment prospects, and keep up with changing financial news and prices. If you're ready to buy and sell

yourself, you can modem your order directly to discount brokers for rock-bottom prices. (See "Picking the Right Investment Tool.")

To find out how good a financial adviser the computer is, we spoke to dozens of people who use a variety of financial programs. We also spoke with professionals to learn whether they thought these "amateurs" were utterly mad to risk their money without guidance—or if they were worried about losing their jobs.

Some of the investors we spoke to were heads of families, taking pains to build up college and retirement funds. Some were retirees having fun with their adrenal glands. Several were high-stakes players using analysis programs to compete against the market, and a few could be called users in the addictive sense, filling their empty hours with stocks and software. Whatever their investment motives and strategies, most of them had lost at least a little money in the market swoops of last spring, but not one was ready to entrust everything to a broker. Some couldn't afford the fees, but those who could didn't see any reason to spend the money.

Of course, there's still no program that offers infallible soothsaying and hence a guarantee of success. Given this crucial deficiency, most of the investors we spoke with devote a lot of time

By Naomi Wise

to research. The computer helps, though, by doing the sort-and-find, track-and-calculate, record-keeping scutwork—leaving the humans free to follow the financial news.

Building an Empire on GI Pay

David Sawyer is a soft-spoken Army officer stationed in Puerto Rico. Before starting to invest and buying the software to help, Sawyer studied financial magazines, investment newsletters, and the financial programs on CNN—research he continues. “I want to know everything I can,” he says, “or I might end up losing a lot of money. I can’t afford that.” Supporting a wife and two children on GI pay of less than \$25,000 a year, he has over \$20,000 invested.

Twice a week, Sawyer boots up Wealth Builder (Reality Technologies/Reuters

account. “It gives me a picture of my future,” says Sawyer. “I have a daughter and a son and I’ve got their college educations plugged in, plus my goals for my military retirement—and a house and new car.”

Wealth Builder is one of several affordable money managers (others include Quicken and Managing Your Money). These packages can do double duty: As portfolio managers, they keep track of investments, and they also advise how much to allocate to which types of stocks and bonds. Some have add-on modules that access financial databases for current stock prices and company histories. Though many of the investors we spoke with use money managers for portfolio tracking, they choose dedicated programs to get information, help them make decisions, and trade online.

Walter Kaatz uses a number of financial shareware programs along with online brokerage accounts to

additional time consulting financial magazines and investor forums—without trusting the latter entirely. “You don’t know if the people [in forums] are experts or not,” he cautions. “Anybody can say anything on a bulletin board.”

If you value your time, you don’t want to download stock prices without a sieve. “I have a friend who downloads the entire stock market every day, by satellite,” Kaatz observes. “He’s got two dishes, two or three computers, and two monitors on his patio. He owns only about 20 stocks, but it takes him 6 hours to download.”

The Software Sieves

“One of the things the computer will do,” says Frank Gaylord, a retired broker in Lakeville, Minnesota, “is take the same data in the newspaper, and sort it. It does things any person can do, but does them much faster.” Not only can you get information about your investments every time you log on, but a filter helps you find new investments that meet your specifications.

Gerald David Kelly, a Baltimore-area postal supervisor, uses Morningstar software to identify mutual funds that meet his conservative criteria for high safety, consistency of

“The way to make money is to buy quality and stick with it,” says financial planner Janet Kratz.

returns, and experienced managers with their own money in the funds. His approach is relaxed but alert: “I follow the market in the paper,” he says. “I only make changes when I hear something new.” Investing \$200 a month, he’s built his accounts to \$63,000 over seven years. “Pretty good, huh? As my mother used to say, it’s just a matter of keeping your eye on the fry.”

Many investors also turn to online discount brokers’ programs such as FOX from Fidelity, StreetSmart from Schwab, and Reality’s Smart Investor Network from *Money* magazine. These provide graphs, charts, and the latest quotes; it’s up to you to figure out what they mean. Such software’s primary purpose, though, is to let you modem your order to the brokerage house at 3 a.m. (if you can’t sleep until you’ve chucked your sagging shares of BugWare Chip and Dip, NYSE).

Marc Salzberg, a Broadway stagehand, combines online brokerage software with an online network program that offers filtered news and historic-performance downloads,

News Service), a household money manager with asset allocation and an add-on for downloading stock quotes from Reuters News Service. Asset allocation helps you get the right mix of investments based on your age and goals—taking inflation into

CompuServe, getting quotes from Prodigy, and trading through two online brokerage accounts. His favorite program is a shareware portfolio manager called Capital Gainz that can calculate the real (after-tax, after-inflation) value of his holdings. He spends



analysis, and portfolio management—and feeds them all to a money manager. Salzberg started using Quicken as a checkbook manager six years ago. When his daughter was born, he bought some stock from his brother-in-law the broker (not a Bernie but a Merrill Lynch pro). He soon realized that as “a little person” (with about \$50,000 currently invested) he couldn’t afford the commissions on an active full-service account, so he chose a FOX (Fidelity) online trading account instead.

“It’s essentially an automated broker, and you get a 10 percent discount,” he says. “It updates prices, keeps track of all your trades, and gives you an immediate record, so you don’t have to wait for your monthly statement.” Salzberg tried Quicken Companion’s investment features, but he found the relatively rudimentary filtering and customizing capacities too cumbersome, especially after he compared them with his one-month, low-priced trial of Morningstar. Since last April, he’s been using Reuters Money Network for Quicken Users. “It gives you all the information and news and historical prices, and it can filter automatically to the companies you’re interested in,” says Salzberg. “There’s *so* much data—a newcomer on CompuServe can be overwhelmed.”

Theaters are littered backstage with financial and computer magazines, Salzberg says. He reads them avidly. For him, his software’s greatest benefit has been to increase his understanding, so that he can now choose investments more wisely. “It’s really helped me see what I’m doing, to see my mistakes, because the programs let me see my portfolio as a whole.”

Between Flirtation and Obsession: Fundamental and Technical Analyses

Most of the filter programs are based on a tool called *fundamental analysis*. They chart the historical performance of a company—for instance, how high its dividends have been during the last three, five, and ten years. This is a typical approach for long-term, conservative investors like Janet Kratz of Wisconsin, a professional financial planner. “The way people really make money is to buy quality and stick with it,” she says. “You can’t change your strategy as the market changes, because you’ll

always be changing after the market changes.” She uses Quant IX, a program several investors praised for its ease of use and minimal memory requirements; it offers fundamental analysis and portfolio management. There’s another type of analysis, however, that appeals mostly to active, short-term traders, especially those who get so enraptured that they invest as much for

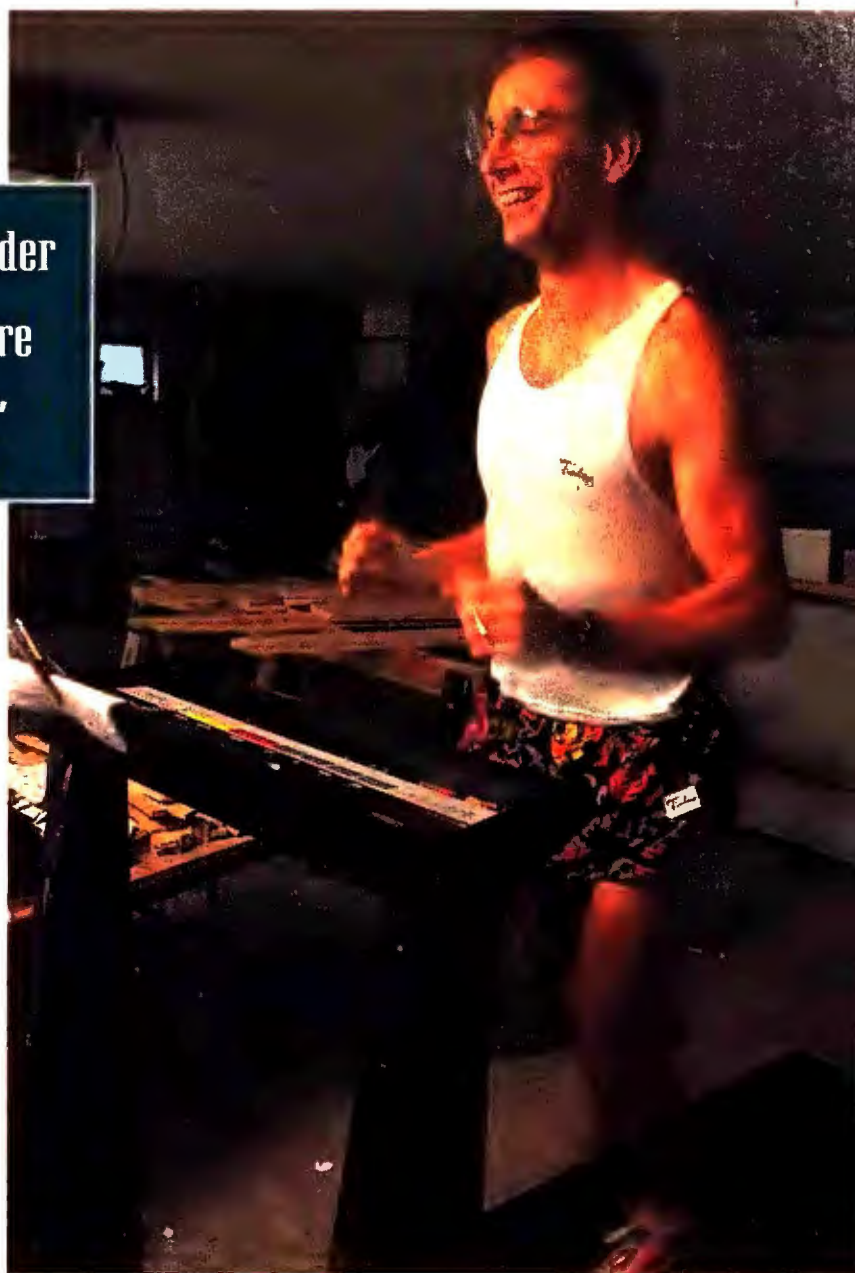
“It is legal gambling,” day-trader David Baluh confesses. “You’re trying to beat the market.”

thrills as for money. *Technical analysis* looks at the performance of the stock, not the company—and graphs it moment by moment to determine the right instant to buy or sell. “You don’t know what’s going on, but if a stock suddenly goes way up, that gives you a hint from somebody who *does* know,” says attorney Allen Bloom, who uses both fundamental and technical analysis software packages.

The most exotic (and pricey) technical analysis programs resemble electronic versions of ancient astrolabes, basing their graphs on astrological movements, sound-wave patterns, or the natural-numbers theories of medieval Italian philosophers. Many stockbrokers also use these tools—sometimes as secretly as the alchemists of old. However, even the more terrestrial technical programs are extremely controversial. Many financial experts regard technical analysis as voodoo. Furthermore, they point out, it’s now common (especially in the commodities market) for individuals with large investments to deliberately trigger all the technical programs’ alarms and profit by the result (a process called *reverse engineering*). Proponents of technical analysis argue that a company’s past is just that—past—and that looking backward does nothing to predict the future of the stock. “‘Long-term’ is a code word for ‘Get out as soon as

possible,’” says syndicated financial software columnist Bob Schwaback (who uses several technical programs).

David Baluh, a former critical care nurse, has been able to trade his uniform for a cowboy hat, move to a pleasant small town,



and stay home with his five young children. Baluh now makes a living as a day-trader. In *USA Today*’s competition for amateur stock trading, he ranked first for Oklahoma and 43rd nationwide. Spending from 10 minutes to 7 hours a day at his computer monitor, he averages between \$200 and \$500 actual profit per day by hopping on ascending rockets and leaping off before they dive. “It *is* legal gambling,” he admits. “You’re trying to beat the market.”

Not a Get-Rich-Quick Activity

Baluh uses Sygnal (an electronic ticker tape) to download real-time quotes over a cable system, and Metastock’s technical analysis program. He also pays heed to his intuitions, which arise from seven years of research. But he counsels neophytes against following his path. “Anybody can buy a PC

and software," he says. "But it's not a get-rich-quick activity. You need to read books, newsletters, and magazines *before* you buy your software. My recommendation is to go slow, venture only what you can afford, take your initial investment out as soon as possible, and reinvest only the profit."

The Experts Look at the Amateurs

When brokers and financial experts look at the software that's now available, they're impressed—with the software, but not nec-

essarily with everyone who uses it. Taking your finances into your own hands can be dangerous, they say. You can end up going broke—or going back to the broker.

But entrusting money to a broker isn't necessarily safe, either. "People working at home can have more information available to them from the software than even the biggest brokerage houses," says Frank Gaylord. Before he bought his current array of mainly technical programs, he gave up working as a broker because he had no con-

fidence in the stocks he was choosing.

Active New York stockbroker Joel Bernstein is another software fan who cautions potential PC investors to use newly available resources wisely. "What's available today to the amateur is what used to be available only to professionals," he says. "But you have to treat it like a job—at least like a part-time job."

"It's like growing vegetables," says Harold Parker, a broker with Smith-Barney in Los Angeles. "If you have time for it, you'll

Picking the Right Investment Tool

Before you can start using your computer to organize your financial information, research your investments, or trade online, you have to pick your software tools

from the 500 or so programs on the market. This wealth of options might leave some newcomers scratching their heads, but look on the bright side: This market is competitive. And competition means the software is affordable—well within striking distance of the beginner. But if you don't know what you're looking for, you could end up feeling like an untanned tourist in a cutthroat bargain bazaar. To help you defend yourself, we've selected our top choices in the following financial software categories.

These tools can help with every facet of your finances: from accumulating a nest egg to tabulating gains and losses; from getting stock prices to researching investments and trading from your PC.

Getting Organized

If all you want is software to help keep tabs on your money, a money manager is for you. Besides balancing your checkbook and paying your bills, money managers help you keep track of long-term financial matters, such as employer-sponsored retirement accounts. Then,

should you decide to take a more active role, you can add a number of more specialized tools to your software arsenal.

There are several money managers on the market, but none of the newcomers has been able to upstage the two long-time leaders: Quicken, from Intuit, and Meca's Managing Your Money. Dollar for dollar, they're still the best buys for versatility and ease of use.

Quicken 3.0 for Windows/Quicken Companion 2.0

If you don't have vast sums to invest, Quicken can help meet the challenge of saving. Don't stop hoping for a long-lost relative to die and leave you a fortune, but until you strike it rich, Quicken can help with the mundane task of reining in your spending.

By Eric Tyson

But Quicken is more than just a money manager. It's a great tool for tracking investments. Not only will it organize your assets, it will track the purchase price, current market values, and rates of return. If you have accounts at numerous investment firms, Quicken will reduce the clutter of tracking your financial empire.

More robust investment tools are available through Quicken Companion 2.0, an add-on to the Windows version of Quicken. Quick Companion includes access to up-to-date stock prices, either through the CompuServe online service or using a 900 number that charges you \$1 per minute. (That may sound like a hefty fee, but once you set up the list of investments, you can download the stock quotes quickly. Depending on the speed of your modem and

the time of day you place the call, you can retrieve as many as 15 to 20 securities prices in a 1-minute call.)

Quicken (DOS and Windows versions), \$69.95; Quicken Companion (Windows only), \$34.95 (\$19.95 if you already have Quicken); Intuit, 800/624-8742

Managing Your Money 1.0 for Windows

First released in 1984, Managing Your Money is the granddaddy of home finance packages. But until this spring, users had to struggle with a DOS interface. MYM for Win-

dows' friendly and unique interface invites you into the world of finance. The opening screen depicts a home office (drop-down menus are also available). If, for example, you want to write a check, click the checkbook. To check your investments, click the Investment board behind the desk. Quicken is still easier to use, but this is a leap in the right direction.

Managing Your Money has the upper hand in tackling issues like retirement planning, buying a house, and sorting through life insurance options. Another strength is the investment advice by noted financial guru Andrew Tobias. Among his many excellent recommendations: Put as much as possible into tax-sheltered retirement accounts, and don't use life insurance as an investment.



get better vegetables if you grow your own. But if you can't give time to your garden, you probably won't get a good crop."

Parker, an admitted perfectionist, averages 12 hours a day at his work. He's seen amateurs succeed after spending just a few minutes a day using the software, and he's also had former clients come back to him after wasting so much time that they finally gave up. "They came to the realization that their time could be better spent elsewhere," he says.

Virtually every expert we spoke with said the main problem is that amateurs can go astray if they don't take time to learn about investing *before* they put money down. And the software can't control its users' emotions. Investment is a game in which everybody loses some of the time. Some amateurs make the mistake of betting their egos along with their money, shriveling at the smallest losses. Conversely, others get so emotionally attached to their holdings that they confuse a stock with a spouse (for

better, for worse, for richer, for poorer) and won't sell even when "their" company heads down the tubes.

Many people want a lot of gain at low risk, and that's not realistic. "The programs are great tools. So is the scalpel—but not for everybody," says Parker.

Bob Schwaback puts it another way: "If you're only going to put in a small amount of time, and you want a safe long-term investment, plant walnut trees. They'll always give you a good return."

Managing Your Money has almost enough investment planning features to warrant putting it into the Retirement Planning category. But many of the tools that are available in the DOS version—the capability to download stock prices, research investments, and trade online—were omitted from this Windows release.

Version 2.0 will offer electronic bill paying and securities and investment quote retrieval. Managing Your Money (DOS and Windows), \$79.95; *Meca Software*, 800/820-7457

Reader service no. 744

Planning to Get Rich

Some of the best retirement planning programs come from the nation's largest mutual fund providers. These programs can run what-if scenarios to help you determine a cohesive plan that fits your budget. The downside: They're DOS only, and they aren't available at your local Egghead or CompUSA.

Retirement Planning Thinkware

Fidelity Investments' retirement planning software helps you understand the importance of planning for retirement. It calculates what you should invest annually to reach your goals, guides you through developing a strategy, and teaches you about Fidelity's funds. While it's a bit self-serving to provide information on only Fidelity's own funds, it's not a huge problem, given the company's quality mutual funds. And even if you don't invest in Fidelity's funds, the rest of the package's retirement planning advice and investment information is easily worth the \$15 purchase price.

In minutes, Fidelity's Thinkware can whip through calculations that would take hours with a calculator and scratch pad. You can change your assumptions on the fly and see immediately what effect the changes will have on your retirement goals. Unfortunately, though, it takes a long time to page back and forth among the screens, so chances are you won't have the patience to make full use of its what-if tools. Retirement Planning Thinkware (DOS only), \$15; *Fidelity Investments*, 800/457-1768

Reader service no. 745

Retirement Planner

This package from The Vanguard Group is a whiz at running different retirement planning scenarios, so you can select investments

based on personalized factors, such as your desired rate of return or your initial bankroll. You can also perform what-if analyses to see how you'd fare with different priorities. For example, the software calculates the impact of earning a couple more percentage points a

year on your investment balances by investing in a fund with a higher yield. You may decide you don't want the added risk, but at least you'll be aware of the trade-offs.

While Vanguard's package does not have the colorful graphics you'll find in Fidelity's, it's better at explaining the risks of investing in the stock and bond markets. It allows you to see how portfolios with different mixtures of stocks and bonds performed all the way back to 1926. While

history won't necessarily repeat itself, this invaluable feature allows you to invest with realistic expectations, so you won't panic and sell the first time securities prices drop.

Vanguard's Retirement Planner has one significant drawback: It's cumbersome for a couple to run a single plan, particularly if they aren't the same age. Retirement Planner (DOS only), \$15; *The Vanguard Group*, 800/876-1840

Reader service no. 746

Doing Your Homework— and Reaping the Rewards

Investment research software packages usually separate investment beginners from those who love to wallow in data. But unless you're a seasoned investor, you may have difficulty differentiating the good information from mediocre and downright awful advice.

The software listed here offers solid advice, but be careful. Many packages connect you to an online service for information or to trade. Unless cost is no object, keep tabs on your connect time so you don't spend too much money just accessing the information.

And before you plunge into the data jungle trying to become the next Peter Lynch or Warren Buffet, don't fool yourself into believing that you'll beat the markets. Even professional investors rarely manage to. Witness the fact that over long periods of time (more than ten years), mutual funds that invest in a fixed market index



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tend to outperform many of their actively managed peers, thanks to lower operating expenses.

Reuters Money Network for Quicken Users

This program works in Quicken's portfolio manager to download investment prices and give you access to the Reuters Money Network online service. For a fixed monthly fee (starting at \$9.95), you get mutual fund information from Morningstar; reports on stocks and bonds from Standard & Poor's; and financial information and news from Dow Jones, Reuters, *Money* magazine, and other sources. An additional \$6.95 per month gets you Reuters' Personalized News Clipping Service, which culls articles on your specific portfolio from publications on the Dow Jones News Wire—a great time-saver.

You can also trade directly from Reuters, though you won't get direct access to your investment accounts. But if you trade frequently or have investments in lots of accounts, you'll like the fixed rate.

Reuters Money Network focuses on current news sources that are of greatest interest to investors trying to outfox the markets. The drawback is that the package doesn't have historical information. Reuters Money Network for Quicken Users (Windows only), \$24.95. Also available: Reuters Money Network for DOS (\$49.95) and Reuters Money Network for Windows (\$24.95). They run solo and have portfolio managers. *Reality Technologies*, 800/346-2024

Reader service no. 747

The Telescan System

If you want to do comprehensive screening of individual stocks, The Telescan System online service is what you've been looking for. It lets you perform stock searches using dozens of variables, including historic and projected earnings, valuation, assets, and liabilities. It also allows you to easily obtain pricing charts for individual securities and mutual funds for the past 20 years.

The cost of Telescan depends on how you use it and what billing method you select. If you use it occasionally, the Per Minute Plan is your best bet. You're charged \$0.41 to \$0.94 per minute (higher rates apply during prime time, 7:00 a.m. to 6:00 p.m., local time), plus \$0.10 per graph and \$2.00 per search. You can buy unlimited access through the Flat Rate Plans, which range from \$45 per month for unlimited non-prime-time usage to \$500 per month for unlimited access at any time. Besides the usage fees, Telescan charges \$13 shipping and handling for the software and a \$50 annual fee for use of the service. *Telescan Inc.*, 800/324-4692

Reader service no. 748

Morningstar Mutual Funds OnFloppy & OnDisc

Mutual fund data hounds will delight in Morningstar Mutual Funds OnFloppy, a software package that provides statistical information on 4000 mutual funds—more than triple the number found in Morningstar's printed directory.



Reader service no. 749

If you already suffer from information overload, save your dollars. If you like lots of data, this package can save time and filing space. Avoid the mistake of selecting funds based on Morningstar's Star Rating system. These are simply a history of a fund's performance, and history rarely repeats itself. Morningstar also offers Morningstar Mutual Funds OnDisc, a CD ROM that gives more in-depth information and analysis. Both are DOS only. OnFloppy, \$45, plus \$95 per year for quarterly or \$185 for monthly updates; OnDisc, \$295, plus \$495 for quarterly or \$795 for monthly updates; *Morningstar*, 800/876-5005

Value Line Value/Screen III

The Value Line Value/Screen III is a disk-based program that offers data and rankings from Value Line Investment survey, the newsletter the *Hulbert Financial Digest* says has the best record for picking stocks. Problem is, it's not very easy to use.

Besides researching individual stocks, the package tracks your stock portfolio and downloads pricing updates via the Dow Jones News/Retrieval service. A two-month introductory offer (DOS only) costs \$59, and annual subscription prices cost \$325 for quarterly updates and \$465 for monthly updates by mail. Electronic monthly updates cost \$495 per year. *Value Line Software*, 800/654-0508

Reader service no. 750

The Fruits of Your Labor

Some services allow you to track the performance of your accounts and buy and sell directly from your PC. You save the hefty broker fees, and you can trade any time of day or night.

Charles Schwab's StreetSmart

Charles Schwab, the fast-growing discount securities and mutual fund company, last year offered the first Windows online trading service. It provides investment research, helps track your account's performance, and lets you trade through Schwab. StreetSmart provides free real-time quotes and investment information held through your brokerage account. You'll see only Schwab investments in StreetSmart, but you can enter others manually, and Schwab rewards PC trading with a 10 percent discount off its broker-assisted fees.

StreetSmart charges on a fee-for-service basis for DJN/R and Standard & Poor's MarketScope. With StreetSmart, you can bill these services to your Schwab account or credit card. DJN/R charges \$1.50 per 1000 characters; company research reports cost \$4.50; and Standard & Poor's Mar-



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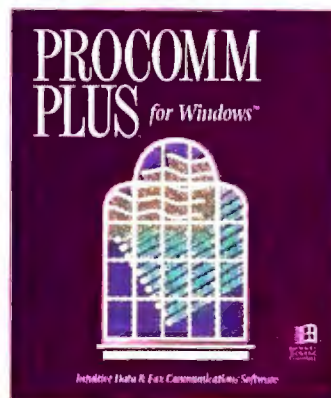
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ketScope costs \$0.80 to \$1.20 per minute, depending on time of day. StreetSmart, \$59; *Charles Schwab and Company*, 800/334-4455
Reader service no. 751

Fidelity's On-line Xpress

Fidelity's On-line Xpress (FOX) offers many of the same features as Schwab's StreetSmart but handles only Fidelity mutual funds, and its DOS interface is less appealing. You also need separate billing accounts with each provider (for example, DJN/R, Standard &

Poor's); with StreetSmart, you pay through Schwab. Choose FOX only if you don't like Windows or prefer Fidelity's funds. Fidelity's On-line Xpress (DOS only), \$49.95; *Fidelity*, 800/544-0246

Reader service no. 752

Naomi Wise is a San Francisco-based freelance writer. Eric Tyson is a San Francisco-based personal finance writer and author of Personal Finance for Dummies (IDG Books, San Mateo, California, 1994). Judy Heim is a contributing editor for PC World.

Going Online for Investment Advice and Information

Want to use your computer to manage your investments, but don't want to spring for new software or services? If you have a membership in a general-interest online service, there's plenty of information at the end of your modem. All the major online services provide relatively cheap end-of-day market quotes and market news. You'll also find lively public investment conferences—wonderful places to exchange ideas with other investors or even boost your financial I.Q.

Following is the best of what's available. There isn't much on the Internet for investors, so you won't find it listed.

America Online

America Online has fewer financial databases than other services, but low access fees and a few key attractions make it a favorite of small investors. It has the popular Morningstar, which details the performance of mutual funds and ranks them. And AOL's portfolio feature is also quite popular. Enter data about your stocks, then call America Online for 15-minute-delayed market quotes. AOL will track your gains and losses for you.

AOL's big drawback is that it's woefully slow. For quickest access, call during the day. A month's subscription is \$9.95 (credit card) or \$11.95 (checking account transfers). You get 5 hours of free access per month. After that, it's \$3.50 per hour. *America Online*, 800/827-6364 **Reader service no. 801**

CompuServe

Among online services, CompuServe has the largest library of financial information. Its best resources are the free market quotes and the investors' conferences—



more spirited than conferences on other services. You'll also find daily and historical stock, bond, and commodity prices. You can find a company's balance sheet, SEC filings, and corporate holdings and affiliations, and also analyze an investment by stock price and other basic data.

Penny-conscious investors can access daily stock quotes and *Money* magazine's mutual fund database as part of the basic \$8.95-per-month membership. And for just \$1 CompuServe will graph the performance of a stock. You can also read a company's Standard & Poor's profile for \$1; for \$2 you can read the latest S&P stock picks. You can screen stocks by such variables as book or market value, growth rate, and more, but it's pricey (\$5 per screen, plus \$0.25 per issue).

Access to some of the databases runs as high as \$40 an hour, so be vigilant about cost. Membership costs \$8.95 per month plus access fees (\$4.80 per hour at 2400 bps, \$9.60 for 9600 and above). *CompuServe*, 800/848-8199 **Reader service no. 802**

Dow Jones News/Retrieval

Dow Jones News/Retrieval is the premier online source of financial information, but high access fees have put it out of reach

of most small investors. Fortunately, Dow Jones offers a low-cost service called Market Monitor. It gives you 8 hours of evening access to closing market quotes, daily historical quotes, a mutual fund searcher, Standard & Poor's profiles and more—all for a flat fee of \$29.95 per month.

However, you'll pay more for Dow Jones' premium databases, such as Dun & Bradstreet or Tradeline reports and financial records. The charges range from \$1.50 for approximately each screen of information, to as much as \$106 per report. *Dow Jones News/Retrieval*, 800/815-5100 **Reader service no. 803**

Prodigy

Prodigy offers some of the most innovative services available online for small investors. For \$1.95 (each time) you can read a newsletter with a compelling selection of stock tips. And Prodigy's Stock Hunter lets you troll for stock picks using any of eight stock models. Cost is \$5.95 each time you access the Stock Hunter.

Prodigy's Strategic Investor feature has daily market news assembled by *Investor's Business Daily*, accesses fundamental data ranging from balance sheets to key ratios on over 5000 companies, and displays charts on a stock's performance.

There are also regular online columns by financial gurus like tax pro Julian Block, plus the text of *Barron's* and the *Wall Street Journal's* "Talk of the Street" column. Frequent celebrity visitors to the Moneytalk BBS also liven up the service. Unfortunately, Prodigy is slow, slow, slow.

Subscriptions range from \$7.95 to \$29.95 per month. The startup software costs \$4.95. *Prodigy*, 800/776-3449 **Reader service no. 804 —Judy Heim**

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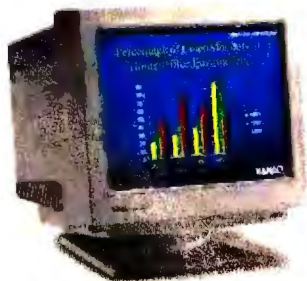
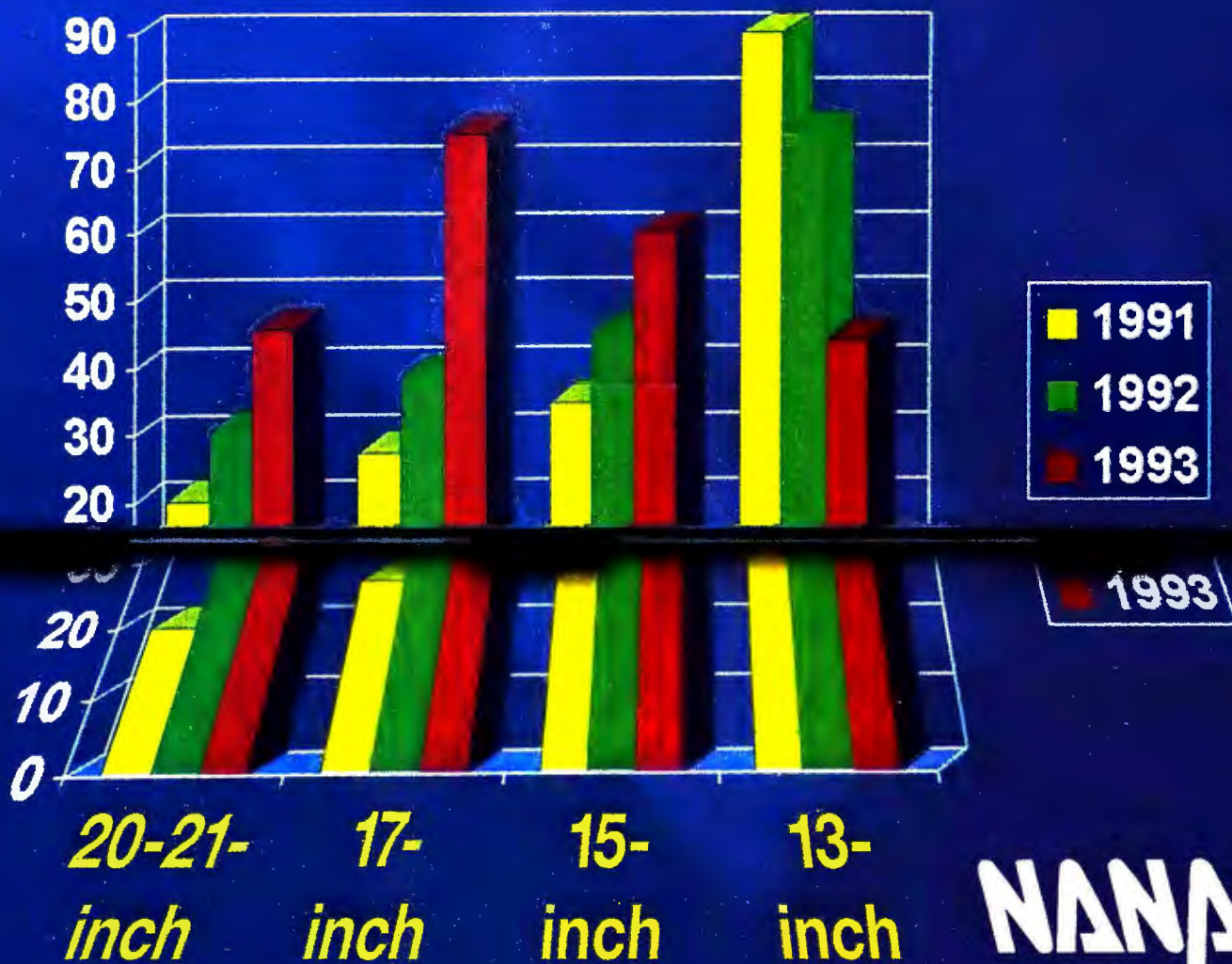
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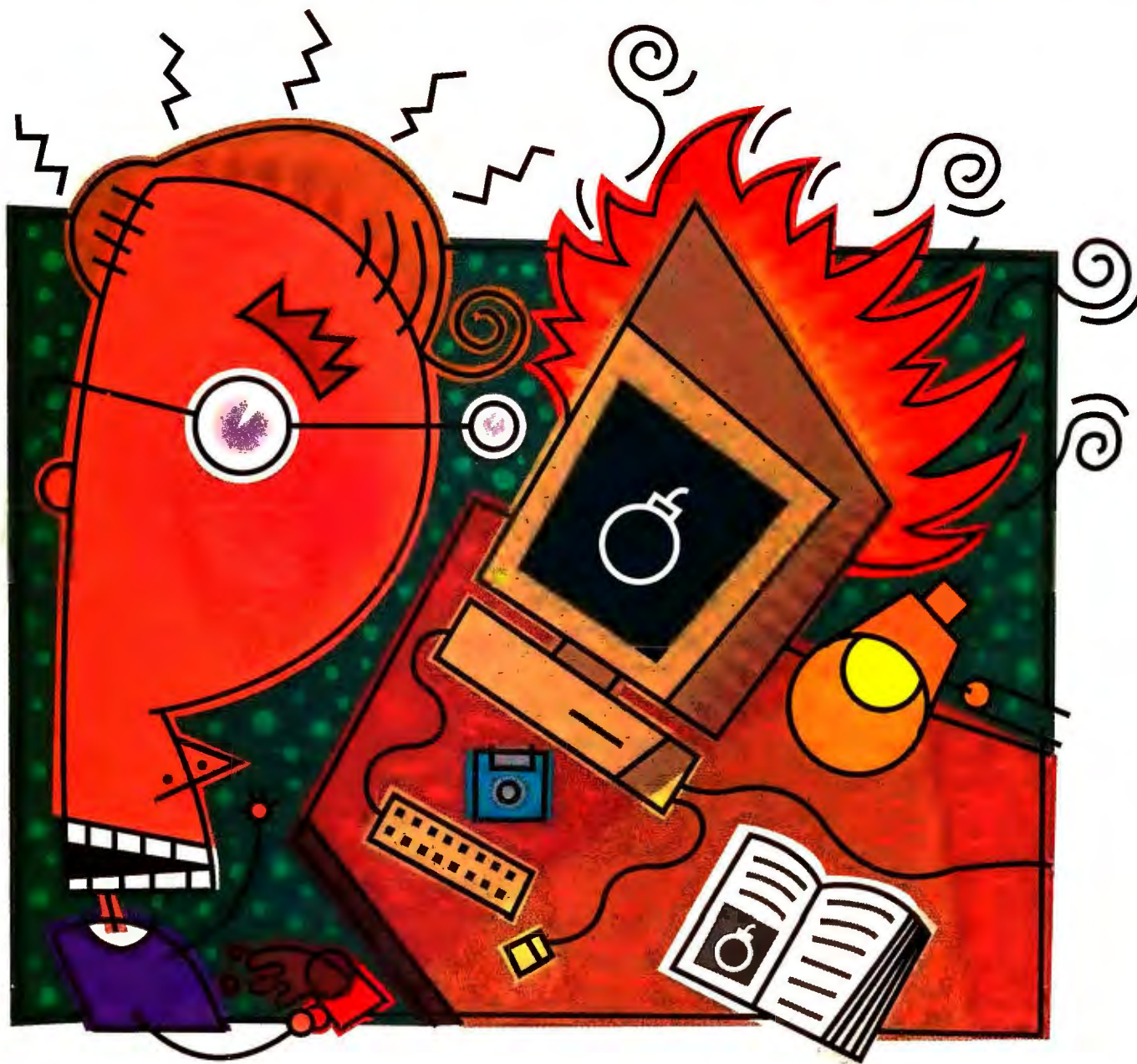
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WINDOWS DETECTIVE

Solving the Mysteries of **ERROR MESSAGES**



How to track down the most common causes of crashes, and what to do about them now—and later.

General Protection Error: They appear without notice, invariably when you're on a tight deadline.

Call to Undefined Dynalink. They are all but indecipherable, and they give you no idea what to do next.

Application Execution Error: They are the mysterious error messages that pop up in Windows. Virtually anyone who's

used Windows has been stopped cold by these ominous declarations of doom. And as hard as they are to understand, it's even harder to know what to do when they appear. Should you click OK, Ignore, or Cancel? Which of these limited choices will let you save your work before you restart Windows or reboot your machine? And how about

the future? What can you do now to prevent these error messages from recurring?

Until now, good advice on error messages has been hard to find. Manuals are all too often silent on the subject. Product support at Microsoft or the company that made the application may or may not have the answer, and they're usually a toll-call away.

By Michael
S. Lasky

Well, you can save your quarter. We contacted Microsoft's Product Support team for you and, with their guidance, came up with the following troubleshooting guide to the most common Windows error messages. We've condensed these explanations for the sake of space. If you want more details on these and other error message solutions, look for ERRORMSG.ZIP on PC World Online (see page 10 for details).



General Protection Fault. Filename caused a General Protection Fault in .Module filename at memory address.

WHAT IT MEANS: The most common error message of all, the 'General Protection Fault' (GPF) is the most vexing to fix because it can have so many causes. The commonest of these is when Windows or an application tries to access memory improperly. Sometimes an application tries to read or write to a memory location to which it hasn't been granted access, while other times it attempts to overwrite its own memory segments. In either event, the code already residing in that part of memory is erased or corrupted, and you're left staring at an error message.

WHAT TO DO NOW: Note the cause. Before you do anything else, note the module in which the GPF occurs. This information can offer a crucial clue that will help you in future troubleshooting. For example, GPFs in KRNL386 usually indicate memory problems. Errors in GDI.EXE often indicate problems with either video or printer drivers. GPFs in USER.EXE can mean that you have problems with sound drivers or with input and output devices, such as the keyboard or the mouse. If an error keeps popping up in a particular module, chances are the error is software-based; random errors more often relate to memory conflicts and hardware problems.

See "Can This File Be Saved?" for tips on how to save your data. You'll probably have to reboot, but at least you may be able to recover your data.

WHAT TO DO IN THE FUTURE: Save your work often. If your application has an auto-save option, use it. Otherwise, make sure to save your files frequently as you work. Back up your hard drive regularly.

Keep system resources free. An application running in the background with scant system resources can cause memory conflicts. From Program Manager, select *Help • About Program Manager* and see what percentage of your system resources is free. If you're working in an application that has caused GPFs in the past, try to keep at least 60 percent of your resources free.

Check the DOS version you are using. Original equipment manufacturer (OEM) ver-

sions of DOS that come with certain brands of PCs (such as Compaq MS-DOS) should be used only on their respective PCs.

Run Windows without WIN.INI. The GPF could stem from corrupted fonts, printer drivers, or software loaded when you started Windows. For that reason, try to open Windows without WIN.INI: Exit Windows and, at the DOS prompt, enter **REN C:\WINDOWS\WIN.INI WININI.OLD**. Restart Windows and try to re-create the GPF by opening the applications and documents you were using at the time of the error message. If you can't re-create it, change WININI.OLD back to WIN.INI, then open it in a text editor. Place a semicolon in front of the Run= and Load= lines, save the file, and restart Windows. Again, try to re-create the errors. If you can't, one of the programs in the Run= and Load= lines is causing the

Can This File Be Saved?

By the time an error message arrives on your screen, chances are it's too late to save your work. But here are a few things to try whenever any error message freezes your system.

Open Task Manager. When the error message appears, press **<Ctrl>-<Esc>**. If nothing happens, try double-clicking on your desktop. One of these maneuvers may succeed in calling up the Windows Task Manager. If the Task Manager window appears, highlight the name of the crashed app, and select the **End Task** button. If this works, you'll have closed the crashed program. Your file will be saved correctly, or at the very least, a recoverable temporary file will be created (see the following discussion).

If you can't close the crashed app in this way, select one of the open apps in the Task Manager list and click **OK**. Once you're in the app, save your open files, then close the application. Repeat this procedure for your other open apps, then proceed to the following steps.

Hit <Ctrl>-<Alt>-<Delete>.

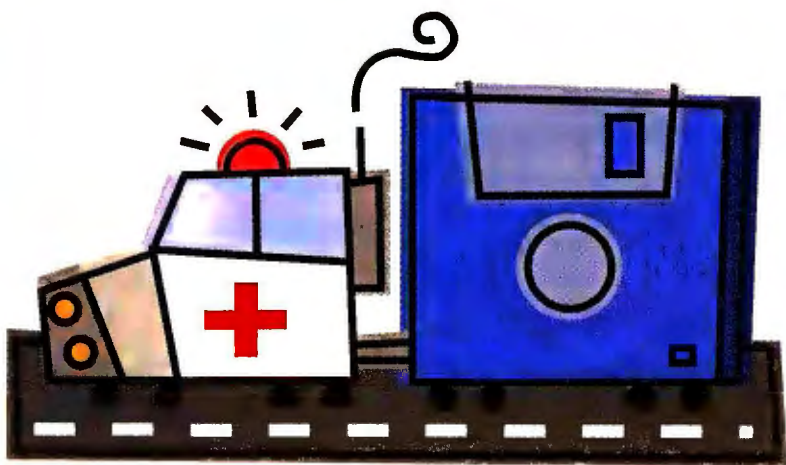
The three-fingered salute should bring up one of two system messages. The first, 'System has either become busy or has become unstable', usually indicates a less-than-fatal error. If you get this message, press any key to return to Windows, and then wait a couple of minutes. If the system doesn't recover, you'll have to restart your system by pressing **<Ctrl>-<Alt>-<Delete>** twice.

The other message you might see is 'This Windows application has stopped responding to the system'. If you get this message, try pressing **<Esc>**. If this returns you to your application, save your work, then exit and restart Windows. If **<Esc>** doesn't work, try **<Enter>**. Any work you've done in the crashed application will be lost, but you'll have a chance to save your work in other applications. Finally, if neither **<Esc>** nor **<Enter>** succeeds, you'll have no alternative but to press **<Ctrl>-<Alt>-<Delete>** and then reboot your computer.



Look for TMP files. Back in Windows, start File Manager and search for all files with the extension .TMP and any files whose names begin with a tilde (~). The reason: Your work may have been saved in a temporary file before you crashed. Don't restrict your search to your \TEMP directory, either; temp files can be stashed anywhere on your hard disk.

Once you've found all the temp files you can, sort them by date. Look for the most recently created files; the latest one is most likely the file you were working on when the error occurred. After noting the file name, reopen it in the application you were using when the error occurred. If you're lucky, you'll find most of your changes have been saved.



error; use the process of elimination to find out which one. If this doesn't work, try reinstalling your printer drivers and fonts.

Reinstall the software. If the error message occurs in a specific application, the app's files on your hard disk may be corrupted or damaged. Try reinstalling the software.

Eliminate possible software conflicts. Make sure the StartUp group is empty, turn off all screen savers, and don't run Windows from a menu program like MS-DOS Shell.

Eliminate possible hardware conflicts. Configure Windows with a plain-vanilla hardware setup. Start Setup (in Program Manager select *File • Run*, then type **Setup**). Select *Options • Change System Settings*, and then specify a plain VGA display, no mouse or other pointing device, and no networks.

If the problem persists: The error could stem from unsupported third-party drivers, a poorly designed or corrupted video driver, incompatible terminate-and-stay-resident (TSR) programs loaded in DOS, or unsupported device drivers in your CONFIG.SYS or AUTOEXEC.BAT file. Accordingly, use the same process of elimination you used on WIN.INI to establish which driver or TSR is causing the error: Deactivate suspected lines in your start-up files by placing double colons in front of each one, then reboot your computer and try to re-create the error. If you can't, remove the double colons one line at a time, rebooting between each deletion. If and when you can re-create the error, the last line you reactivated should be the culprit.

! Divide By Zero

WHAT IT MEANS: An application has tried to divide a number by zero, resulting in computer chaos. The likeliest culprits are conflicting software programs, corrupted files, or software bugs.

WHAT TO DO NOW: *Reboot.* This error will definitely cause your system to hang.

Look for your work. After you return to Windows, check for temp files to see if your work was saved (see "Can This File Be Saved?").

WHAT TO DO IN THE FUTURE: *Re-create the error and eliminate the suspects.* Start Windows

"clean" by taking all the apps out of your StartUp group, placing a semicolon in front of the Load= and Run= lines in WIN.INI, then restarting Windows. If you can't re-create the 'Divide By Zero' message in this clean setup, restore the applications you removed from StartUp one at a time until you can. If you still can't duplicate the error, create a new Run= line in WIN.INI and, using your original Run= line as a reference, add one app to it at a time. Reboot between each addition to try to get the 'Divide By Zero' error. Finally, repeat the procedure for the Load= line. Whichever component you added last is the guilty party.

Reinstall your app. If the error recurs after you've started Windows clean, try reinstalling the application that was running when you got the error message, then try to re-create the error.

Call for help. If reinstalling an application doesn't fix the problem, call the vendor for a fix or update.

! Call to Undefined Dynalink or Can't find Dynalink filename.

WHAT IT MEANS: You have an outdated or corrupted Dynamic Link Library (DLL). This error doesn't crash your app, but you might find it difficult to continue working. Because the error is based on a DLL the app requires, the error that stopped you in your tracks will recur until the faulty DLL is replaced.

WHAT TO DO NOW: *Restart Windows.* Sometimes just restarting Windows and then the app will fix the problem. If this works, the problem was a memory assignment glitch. If it doesn't, the DLL is most likely out of date, corrupted, or missing from the appropriate directory.

Look for your work. After you return to Windows, look for temp files to see if your work was saved before you crashed (see "Can This File Be Saved?").

WHAT TO DO IN THE FUTURE: *Replace the DLL.* If the error message referred to a specific DLL, you're in luck; replacing the file in question will probably solve your problem. You'll find most DLLs in the WINDOWS\SYSTEM subdirectory, but they also reside in application and \WINDOWS directories. Once you've found the file, compare its date to those of the other files that came with the program (in File Manager, select *View • Sort By Date*). If the DLL is older than the rest, you'll need to get a more updated version from the software publisher. If the DLL file isn't out of date, try reinstalling it from the original disks.

! Cannot find a device file that may be needed to run Windows in 386 enhanced mode. You need to run the Setup program again. Filename.386. Press a key to continue.

WHAT IT MEANS: A virtual device driver listed in your SYSTEM.INI file was not found at start-up.

WHAT TO DO NOW: *Restart Windows, then look for your work.* After returning to Windows, scan your hard drive for new temp files (see "Can This File Be Saved?").

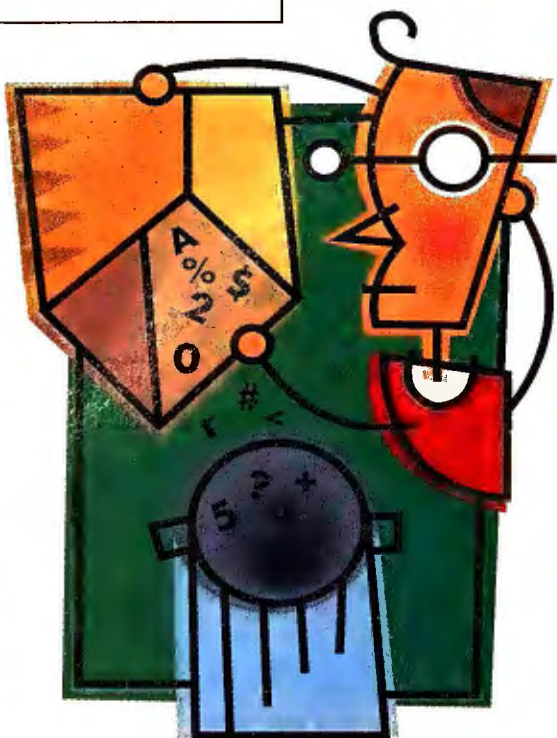
WHAT TO DO IN THE FUTURE: *Make sure you have the file.* Search for the file noted in the error message to see if it's on your hard disk: In File Manager, select *File • Search*, enter the file name in the Search For box, specify **C:** in the Start From box, and be sure the *Search All Subdirectories* box is selected. If you can't find the file, you'll have to reinstall the software.

Make sure Windows knows where the file is. Search your INI files for mentions of the missing file. Make sure the proper path name is used. If a DOS app needs the file, make sure the app's directory is in your AUTOEXEC.BAT file's PATH statement.

! Insufficient memory to run this application. Quit one or more Windows applications and then try again.

WHAT IT MEANS: Logically enough, this message pops up when a Windows app calls for memory Windows doesn't have.

WHAT TO DO NOW: *Close down other simultaneously running applications.* Press **<Alt>**.



<Tab> to switch to your other open apps, and shut them down. Then try to relaunch the original application. If the error message doesn't reappear, you've recovered enough memory.

Check the Clipboard. Sometimes the Clipboard is left holding gobs of data, which, in turn, can consume gobs of memory. You can get rid of the extraneous Clipboard contents using the Clipboard Viewer: Select *File • Run* in Program Manager, type **CLIPBRD** in the Command Line box, then delete the contents by pressing <Delete>.

WHAT TO DO IN THE FUTURE: *Adjust the swap file size.* Make sure your *swap file*, a dedicated portion of your hard disk used to simulate additional RAM, is big enough. In Control Panel, double-click *386 Enhanced* and select *Virtual Memory • Change*. After making sure Type is set to *Permanent*, compare the Size under Current Settings with the Recommended Size under New Settings. If the Current setting is less than the Recommended, click *OK* to accept Windows' recommendation.

Reclaim resources. To cut the drain on your system resources, reduce the size of toolbars in your applications, get rid of your wallpaper, keep icon-heavy groups closed, and load only the fonts you really need.



**KB required value too large.
Decrease PIF KB Required.**

WHAT IT MEANS: The application's Program Information File (PIF) says the app requires more conventional memory than you have available.

WHAT TO DO NOW: *Relax.* You're in luck; this error won't crash Windows.

WHAT TO DO IN THE FUTURE: *Make room.* You need to increase the space available in conventional memory. Make sure you're loading all the device drivers and commands you can into high memory by using DOS 6.0's MemMaker or a third-party memory manager.

Edit your PIF. Using the PIF Editor (PIFEDIT.EXE), check to be sure that the KB required value is not larger than 640K. Check your application's manual to see how much memory the app requires and set the PIF accordingly.



Application Execution Error. Cannot find file name (or one of its components). Check to ensure the path and file name are correct and that all required libraries are available.

WHAT IT MEANS: When you start a Windows application, you're loading more than just an EXE file. You're loading a bunch of associated files, too. This message indicates that one or more of those files is missing

from the expected directory. One common cause: moving an application's files from one directory to another.

WHAT TO DO NOW: *Read the next paragraph.* Again, you don't have to do anything; this error doesn't crash Windows.

WHAT TO DO IN THE FUTURE: *Restore the files.* If you have a backup of the application (and you should), restore it to the appropriate directory.

Relocate your files. Return any recently-moved files to the proper directory.

Reinstall the app. Your application may have a selective installation routine. If so, use it to reinstall just the files you know you need. If not, reinstall the whole thing.



Segment Load Failure

WHAT IT MEANS: Windows can't find the application components it needs because of bad sectors or high file fragmentation on your hard disk. The result: Windows can't boot the code and instead gives you the boot. You can also get this message when you don't have enough DOS file handles specified in CONFIG.SYS.

WHAT TO DO NOW: *Grin and bear it.* You'll be unceremoniously dumped back on your Windows desktop, so there's not much you can do. At least you didn't lose any work.

WHAT TO DO IN THE FUTURE: *Check your hard disk.* If you're using MS-DOS 6.2, exit Windows and use ScanDisk to check your hard disk for bad sectors, file inconsistencies, and allocation faults. If you're using an earlier version of DOS, exit Windows and use CHKDSK, preferably with the /F switch (so the problems it finds get fixed).

Defragment your hard disk. Use DOS's Defrag or any third-party utility to defragment your hard disk (be sure to back up your data first).

Add file handles. Using the Windows system file editing utility (in Program Manager, select *File • Run* and type **SYSEDIT**, open CONFIG.SYS. Increase the number of file handles in increments of 10 by editing the line FILES=; for example, if your CONFIG.SYS currently contains the line FILES=40, change it to 50. Save the changed CONFIG.SYS, exit Windows, and reboot the computer.

Windows 4.0: The End of Rebooting?

With the imminent release of Windows 4.0 (code-named Chicago), the folks at Microsoft are hoping to make the Windows reboot a thing of the past. Mind you, Microsoft isn't saying you'll never see another error message. But with the new version of Windows, the company claims you'll no longer have to

press <Ctrl>-<Alt>-<Delete> every time an application goes south on you.

Under the new version of Windows, all 32-bit applications will run modularly. As a result, when you get an error message in one of these apps, you should be able to close just the offending program. Other 32-bit

applications open at the same time should remain unaffected.

Unfortunately, this protection won't extend to older, 16-bit programs. If one 16-bit application crashes, any other 16-bit apps you have open could crash with it. So even after you upgrade to the next Windows, keep this article handy.

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—Walter Mossberg,
in *SmartMoney* magazine
February 1994



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Circle 103 on reader service card



Access Denied

WHAT IT MEANS: This error most often appears in File Manager when you try to copy, move, or delete a file that File Manager senses is already open. The direct reason for the error is usually appended to the message. This error message will also pop up if the full path name of the file exceeds the 63-character limit (excluding backslashes).

WHAT TO DO NOW: *Close the file.* If the error message tells you 'the source file may be in use', switch to the app using the file and close the file. Return to File Manager and retry what you were doing when you got the error message.

WHAT TO DO IN THE FUTURE: *Get rid of duplicate directory names.* If the error message explains that 'The disk is full', it probably means you're trying to create a new directory (for instance, \STUFF) when you already have a file by the same name (in other words, Stuff) in the current directory.

Shorten your path names. If you have path names that are too long, rename the subdirectories to fit within the 63-character limit. In addition, you should consider performing a full-scale hard disk reorganization.



Parity Error

WHAT IT MEANS: This invariably indicates a hardware problem. Your PC checks its RAM for anomalies every time memory is read or written to. If a check fails, the PC generates a parity error message.

WHAT TO DO NOW: *Exit Windows immediately.* Get out of Windows and search for the problem using the following methods.

WHAT TO DO IN THE FUTURE: *Eliminate software suspects.* Deactivate the memory-resident programs and device drivers contained in your CONFIG.SYS and AUTOEXEC.BAT files, then reboot. To deactivate a line, add two colons to the start of it; this prevents the line from executing. If all goes well, reinstate each TSR and driver,

one at a time, until you re-create the problem. Unfortunately, data and code in Windows change memory locations constantly, so the parity error could appear one time and not another.

Locate bad SIMMs. The first step is to swap out memory chips until the problem

This message is sometimes followed by a 'General Protection Fault'. Another possible cause: The currently installed video driver can't handle a scrolling operation.

WHAT TO DO NOW: *Choose Ignore.* If this method works, save your work with a new file name immediately.

Solutions After the Fact

From the Horse's Mouth

Microsoft has an extensive library of error message reports and solutions posted on its Microsoft Knowledge Base on CompuServe (GO MSKB). If you want to use the database, first download the document "Query Keywords for the Microsoft Knowledge Base." It also appears as Document Q96132, which is retrievable via Microsoft's fax-back service (call 800/426-9400).

The company also offers a comprehensive information service with its Microsoft TechNet, or Technical Information Network. Offered on CD ROM disks that are updated monthly, the

virtual Microsoft library is available by subscription (call 800/344-2121).

The Error Bookshelf

Few Windows books specifically cover error messages or even include the term *error message* in the index. Some, though, may still prove helpful when Windows crashes.

Windows Configuration Handbook, by John Woram (Random House, \$34), offers an exhaustive appendix of error messages, with causes and remedies for each one. This volume is probably the single best source for error message diagnosis and treatment.

Windows for Dummies, by Andy Rathbone (IDG Books, \$16.95), devotes one chapter to error messages and covers only a limited number of them.

But the errors discussed are those beginners are most likely to run into, and the information is clearly and simply presented.

Catherine Murray's *S.O.S. for Windows* (IDG Books, \$12.95) is filled with whimsical illustrations that add nothing to your knowledge. But the sidebars—with suggestions on how to deal with tech support people, definitions of technical terms, and step-by-step solutions—make the book a valuable troubleshooting resource.

disappears. Open up your PC, remove one of the SIMMs, restart your system, and see if Windows works. If it doesn't, you've found the faulty RAM. If it does work, swap out another SIMM, and repeat the process until you find the SIMM that caused the error. Of course, if you are not comfortable pulling out the vital organs of your computer, you'll need to get professional intervention.



An error has occurred in your application. If you choose Ignore, you should save your work in a new file. If you choose Close, your application will terminate.

WHAT IT MEANS: More than likely, you've run into an incompatibility between a Clipboard file and the installed video system. This happens, for example, when you try to view a high-resolution graphics image on a system that doesn't support that resolution.

Choose Close. Use this if Ignore didn't do the trick. You will be returned to the Windows desktop. Open the Clipboard Viewer to see if your work is still there. If so, save it to a new file. Then quit and restart Windows to clean out the memory in use.

WHAT TO DO IN THE FUTURE: *Update VGA.DRV.* If the error occurs during scrolling, the fault lies with your current version of VGA.DRV. To test this, close all active programs in Windows. Press <Print Screen> to capture a full screen to the Clipboard. Next, open the Clipboard Viewer and maximize the screen. When you scroll to the end, your error message should pop up. If this happens, you need to reinstall VGA.DRV. Because the copy on your hard disk was somehow corrupted, try reloading the one that came with your original Windows disks. If this doesn't work, contact Microsoft to get a new copy of the file.

Michael S. Lasky is an associate editor for PC World.

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Small Office Home Office

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



CONTENTS

- 230** The Savvy Shopper
- 239** Top Picks for the Home Office
- 243** Great Communicators

Edited by Steve Fox
Illustration by Glenn Mitsui



**Intrepid consumer
Steve Bass knows how
to spot a good deal
when he sees one.**

The Savvy Shopper

**In the market for a new PC?
Our shopper goes undercover in search of the
best places to buy. By Steve Bass**

SHOPPING FOR A NEW COMPUTER can be as scary as buying a new car—only worse. You worry about getting stuck with obsolete, under-powered equipment or being talked into an expensive system with more computing power than you'll ever need. To make things more confusing, computers are sold practically everywhere nowadays: computer superstores, office supply stores,

discount warehouse clubs, consumer electronics outlets, and even traditional mass merchants such as Sears and Montgomery Ward. What's next, your local 7-Eleven?

The question is, which kind of store is right for you? To find out, *PC World* sent me shopping. My assignment: Visit the most popular stores in Southern California that sell computers and pretend to buy a

system. I'd play the part of an average user setting up a new home office desktop publishing service. I'd say I want a PC to run PageMaker, PowerPoint, CorelDraw, and Word for Windows; to manage the business, I might add Quicken and Excel in the future. My disguise? I put on a shirt and tie and tried not to look like a propeller-head.

I'd tell salespeople that I'd researched my purchase in computer magazines and wanted a PC with 2MB of RAM, a 100MB hard drive, and a 2400-bits-per-second (bps) fax-modem. This little fiction was designed to test their acumen: 2MB isn't enough RAM to run Windows, a 100MB hard disk is too small to hold large graphics files and today's space-hogging applications, and 2400-bps modems are outmoded.

Sure, it was a sting, but if Mike Wallace can do it, so can I.

Computer Superstores

My first stop was CompUSA. It was Saturday afternoon and the place was jammed; parking alone took ten minutes. Once inside, trudging past aisles of software and PC peripherals, I faced rows of Dells, Compaqs, Packard Bells, and CompuDynes, CompUSA's house brand.

I nabbed a staffer named Derrick and told him my story. In return, he gave me an earful of advice about what I'd need on my desktop and about computers in general. Right off the bat, he told me I needed a system with more muscle. He went on, outlining the system I needed component by component. His recommendations for CPU speed, amount of RAM, and hard disk size were all on target.

Ultimately, he recommended the house brand, a CompuDyne system, and told me that if I wanted to add a tape backup or a multimedia kit, they'd install it at no charge. The only time I felt I was getting a hard sell was when he told me—with complete sincerity—that CompuDyne systems use higher-quality

components than those from other, pricier manufacturers. Yeah, sure. As for CompUSA's pricing, while I didn't see any bargains, I didn't feel like I was getting gouged.

With one computer superstore under my belt, I hopped back onto the freeway to check out my local Micro Center, a 50,000-square-foot store filled with some 23,000 products. I had no trouble finding a salesperson, and he knew his stuff. He acted more like a user group member taking a novice under his wing than a pushy salesperson earning a living. Instead of buying Microsoft Word for Windows and PowerPoint separately, he pointed out, I could save a bundle

by buying Microsoft's Office, and I'd get a copy of Excel in the bargain. Good advice. Then he helped me find a reasonably priced multimedia system from Micro Center's own line of PCs: The 486DX2-50 included 8MB of RAM, a 340MB hard disk, a 15-inch monitor, a CD ROM drive, and a sound card—all for about \$1750.

Micro Center proved to be as good a shopping experience as CompUSA. I'd feel safe sending my mom either place—as long as I went with her.

Office Supply Stores

Colossal office supply stores like Office Depot carry everything from rubber bands and paper clips to copy-

ing machines and phone systems. These stores also claim to stock thousands of PC products, but the two I visited proved lacking. When I stopped by my local Office Depot, for example, I found just one lonely Compaq Presario and a handful of Packard Bells. According to the salesperson, the last IBM had been sold the week before and a new shipment, including some IBM ThinkPad notebooks, was on the way. I must admit the collection of Macs was excellent (too bad I don't write for *Macworld*).

Office Depot's skimpy selection was a shame, because the store's in-house computer evangelist was knowledgeable and eager to help.

What's in Store: Comparison Shopping

So what's the best place to buy PCs, printers, software, and the like? Our top pick goes to the computer superstores, with warehouse clubs running a close second. If you're skilled at fending off predatory salespeople, consumer electronics store are a reasonable option. Office supply stores, because they offer one-stop shopping, come in fourth, while mass merchants have the dubious distinction of being our least favorite venue for PC purchasing. For the sake of comparison, we've also listed the pros and cons of buying mail order.

Computer Superstores

PROS: The best selection of PCs and peripherals, reasonable prices, plenty of knowledgeable salespeople, and in-house service and tech support departments. And they'll custom-configure your system.

CONS: Sales staff may be on commission (they aren't at CompUSA, but they are at Micro Center), so watch yourself.

Warehouse Clubs

PROS: Pricing and customer assistance can be quite good. And you can buy paper towels and PCs in one stop.



CONS: Selection is meager. The stores we visited had only two brands of PC (albeit Dell and Compaq), plus software, printers, fax-modems, and graphics boards. No in-house service or tech support.

Consumer Electronics Stores

PROS: Generally good selection of PCs and, in some stores, peripherals, for okay prices. Salespeople can be good, though not all are. Some stores may have an in-house service department.

CONS: High-pressure, commissioned salespeople. Hard to obtain sales literature. No in-house tech support.

Office Supply Stores

PROS: Pricing is competitive with that of computer superstores. Small office/home office denizens can equip an entire office in one shopping trip. Sales staff can be excellent.

CONS: The selection of PCs is narrow. In stores we visited, choices were limited to two or three brands. Sales staff is small and its quality is hit-or-miss. Many stores lack in-house service departments.

Mass Merchants

PROS: Sales staff is well-trained in customer relations. Plentiful literature; in-house service departments.

CONS: The PC departments seem like afterthoughts: The selection of PCs is poor, and there are often gaping holes in salespeople's computer knowledge.

Mail Order

PROS: Great prices, wide selection. Vendors will generally customize your system's configuration to meet your specifications.

CONS: You'll have to wait for your PC to arrive in the mail, and you can't take a look at your purchase before you buy.

—Dan Miller

Admitting to dismay at the store's slim pickings, he did a decent job of describing what little stock he had. As I played dumb, he let me pick his brain for 40 minutes with dozens of questions. The only dubious advice: He recommended I try Microsoft's Publisher rather than PageMaker because "it's easier to learn"—true enough, but no professional DTP'er would run a business using a low-end package like Publisher.

The selection at Staples, the other office supply store I shopped, was worse than at Office Depot: a solitary

Compaq 486DX-50 and two low-end Packard Bells. The salesperson, bless his inaccurate heart, warned me away from computers with SX chips because "if you do serious drawing, like hard-core graphics, you'll need a DX." I see. He recommended the Compaq because, among other things, it has extra slots so I can "put in a video card or a color card." Next.

Warehouse Clubs

Next in line was Price Club, the giant discount warehouse club. After all, I needed to pick up a sack of dog

food and a case of laundry detergent anyway, so why not look for a computer while I was there?

The first Price Club I visited sold only two brands of PCs—Dell and Compaq—and the selection of these was pretty spare. As I walked past the sample systems—plugged in and working, stacks of literature nearby—my attention kept drifting over to *All My Children* playing on the TVs in the next aisle. During commercials, I discovered a Dell multimedia system—a 33-MHz 486DX with 4MB of RAM, a 230MB hard disk, a double-speed CD

Retail Details: From Superstore to Mail Order

	Number of computer products sold ¹	Computer brands	Custom-configured systems ²
COMPUTER SUPERSTORES			
CompUSA 800/266-7872	5000 ³	Apple, AST, Compaq, Compudyne, Dell, Epson, Hewlett-Packard, IBM, Packard Bell, Toshiba	Y ⁴
Micro Center 614/481-8041	23,000	Apple, AT&T, Compaq, Hewlett-Packard, IBM, Laser, NEC, PowerSpec, Toshiba, WinBook (Micro Electronics)	Y
OFFICE SUPPLY STORES			
Office Depot 800/685-8800	3000	Apple, Compaq, IBM, Packard Bell, Toshiba	N
Staples contact your local store	n/a ⁵	Compaq, Packard Bell	N
WAREHOUSE CLUBS			
Price Club/Costco 800/774-2678	40-45	Compaq, Dell	N
CONSUMER ELECTRONIC STORES			
Circuit City 800/251-2665	200-500	Apple, AST, Compaq, IBM, Packard Bell, Toshiba	N
Good Guys 415/615-5000	n/a ⁵	Acer, Apple, AST, Compaq, Epson, IBM, Leading Edge, Packard Bell	N
MASS MERCHANTS			
Montgomery Ward contact your local store	200-300	Apple, Compaq, IBM, Packard Bell, Pionex	N
Sears contact your local store	200-250	Apple, AT&T, Epson, IBM, Packard Bell	N
MAIL ORDER			
Dell Computer Corp. 800/433-8110	n/a ⁵	Dell	Y
Gateway 2000 800/846-2065	n/a ⁵	Gateway	Y

¹ As measured in stock keeping units (SKUs). ² Options include extra RAM, a larger hard drive, and a CD ROM or tape drive.

³ Can special-order an additional 40,000 items. ⁴ Compudyne house brand only. ⁵ Company does not divulge SKUs.

ROM drive, sound, speakers, and a 14-inch monitor—all for a reasonable \$1899. The multimedia

Compaq Presario 833 CDS, based on a 33-MHz 486SX, was selling for \$1599, about \$100 less than I'd seen it elsewhere.

I looked around for some help. Frankly, I wasn't expecting much in the way of customer service. But while I was fiddling with the Presario, I bumped into a salesperson who really knew computers.

After hearing my story, he ex-

I needed to pick up some dog food and a case of laundry detergent anyway. Why not look for a PC while I was there?

plained that the Dell, while more expensive, would be best because of its speed. But the Compaq has a modem, I told him; isn't that good? "It runs at only 2400 baud, and that's old technology," he pointed out, correctly. "And unless you plan on going online right away, you can wait a while and put a faster, 14.4-bps fax-modem into the Dell," he suggested. Made sense to me.

And this store was no fluke. I tried a different Price Club the following week (I needed more dog food). They had the same Compaqs and Dells as the first store, with two more powerful models on display. And the salesperson had the same patient approach and level of competence.

If you're willing to try Price Club, you can expect good prices but few choices. Just remember: If you see a system you want, buy it fast, because what's in stock today may be discontinued tomorrow. On a third shopping trip two weeks later, the Presario 833 was no longer available.

PC sales staff per store	Commissioned sales staff	Money-back guarantee	In-house service	In-house support
20	N	Y	Y	Y
100	Y	Y	Y	Y
2	N	Y	N	Y
1-5	N	Y	N	N
1-5	N	Y	N	N
4	Y	Y	Y	N
2	Y	Y	N	N
1-5	Y	Y	Y	N
1-5	Y	Y	Y	N
n/a	N	Y	N	Y
n/a	Y	Y	Y	Y

Consumer Electronics Stores

I knew from past shopping trips that the name of the game at Circuit City is "commissioned sales." As I made my way past the refrigerators and into the computer section, a guy who looked suspiciously like a used car salesman sidled up to me and asked if I needed help. He gave me a minute to explain the needs of my incipient business and then proceeded to demonstrate the virtues of a CD ROM-based encyclopedia. I asked him to look up *perfunctory*.

I managed to dislodge myself from the encyclopedia demo and started to examine some of the systems. Circuit City has PCs from lots of vendors—like Packard Bell, AST, IBM, and Compaq—each in a variety of models. Better yet, prices are reasonable, and the store guarantees to beat any local store's price (of course, you'll have to find the exact same configuration—good luck). Unfortunately, sales literature is difficult to come by. Most of it is laminated and attached to the shelf, and it takes an act of Congress to get it photocopied.

By now, another salesperson was circling. This one actually paid attention to what I had to say. He recommended an AST 486SX-33. I asked if a DX2-50 might not be better for

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work. Simple tasks are automatic, more complex jobs are a breeze.

Say that you want to browse through all your data to find some sales totals. Click. AutoFilter shows you just what you want.

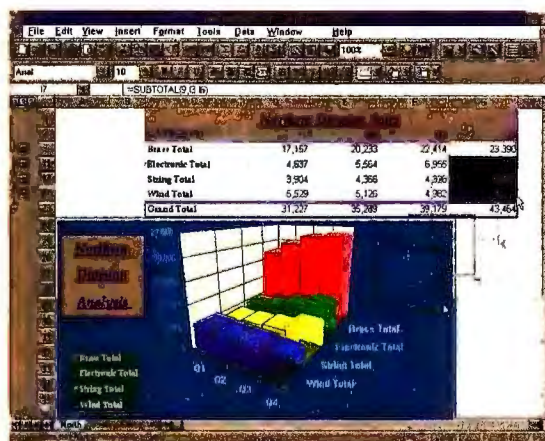
You can add those totals automatically with the Subtotal feature

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from different points of view—by product, region, quarter, whatever. Just drag and drop different headings to rearrange your report. As you go, your figures are immediately recalculated. So you see them in a whole new way.

Of course, Microsoft Excel is another smooth-fitting piece of the Microsoft Office, where the programs work together like one.

After creating a table or chart in Microsoft Excel, you can just drag and drop your work into Word.

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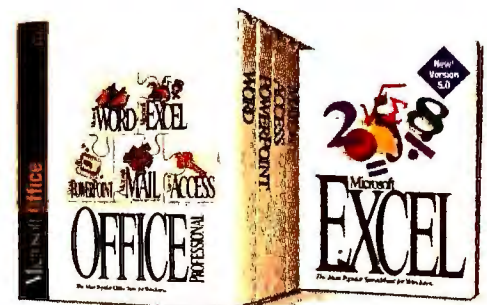
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me. "Nope," he explained. "But if you're doing desktop publishing, you'll be happier with a 17-inch monitor. And lemme tell ya 'bout our extended warranty..." Want to bet he's on commission?

My next stop on the electronics circuit was The Good Guys. The first thing the salesperson wanted to know was, "What're you going to do with it?" The question nearly brought tears to my eyes. Wait, it got better. Jeff walked me through each component of Acer's 4571G. "The 340MB hard disk has about 100MB of installed applications, so even with your new programs, you'll have plenty of space left for data." How about speed? "Get at least a 33-MHz DX—you'll be unhappy with a slower SX. Put your money into more RAM—about 4MB more—instead of a 50-MHz processor."

His sales pitch was so convincing, I almost found myself reaching for my Visa. (The prices were on a par with the other stores I shopped.) Now I know why it's called The Good Guys.

Would I recommend buying a PC at an electronics boutique? Yes, as long as you stay wary and do your homework first. And if a salesperson comes on too strong—or

can't answer all your questions—head for the door. Unless, of course, you really do need that new refrigerator.

Mass Merchants

I didn't expect to find anything innovative or exciting in Sears' PC department—and I was right. Plenty of Packard Bells and a few IBMs. The sales force consisted of one poor soul trying to take money at the register and answer the telephone while fielding my barrage of questions (okay, I felt a *little* guilty).

I headed over to the gardening center for a while, giving the guy time to catch up. When I got back, I went through my song and dance. This time I got some real Sears service. He grabbed literature, jotted down the price of each system, and explained the components of each computer. Nice work. But he wasn't familiar enough with the software I planned to use to realistically gauge the best system for my needs. At least he was honest enough to admit his ignorance.

Montgomery Ward was no better. The store I visited carried two IBM PS/1s and the now ubiquitous Packard Bell. I tried my damndest to get the salesperson to figure out the system best for me. All the conversation

got me was a listing of each computer's specs, and, at that, he wasn't clear.

"Does the Packard Bell have enough room for my software?" I asked adroitly.

"Yep, it comes with 270MB of memory," he replied. I considered giving him a quick tutorial on the difference between memory and hard disk space, but managed to resist.

"Er, can the store customize any of these systems?" I tried.

"Nope," he said.

The good news: I got a cool pair of Reeboks—on sale.

The big retailers are great for certain things—shopping for a wrench set at Sears is one of life's little pleasures. But are they good places to buy computers? Not until they start putting DX2s on radial-arm saws.

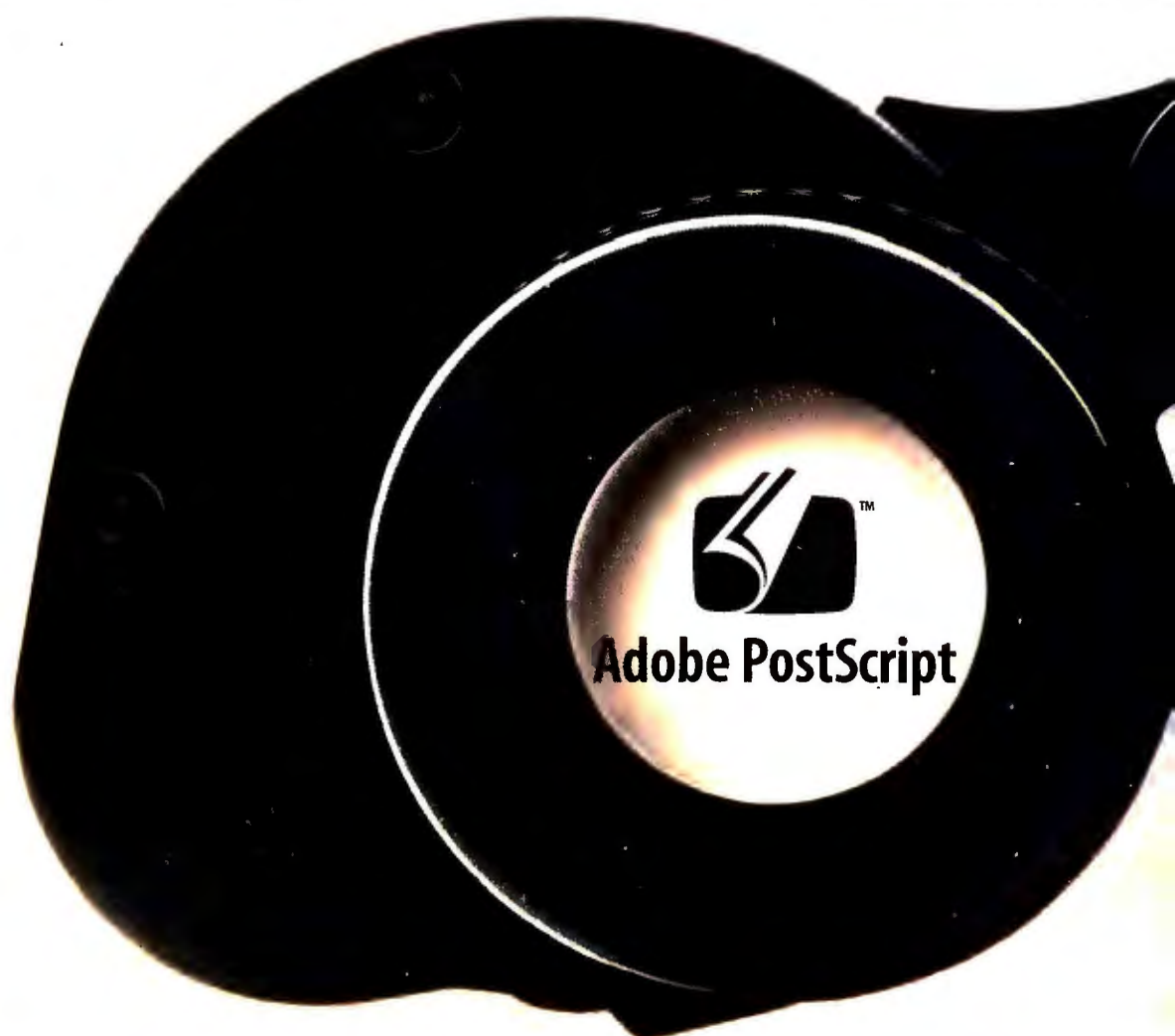
The Bottom Line

I shopped until I dropped, talked with lots of salespeople and scribbled plenty of notes. What did I learn? That if you really *are* looking for a PC, you don't have to fret.

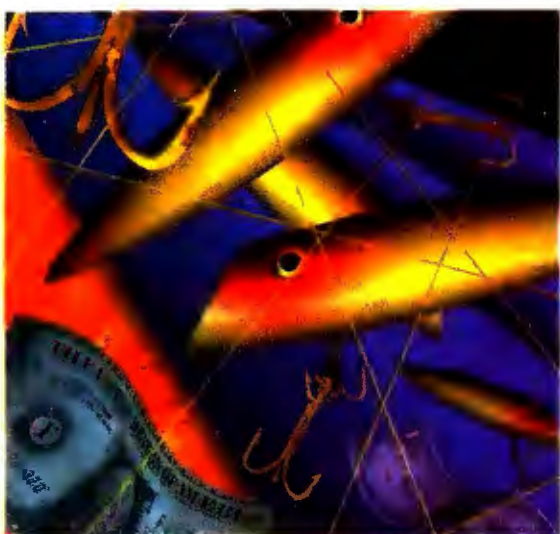
If you live in a big city, you have plenty of choices. At the top of my list are the computer superstores: They're dedicated to selling computers and everything that goes

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with a system. Each superstore I visited had a great selection, with everything in stock. The salespeople were a well-trained bunch who never pressured me. Next, I'd suggest a warehouse club like Price Club/Costco. You can save a little money, as long as you know what you want and you can tolerate the mediocre selection.

Choice three is a consumer electronics store. The selection is generally good and the prices are okay. Again, you have to know what you want, because the quality of the sales help is unpredictable.

The office supply stores were disappointing. Even though system prices are reason-

able and I found a well-trained salesperson at Office Depot, there wasn't much to choose from. My advice is to steer clear. At the bottom of my list are the mass merchants—Sears and Montgomery Ward. The PC departments felt like afterthoughts.

How do these outlets compare with mail order? You can get better prices, great selec-

a while, give it a whirl. If the prices are too rich or the brand selection too thin, you can always head for a chain.

One final note: If you want advice on choosing a PC outlet in your area, consider joining a local computer user group and then asking members for recommendations. You might even get someone to take you

I knew from past shopping trips that the name of the game at Circuit City is "commissioned sales."

tion and often some customizing when you shop by phone. But you can't *see* equipment you're buying. The other problem with mail order: You have to wait for your PC to arrive in the mail. Buying locally means you can pick up your PC in the morning and be playing Minesweeper that afternoon.

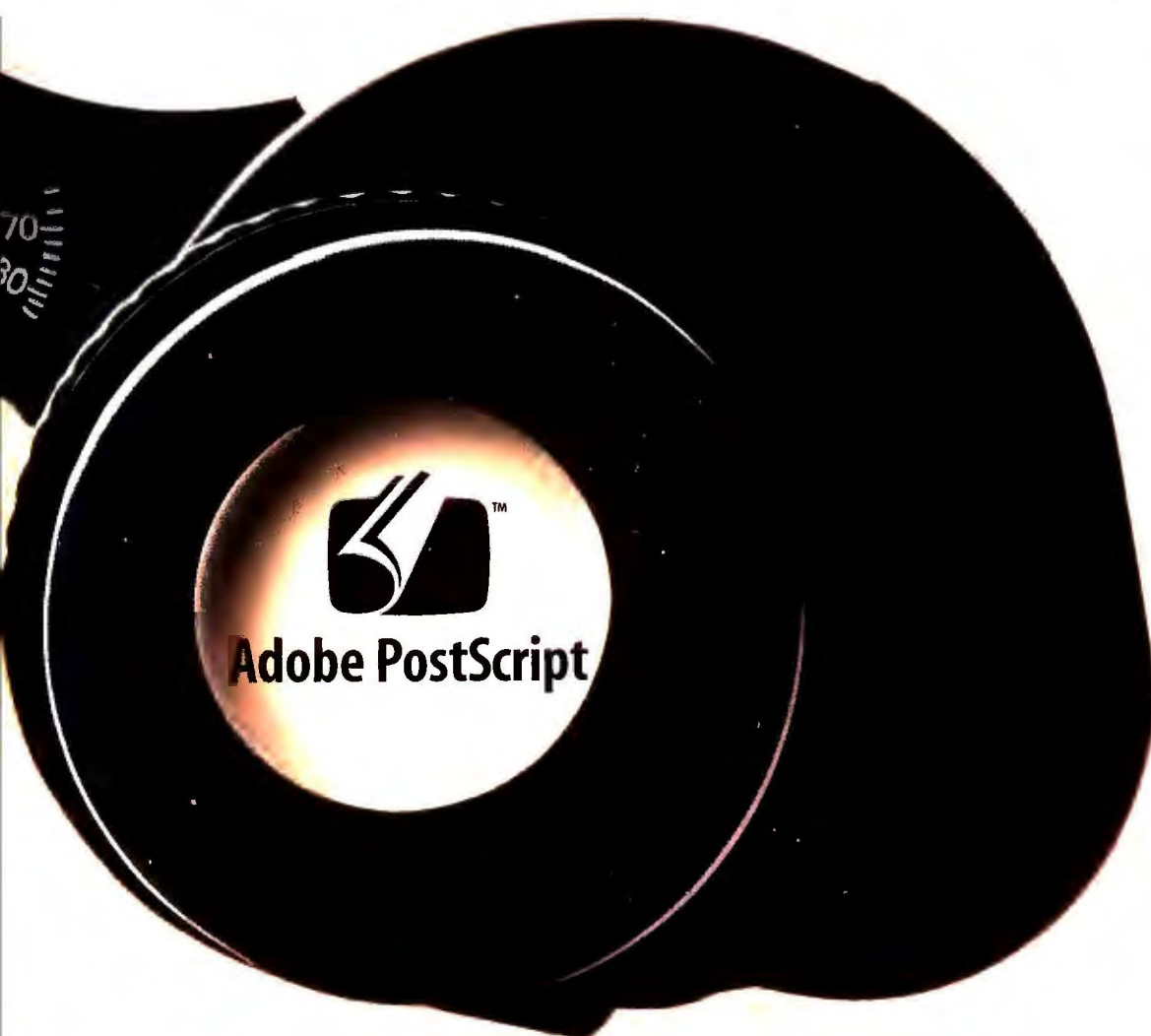
You can also buy from a local mom-and-pop computer shop. At their best, local shops offer friendly, expert advice and custom-configured systems. Still, even the best of them have trouble competing with the bigger outlets on pricing or selection. If you can get a solid recommendation for a trustworthy local store that's been in business for

along on a shopping excursion. You can find a user group in your area by calling the Association of Personal Computer User Groups' locator number (914/876-6678), by looking for user group listings in local computer mags like *Computer Currents*, or by checking out the *Consumer Watch* column in the October 1993 issue of *PC World*.

As for me, well, I'm getting back into a T-shirt and heading out to Price Club. Looks like I'm outta dog food again.

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. Dan Miller is an associate editor for **PC World**. ■

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Top Picks for the Home Office

These are a few of our favorite things. By Steve Bass



Panasonic's KX-F390 is an answering machine, fax machine, and cordless phone.



LOOKING FOR GOOD PRODUCTS at reasonable prices? Here's a sampling of some topflight tools.

Home Office Bottom Lines

Okay, I'll admit it: I've never been a big accounting fan. But with Intuit's QuickBooks 2.0 for Windows, even I look forward to a bookkeeping session. That's because QuickBooks not only takes care of check writing, accounts payable and receivable, and the usual accounting tasks, it also features exceptional business management tools. The program's graphs give you a quick visual look at the status of, say, your receivables, or you can

monitor your income and expenses in the form of a pie chart. Even better, it enables you to zoom in on behind-the-scenes details by clicking any portion of a graph. For a street price of about \$95, QuickBooks also offers insight into your business, with reports that forecast cash flow and determine your company's up-to-the-minute net worth. Now, if only

QuickBooks had an ATM option for dispensing \$20 bills from the floppy drive. *QuickBooks 2.0 for Windows* \$159.95; Intuit; 800/624-8742. **Reader service no. 605**

A Cordless Combo

If you're planning to open a small office, you know you'll need a fax machine. But you'll also undoubtedly need an answering machine—and don't you want the convenience

of a cordless phone? Well, it gets easier all the time with Panasonic's new KX-F390 integrated system. It has everything you want, including the latest cordless phone technology: 900-MHz range for clearer reception at longer distances. Privacy Ring enables the unit to recognize numbers you've entered into memory and identifies the call with a special ring pattern. The KX-F390 saves you money by letting you print fax documents in half-size, reducing thermal paper use. And the unit's ten-page document feeder lets you set the unit to delay faxes until off-peak hours, when long-distance charges are con-

siderably lower. *KX-F390* \$1299.95; Panasonic; 201/348-9090. **Reader service no. 606**

Wring Out a Few More Bytes

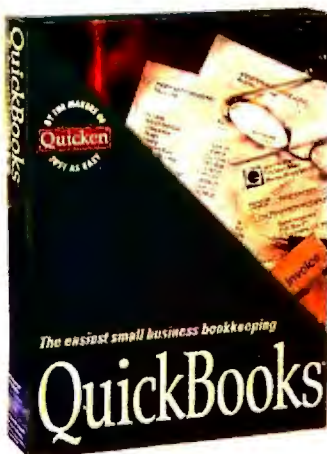
Remember when you first bought that 200MB hard drive? I'll bet it's almost full and you're considering upgrading. But before you touch that screwdriver, take a look at Stacker 4.0 for Windows: For around \$100 on the street—lots less than a new hard drive—this disk compression program can double your hard disk space. I more than doubled the size of my 230MB hard drive—a mind-expanding experience. Now you can finally load that 18MB screen saver.

In addition, the program's Windows Toolbox lets you optimize and fine-tune your compressed disk, and it alerts you to changes in the disk's condition. For safety's sake, Stacker also maintains duplicate sets of important system files on uncompressed portions of your hard disk. *Stacker 4.0 for Windows* \$149; Stac Electronics; 800/522-7822, 619/431-7474, 619/431-0880 (fax). **Reader service no. 607**



Achy Breaky

Tired of schlepping your handset from the phone to your ear? Achy from squeezing your shoulder against your neck with the phone wedged between? Try a headset from Plantronics. It's small and lightweight—about 3.5 inches and just half an ounce—and fits snugly into



QuickBooks keeps your books and forecasts your cash flow.



PaperMax is a small, fast scanner that springs to life when you feed it paper.

one ear. The headphone connects to both external and internal modems as well as fax-modem cards.

If you prefer to use a headset that loops around your head, you can choose the Supra Headset and plug it directly into your desktop phone. *CompuSet \$99.95, Supra \$196; Plantronics; 800/544-4660, 408/426-5858. Reader service no. 608*

Big League Marketing From Home

Got a hot product to sell but no big bucks for a marketing firm? If you have a CD ROM drive, Pro CD's Direct Phone can give you unlimited and inexpensive access to some top-of-the-line marketing information. Direct Phone is a two-CD set with a complete residential directory for the entire country packed on one disk, and listings for all businesses on the other.

For a street price of less than \$100, you can plot businesses by town,

Scanning the Horizon

Ever need to copy an insurance form quickly? Or convert a paper document into something you can fax directly from your computer? Then you'll want to check out PaperMax and MaxMate for Windows, an exquisitely integrated scanner/software combination.

The PaperMax is a compact 3-by-3.75-by-12.5 inch scanner that hooks into your PC's serial port. Insert a sheet of your document, and the PaperMax springs to life, scanning the page in seconds. Then, in less time than it takes to say *paperless office*, the scanned image pops up on screen in the companion MaxMate application, which lets you rotate, zoom, annotate, and touch up the image. You can even combine multiple documents—for example, all your bills—into one file. The scanned black-and-white image is slightly better than standard fax quality, although not good enough for desktop publishing. But at \$499 list, you wouldn't really expect it to be. *PaperMax with MaxMate for Windows \$499; Visioneer; 800/787-7007, 415/493-9599. Reader service no. 609*

Desktop Holdings

Is your desktop real estate at a premium? MultiForm Products has some nifty gadgets designed to lift and swivel and raise your electronic devices uptown. You can put your phone atop a telescoping arm that swings out of the way when you don't need it.

Next, you can raise the monitor to eye level with the Tandem 1 raised

the unit closer to you, push it back, or rotate it 90 degrees to the left or the right from the front. *Telescoping Arm \$114.95, Tandem 1 \$329.95; MultiForm Products; 800/382-8113. Reader service no. 611*

On the Road Again

Want to keep a computer by your side without throwing out your back or your budget? Just power up Hewlett-Packard's OmniBook 530 PC, a 3-pound 33-MHz 486SX sub-notebook. The OmniBook is tiny—11.1 by 6.4 by 1.4 inches—but it still boasts 4MB of RAM, a 130MB PCMCIA removable hard drive, and a full-size keyboard. The 9-inch, 640 by 480 VGA display isn't backlit, but it's adequate. There's also a second PCMCIA slot and an output connector for hooking up an external monitor. Running on its rechargeable nickel-metal-hydride battery pack, the sub-



The 3-pound HP OmniBook 530 makes 486 power a breeze to carry.

note gives you up to four hours of mobile computing time. You transfer data to your desktop either with the built-in LapLink Remote software or with the bidirectional infrared port.

The OmniBook comes bundled with Windows 3.11 and DOS 6.2. *HP OmniBook 530 PC \$1799; Hewlett-Packard; 800/443-1254. Reader service no. 612*

For information about all products in this article, circle reader service no. 901.

Pro CD's Direct Phone gives you unlimited access to primo marketing information.

phone number, area code, prefix, or type of business, then export the data to your favorite spreadsheet or word processor. Especially useful for direct mail and telemarketing. *Direct Phone \$149; Pro CD; 800/992-3766, 508/750-0000, 508/750-0070 (fax). Reader service no. 610*

desktop. This extra platform clamps onto your desk, adding more than 3 square feet of work space and supporting up to 110 pounds, so you can keep your fax or answering machine aloft as well. Once the platform is attached and locked into place, a unique swivel device lets you pull

If catching a trophy king salmon in Alaska sounds like an adventure, try shipping it to Tulsa.



Pete Devaris of Kodiak Wilderness Tours (left) uses Mail Boxes Etc. to take packing and shipping off his hands.

Pete Devaris, owner of Kodiak Wilderness Tours in Alaska, doesn't mince words. "We're in the adventure business, not the shipping business." So

when Pete's fishing charter customers want their trophy catch sent back home, he does what other small business owners do. He heads for John Whiddon's Mail Boxes Etc.®

"John does it all. He has the packing material, the special boxes and the overnight UPS® service it takes to get a 60-pound salmon back to my customer's home town in perfect condition." All of which has made life a lot easier over at Pete's place. "There was a pretty big sigh of relief back at the office when John opened his MBE Center."

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rapid overnight delivery to scheduled ground service to reaching destinations all over the world, Mail Boxes Etc. is your UPS connection.

We also provide full-service mailboxes, quality copies, faxes, office supplies and more.

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PACKAGE 1

- 486SX-25** \$1195
- 486DX-33** \$1395
- 486DX2-50** \$1395
- 486DX2-66** \$1495
- 4MB RAM
- 214MB IDE hard drive with built-in 32K cache
- 3.5" 1.44MB floppy drive
- On-board VESA local bus SVGA color video
- ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch
- MS-DOS 6.2 w/Enhanced Tools, Windows for Workgroups 3.11, Microsoft Mouse

PACKAGE 2

- 486SX-25** \$1395
- 486DX-33** \$1595
- 486DX2-50** \$1595
- 486DX2-66** \$1695
- 8MB RAM
- 340MB IDE hard drive with built-in 128K cache
- 3.5" 1.44MB floppy drive
- On-board VESA local bus SVGA color video
- ZEOS 14" 1024 x 768 NI SVGA color monitor, .28mm dot pitch
- MS-DOS 6.2 w/Enhanced Tools, Windows for Workgroups 3.11, Microsoft Mouse

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EPA POLLUTION PREVENTER

It's green: All ZEOS Ambra computers are now green—meaning they use less energy. Why should you care? Because Ambra PCs cut down on pollution and lower your electricity bill. That can translate into big savings for you and your company!

These are just two of the reasons this machine is so keen. There are others like even lower prices; money-saving packages or the option to build a system to your own needs; and 100% compatibility with all major network operating systems—



including Novell NetWare.

There's more...like award-winning after-the-sale support. No company has won more *PC Magazine* Readers' Choice for Service & Reliability awards than ZEOS—six in all!

The ZEOS Ambra is a little powerhouse that's great for word processing or intense spreadsheets. Whether it's plugged into your network or plugging away at the home office, ZEOS Ambra computers are the sensible system that won't cramp your style or take a bite out of your wallet. Others will be green with envy at your mean machine with the lean price. Call your ZEOS Systems Consultant now.

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Purchase orders are subject to approval. Business leasing programs available. Lease prices based on a 36-month lease, 10% purchase option. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. The Energy Star emblem does not represent EPA endorsement of any product or service. Novell compatibility is Developer Tested Only. Novell makes no warranties with respect to this product. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside is a trademark of Intel Corporation. ZEOS is a registered trademark. Ambra is a trademark of ZEOS International Ltd. ©1994 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS). AMB-PCW 9409

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Great Communicators

The telephone is your business's lifeblood. Here's how to make the most of it. By William Rodarmor

THESE DAYS, YOU CAN HANG MORE toys on a phone line than lights on a Christmas tree. You may start with an answering machine, and later add a fax machine or fax-modem. Then your local phone company seduces you with promises of voice mail, call waiting, call forwarding, and the like. Before you know it, your office looks like an AT&T showroom, with a sprawling PBX system and wall-size video phones. Where do you stop?

For that matter, where do you begin?

The key to taming the telephone is to make it work for you, not vice versa. The best way to begin is by asking a few simple questions.

What Kind of Phone?

Many small businesses start out as just that—small. Then clients start calling back, word of mouth spreads, and suddenly that princess phone in the living room has turned into a royal pain.

To keep up with the flow, you'll need to upgrade your telephone. For less than \$50 you can buy a cheap phone with a "flash" key that lets you hold or transfer calls. But this is no place to scrimp. Buy a phone with every feature you think you'll ever need—then add a few to grow on.

Do family or fellow workers occasionally answer your line? Get a model with an intercom, so they can call you to the phone. Need to take orders or notes while you're gabbing? A \$100 Plantronics headset lets you talk and type without getting a crick in your neck. If you and your partner absolutely must talk to a client together, get a speaker phone. A full-duplex model like the \$150 AT&T Speakerphone 870 doesn't have that tinny, bottom-of-a-mine-shaft echo.

If you spend most of your time away from your desk—in a carpentry shop or back in the storage room digging through inventory, for example—consider a cordless phone. For \$60 to \$180 you can buy a 46- or 49-MHz model that works just fine, provided you stay reasonably close to the phone's base. Phones that use the newly approved 900-MHz frequency have greater range and clarity but cost from \$299 to \$450. How useful is a cordless? Ken Boche and Barrie Moss, who run Aikane Nursery on the Big Island of Hawaii, regularly take calls on an AT&T cordless while they're out tending their plants. "We couldn't live without it," says Moss.

If you're on the road a lot, a car phone lets you make deals on wheels. But be honest: Do you really need a car phone or just want company when you're stuck in traffic? Cellular gear isn't cheap—Motorola phones range from \$190 to \$250—and at about a dollar a minute just for local calls, the charges can quickly go through the sunroof. But for some businesses, says Salli Rasberry, coauthor of *Running a One-Person Business* (Ten Speed Press, 1994), a car phone is dynamite. Her husband, Michael Eschenbach, is a contractor in Freestone, California, who often

Be honest. Do you really need a car phone, or do you just want company when you're stuck in traffic?

has several crews working at once. Rasberry says the car phone has upped his efficiency 30 percent.

Nearly every U.S. city is served by at least two cellular phone companies, and stores that sell the gear are affiliated with a particular service, so expect a strong sales pitch. Before you buy anything, ask for a free one-month trial period to see if you get consistently good reception on the routes you usually drive. But remem-

ber, a hacker can modify a police scanner to eavesdrop on cordless or car phones. Lawyers, stockbrokers, and others who trade in confidential information should use phones wired to the wall—or be doubly discreet while talking in transit.

How Many Lines?

Many small-business owners do fine with just one phone line; others insist on two or more. Multiple lines come

in handy when you share a phone line with someone else or if you need to segregate business calls for accounting purposes. But the best reason for getting additional lines is to add more gear or services—fax machine, voice mail, and so on—than one line can easily handle. No business can afford to have customers complaining that they can't get through fast enough.

So if you send or receive a lot of faxes, spend much of your day making calls, or roam online services like CompuServe, get a second line. This is especially true if you use voice

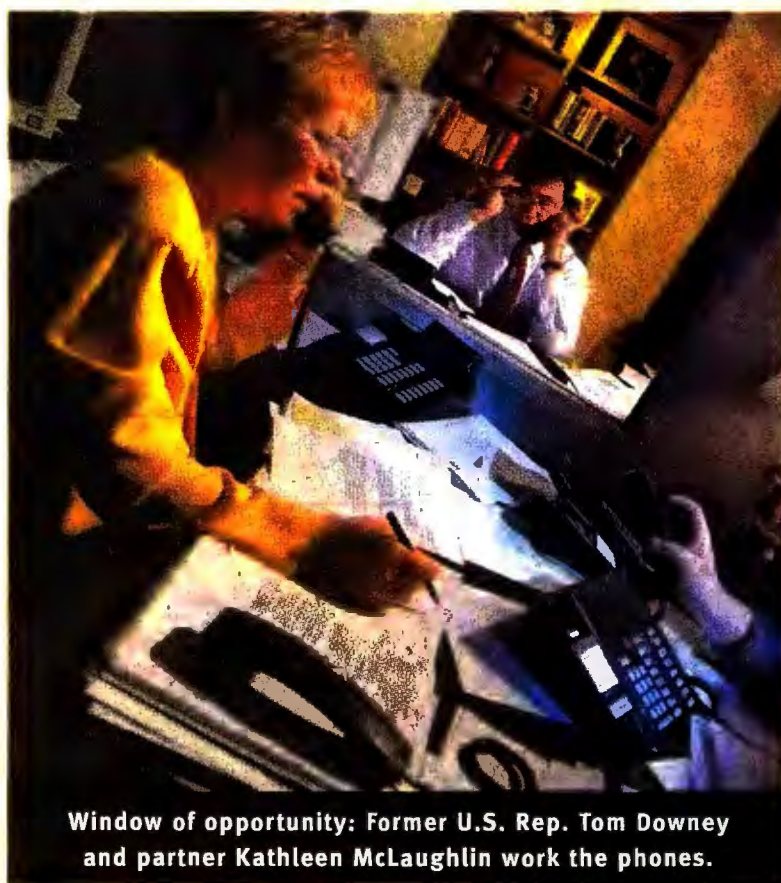
"The Vice President Is on Line Two"

After 18 years in Congress, Tom Downey was chagrined when his Long Island constituents abruptly put him out of a job two years ago. Today, the former representative heads a five-person legislative consulting firm half a mile from the Capitol dome. Downey does some lobbying, but he primarily tracks issues and offers strategic advice. He knows people like Treasury Secretary Lloyd Bentsen and White House Chief of Staff Leon Panetta—and he happens to be best friends with Vice President Al Gore. So when people want to reach out to the powerful, they reach out to Downey.

"The time Tom spends on the phone!" exclaims Kathleen

McLaughlin, Downey's partner and former chief of staff. On a moderately busy day, she says, the office gets more than 200 calls—or about 1 a minute. As a result, Downey and Associates has had to develop some unique phone survival skills.

When Downey and McLaughlin first set up shop, each had a phone line that could "ring over" to a second number—the equivalent of four phone lines. "When we expanded to four people, we set up one main



Window of opportunity: Former U.S. Rep. Tom Downey and partner Kathleen McLaughlin work the phones.

line and five ring-overs," says McLaughlin. "So now we have six lines, but only four people! We're always getting two calls at once." The firm made another unusual choice: "We had the privacy feature overridden," says McLaughlin. "That way, we can pick up on a live line, and have two, three, or even all four of us on the same call."

In addition to a hard-working fax machine, the firm uses voice mail, but with a twist. Callers can leave messages for

McLaughlin or her two colleagues—but not for Downey. "Otherwise everybody would call for Tom," she says, "and I'd have to retrieve the messages anyway." McLaughlin also uses her phone's "conference" feature to put people through to Downey when he's out. "Tom can take the call at home, and the caller doesn't know that he isn't sitting right in the office."

Downey also likes an absurdly low-tech architectural feature: a sliding window between his and McLaughlin's offices. "We leave it open," she says. "I can listen when Tom is talking, take notes, and follow up." More than once, calls for Downey have come in on McLaughlin's private line,

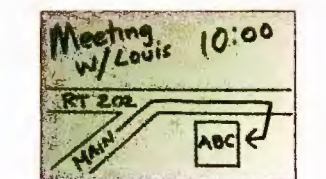
and she's had to hand the phone through the window to her boss. "Then of course his phone will ring, I reach over to pick it up, and we get tangled in the lines."

Even when they're tied up, though, staffers know which client takes precedence. "If [White House Adviser] George Stephanopoulos calls, we drop everything," says McLaughlin. "And if the vice president rings, we stop what we're doing and get Tom to the phone."

It's the latest addition to the #1 selling line of personal information organizers. It features a pen-based graphical user interface, 512K of

and connect to on-line services like CompuServe®.

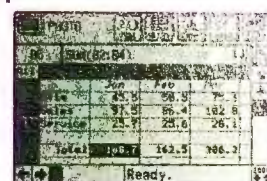
A word processor with cut, paste, and a variety of text styles enables you to produce



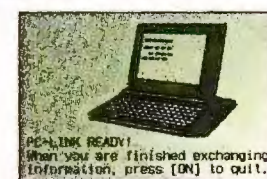
directly on the screen using the Wizard's

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stylus or your finger. Images can also be imported from a PC or

To Do list, and there's even a function that allows you to enter

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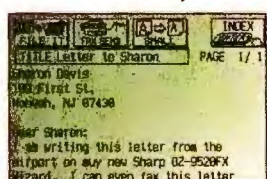
The unit's built-in fax software permits users to send a drawing, a letter, or even an entire folder of documents. The software also provides



(IT WOULD BE EASIER TO TELL YOU WHAT IT DOESN'T DO)

a speed-dial directory and automatically creates a cover sheet for outgoing faxes. By entering the terminal mode the OZ-9520FX uses ASCII or VT-100

beamed to a colleague's Wizard or output wire-

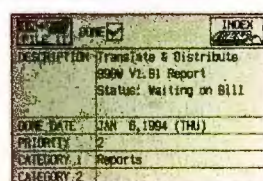


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mail—most voice messaging services can't properly identify incoming fax calls and will fill up your mailbox with fax machine beeps.

And if your office has six or more employees, consider getting an integrated office phone system, or PBX (Private Branch Exchange). A PBX lets you smoothly integrate phone, fax, and modem lines, and tailor each station with features like speed-dialing, paging, voice mail, a speakerphone, and more. Mainly, a PBX is the best way to control mounting phone bills, letting you track who calls where and for how long. Many firms, including phone companies, sell PBX systems. Hello Direct of San Jose, California, for example, carries Executone systems that range from a 4-line, 8-station system for \$1799 to an 8-line, 16-station system for \$3669, including installation and training.

What's Your Line?

Should you get a business or residential listing? Is an 800 number worth the extra cost? Which long-distance carrier should you choose? So many questions, so little time to worry about them. Here's a brief guide.

The best reason to pay for a business line is to get a separate business or Yellow Pages listing. Businesses from pizza makers to car mechanics live or die in those pages. But if you get most of your clients by word of mouth, you'll do better with a residential line. You pay more for a business line in installation and monthly fees, and you're usually charged for every local call you make. If you decide to get a business listing, follow the advice of P.A.M. Borys, a computer consultant in Woburn, Massachusetts, and use the line strictly for incoming calls; make all your outgo-

ing calls on your residential line.

A word of warning: If the phone company knows you're running a home business, it may insist you pay business rates. A few years back, a Texas phone company decided that all computer bulletin board services were home businesses and charged them accordingly. But other home businesses have gone undetected for years—including one BBS operator who had nearly a hundred residential lines to his house, to the amusement of the local phone installers.

A different listing decision arose for Kerry Myers, who designs desk nameplates in San Francisco. He lists his business in the 27-volume *Thomas Register of American Manufacturers* but recently decided to get an 800 number, which AT&T links to a national business-to-business directory. The 800 service piggy-

No Place Like Home

What's the difference between business and residential phone service charges? As much as several hundred dollars a year, in some cases.

Here's a quick look at key services available for homes and businesses in Phoenix, Boston, San Francisco, and Washington, D.C.

BUSINESS VERSUS RESIDENTIAL PHONE SERVICE RATES

	PHOENIX U.S. WEST		BOSTON NYNEX		SAN FRANCISCO PACIFIC BELL		WASHINGTON, D.C. BELL ATLANTIC	
	Business	Residential	Business	Residential	Business	Residential	Business	Residential
INSTALLATION								
Connect fee ¹	\$56.00	\$46.50	\$93.02	\$37.07	\$70.75	\$34.75	\$83.25	\$30.76
Call waiting ²	\$13.00	\$13.00	n/c	n/c	\$6.00	\$5.00	n/c	n/c
Voice mail ²	\$15.00	\$13.00	n/c	n/c	\$15.00	\$15.00	\$15.00	\$10.00
One-time subtotal:	\$84.00	\$72.50	\$93.02	\$37.07	\$91.75	\$54.75	\$98.25	\$40.76
MONTHLY COST								
Local access ³	\$32.00	\$12.40	\$17.97	\$21.33	\$11.85	\$11.85	\$14.24	\$15.30
100 local calls	n/c	n/c	\$7.80	n/c	\$6.00	n/c	\$7.25	n/c
Call waiting	\$7.50	\$5.00	\$5.10	\$2.58	\$4.20	\$3.50	\$5.30	\$4.75
Voice mail	\$12.75	\$6.95	\$12.00	\$6.00	\$19.95	\$5.95	\$10.00	\$10.00
6 additional boxes	\$76.50	n/a	n/a	\$6.45	\$119.70	\$17.70	n/c	n/c
Monthly subtotal:	\$128.75	\$24.35	\$42.87	\$36.36	\$161.70	\$39.00	\$36.79	\$30.05
Grand total:	\$212.75	\$96.85	\$135.89	\$73.43	\$253.45	\$93.75	\$135.04	\$70.81

n/a = not available n/c = no charge

¹ Deposits often required on business lines. ² Extra charge if added after initial line installation. ³ Includes variable federal access charge.

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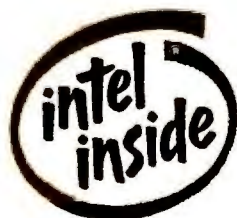


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Circle 228 on reader service card

backs on his existing line, and after a \$50 connect fee, Pacific Bell charges him \$15 a month plus a usage fee of \$6 to \$10 an hour. "Advertising in the 800 book is cheaper than the *Thomas Register*," says Myers. "I hope to get more bang for my buck."

Long-distance service involves too many variables to list here. But remember: AT&T, Sprint, and MCI are clawing at each other to get your

you choose? Well, maybe both.

Answering machines provide many of the features of voice mail for less money, and they're surprisingly sophisticated. For example, Southwestern Bell's Digital Answering Machine comes with four voice mailboxes for \$119—about what three to six months of voice mail would cost. For \$129 without a built-in phone (or \$169 with), the AT&T two-line

them ("For velociraptor breeding information, press 1; to charge by phone, press 2."). You can even set up guest mailboxes for temporary workers or forward messages from one mailbox to another.

When it comes to voice mail, Michael Phillips, a small-business consultant and radio talk show host in San Francisco, is a true believer. "A major function of voice mail is to reduce the amount of time you spend fielding calls you don't have to," Phillips says. "You shouldn't find yourself repeating, 'We're open 9 to 5 and until 8 p.m. on Thursday', or, 'Yes, we accept credit cards'."

But voice mail can be expensive, especially if your local phone company charges full price for each extension mailbox. And some people just don't like it. So be sure to record a friendly, informative greeting, and tell callers early on that they can press the * or # key to bypass your outgoing message—a boon to long-distance callers.

In short, if you need to save money or screen calls, get a machine. When you want to sound big—or can't afford to miss any calls—go for voice mail. If money is no object, get both.

Reach Out and Touch

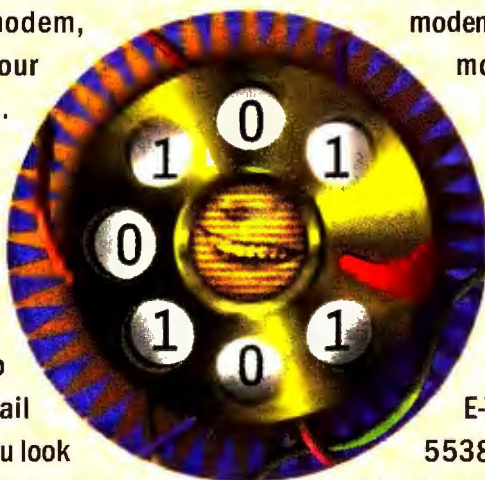
Whatever strategies you ultimately choose, the bottom line is that businesses flourish when they treat their customers well. Using the phone intelligently helps, but all the technology in the world can't replace face-to-face contact. So after you've modemed that final spec sheet, faxed the last architectural sketch, and turned on voice mail to greet the rest of the world, go have a cup of coffee with a client. Because when it comes to conveying information about your business and yourself, no device is as powerful as the human face.

A former **PC World** editor, William Rodarmor is managing editor for **California Monthly**, the alumni magazine for the University of California, Berkeley.

GLENN MITSUI

Answering Machine in Your PC

Answering machines are inexpensive, and voice mail is flexible. But if you own a PC, you can get the best of both worlds with a voice-enabled modem, which lets you create your own voice-mail system. Available as an external model or a card that slips into your PC or Macintosh, this device stores messages on your hard disk and allows callers to select standard voice-mail options. So what should you look for in one of these units? The same things you'd look for in a regular fax-modem: 14.4-kilobits-per-second speeds for faxes and data, V.42bis and MNP-5 data compression, and V.42 error correction. Then be sure that it works as an answering machine: It should support remote access (so you can dial in and col-



lect messages) and switch automatically among voice, fax, and data modes as incoming calls demand. The prices for these modems range from \$99 to \$799; most are less than \$250. At press time, vendors included: Best Data Products (800/632-2378), Boca Research (407/997-6227), Computer Peripherals (800/854-7600), Digicom (800/833-8900), E-Tech Research (800/328-5538), Interactive (800/292-2112), Media Magic (800/624-8654), MultiTech Systems (800/328-9717), National Semiconductor (800/538-8510), Octus (800/634-8248), Prometheus Products (800/477-3473), Spectrum Signal Processing (800/667-0018), Zoltrix (510/657-1188), and Zoom Telephonics (800/666-6191).

business—so now is an excellent time to negotiate. Even if you've been using Sprint since before Candice Bergen became Murphy Brown, call up and point out that MCI has been courting you. They just might make you an offer you can't refuse.

Answering Machine or Voice Mail?

For years, answering machines have been around to answer calls when you're not. Today, you can also use voice-mail services that are as impressive (or maddening) as those used by the Fortune 500. Which should

Remote Answering Machine takes calls on both lines and gives four different outgoing messages. And you can use a machine to screen calls—vital if you want to work while listening for that critical long-distance call.

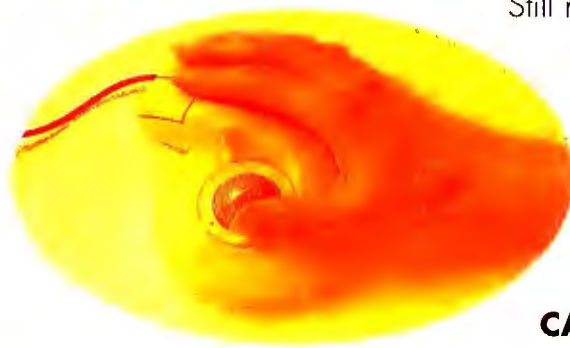
But voice mail has one big advantage: It takes messages even when you're on the phone, so your callers never hear a busy signal. Voice mail can also make your business sound bigger than it is and handle customers efficiently. You can set up extension mailboxes (with individual passwords) so callers can leave private messages for the person best able to handle



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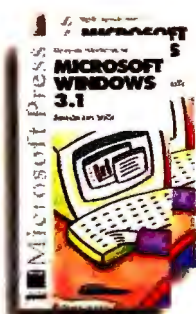
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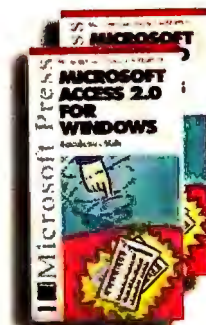
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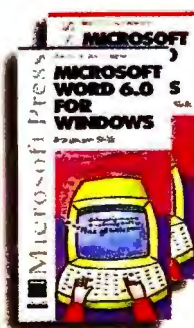
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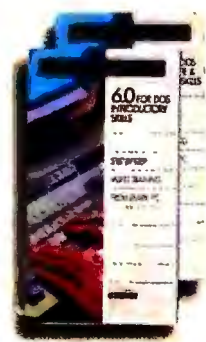
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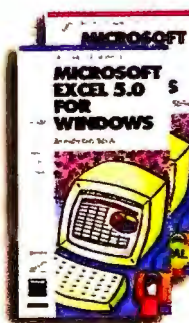
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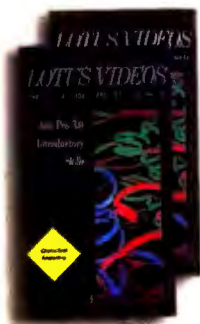
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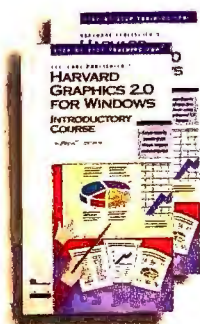
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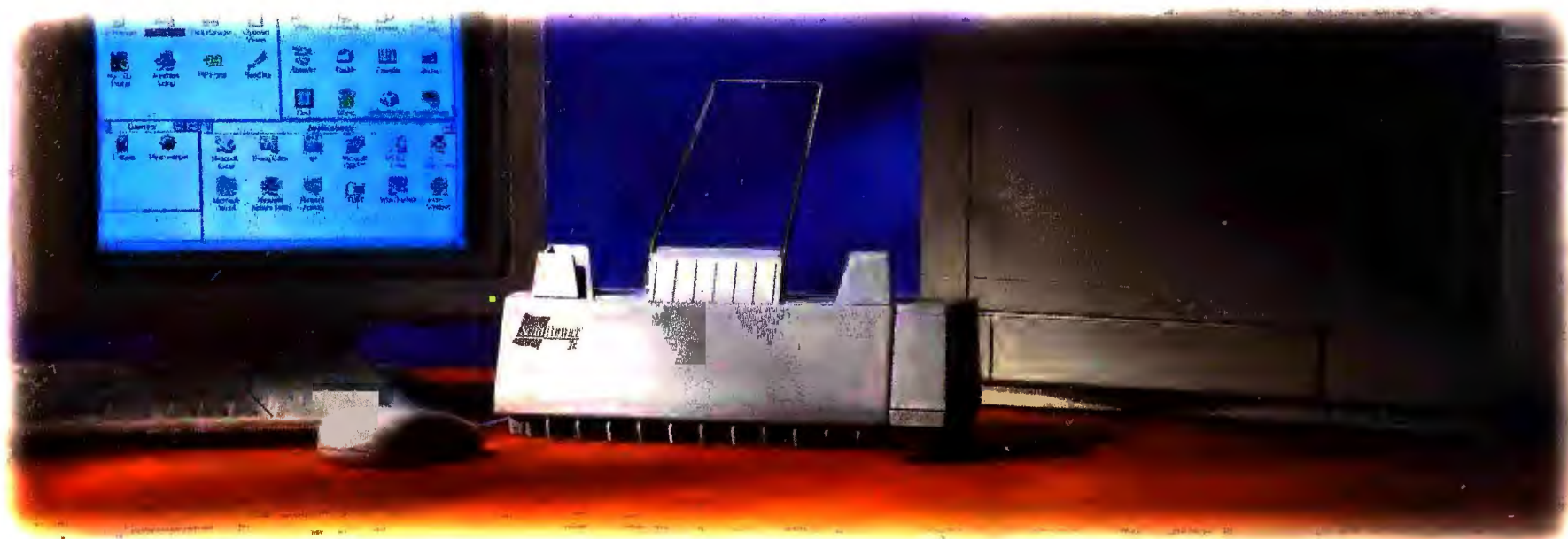
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HELP LINE Q & A



Tip of the Month

BALANCING DISK COMPRESSION AND DATA SAFETY: Are you wary of disk compression? Put your programs on the compressed drive, and your data files on a separate, uncompressed drive. Not only will your data be safe if the compression program crashes, you only have to select one drive to back up all your data.

If you're a new user ready to set up an empty hard disk, install DOS and partition your hard disk, giving one third to drive C: and two thirds to drive D:. Format each drive, making C: the boot drive, and then install your compression package on C: and compress only that drive. If you're using Windows, install it next and create a permanent swap file on drive D:. Next, install your programs, instructing them to create their working directories on D:. Last, create a boot floppy containing such files as CONFIG.SYS, AUTOEXEC.BAT, FORMAT.COM, and FDISK.EXE so in the event of a crash you'll be able to access your data drive and begin recovery.

Hardy souls wanting to reconfigure their hard disk in this manner should back up programs and data files, create a boot floppy as described above (or use DOS setup disks), and use FDISK to remove existing partitions and create new ones.

Richard Koroll, Etobicoke, Ontario, Canada

Parlez-Vous OS/2?

Q How does OS/2 compare to DOS? I've heard it's faster than DOS and uses less memory—is this true? Do I have to buy all new software, or will my DOS and Windows software work? If I decide to use OS/2, how should I go about installing it and removing DOS?

Kevin A. Normand,
Lafayette, Louisiana

A OS/2, unlike DOS, is a complete 32-bit multitasking operating system. It is sometimes faster and sometimes slower than DOS, depending on what software you are running and how that software uses system resources. (File access, for instance, tends to be quicker, so disk-intensive programs may run faster.) It does not, however, require less memory than DOS. Like Windows, it needs at least 8MB to run well, and 16MB is preferable.

OS/2 runs almost all DOS and Windows software. If you don't want to run Windows software under OS/2, or if you want OS/2 to use your existing copy of Windows, you can save money by buying the less expensive OS/2 for Win-

dows instead of the regular OS/2 package. (Regular OS/2 includes code to run Windows programs; OS/2 for Windows does not.)

You don't need to uninstall DOS. OS/2's installation process lets you replace DOS with OS/2 or, if you prefer, gives you a "dual boot" option that lets you pick which one to run when you start your PC. The latter is handy as a backup, in case you need to run software that works only under DOS.

Lotus Limps

Q When I run 1-2-3 release 2.2 from Windows, the program opens and I can issue commands from the 1-2-3 menu. But when I try to retrieve a spreadsheet, I get a message from Windows saying that 1-2-3 has attempted to execute an invalid instruction and has violated system integrity. I have reviewed the PIF file for 1-2-3 (which was provided by Microsoft) and found nothing unusual about it. My system uses MS-DOS 5.0, 386Max 7.0, and a Diamond graphics card. Can you help me get 1-2-3 to run?

James P150, America Online

A There are several possible problems. 1-2-3 release 2.2 uses a DOS extender—special built-in software that lets the program run in protected mode and gives it more than 640K of memory to work with. Windows sometimes fails to cooperate with DOS programs—especially those built with DOS extenders. You may be able to mitigate this problem by adding the line **MaxBPs=768** to the [386Enh] section of SYSTEM.INI.

Another possible source of the problem is the video display driver. Windows sometimes has problems with DOS programs that are attempting to take advantage of a video card's advanced features and high-resolution graphics modes. Try using the simplest Lotus text driver—the 80 by 25 driver for a standard VGA. If you use 1-2-3's graphics functions, use the standard VGA driver for these also; otherwise, select no graphics driver at all. You may not be able to see as many rows or columns of information in standard VGA (640 by 480) as in a higher resolution, but this is often the only way to reduce the incidence of crashes in Windows DOS boxes.

Y Not?

Q At the end of each year, I run a batch program that backs up my files to tape and uses `DEL path*.*` to delete all the previous year's files. Trouble is, the batch file pauses for confirmation before deleting the files. Is there any way to eliminate the prompt?

J. P. Rabbitt, Fayetteville, Georgia

A In DOS 6.0 and above, you can use the command `DELTREE` with its `/Y` option to delete a directory tree with no confirmation. Thus, the command `DELTREE path /Y` does the trick, though you have to re-create the directory afterward.

Two Smart

Q What is the difference between `SMARTDRV.EXE` and `SMARTDRV.SYS`? On my PC, a `DEVICE=` line in `CONFIG.SYS` loads `SMARTDRV.SYS`, while another line in `AUTOEXEC.BAT` loads `SMARTDRV.EXE`. Do I need them both?

Steven Gorman, San Francisco

A The very first versions of the SmartDrive disk cache were implemented as `CONFIG.SYS` device drivers called `SMARTDRV.SYS`. But in Windows 3.1 and DOS 6, `SMARTDRV.EXE`, a double-duty program, replaced `SMARTDRV.SYS`. When loaded with a `DEVICE=` statement in `CONFIG.SYS`, `SMARTDRV.EXE` becomes a device driver that can provide double buffering for certain hard-disk controllers that cannot work with the memory provided by EMM386 or Windows running in 386-enhanced mode. But when you load `SMARTDRV.EXE` from `AUTOEXEC.BAT`, it sets up read/write caching for your floppy, hard, and CD ROM drives. You can also use it in any batch file or at the DOS prompt to turn off or change caching functions and to report whether buffering is needed.

If you have `SMARTDRV.EXE` (I recommend the version that came with DOS 6.2 and 6.21) and want to keep using SmartDrive as your disk cache,

delete `SMARTDRV.SYS` from your hard disk and use `SMARTDRV.EXE` instead. Don't use `SMARTDRV.EXE` as a driver in your `CONFIG.SYS` file unless your disk system requires double buffering.

Funny File

Q I've found a file called `386SPART.PAR` on my hard drive. It's a hidden system file more than 12MB in size. What is it? What's it for?

Jon n Fla, America Online

A `386SPART.PAR` is the name of Windows' permanent swap file. A swap file is a file on your hard disk in which Windows stores information that overflows your computer's RAM. Because Windows programs see this part of your disk as RAM, it's called virtual memory. It's important not to try to move, write to, or delete this file—especially while you're running Windows—or Windows may get confused or crash.

If you don't want a permanent swap file to take up 12MB of valuable disk space, you can change its size. Open the Windows *Control Panel*, double-click the *386 Enhanced* icon, click the *Virtual Memory* button, then the *Change* button, and pick which drive to use, the type of swap file (permanent or temporary), and its size in K.

A temporary swap file, unlike a permanent one, is deleted when you quit Windows. If you use one, your applications may run slightly slower. A temporary swap file is not necessarily contiguous (which means it may take longer to read), and Windows can't bypass DOS when accessing it (as Windows can with a permanent one). However, a temporary swap file has one big advantage: It can shrink or grow (up to a maximum size you set), while a permanent swap file is always a fixed size. The Virtual Memory dialog box also gives you the option of running with no swap file at all. But since Windows programs tend to be memory hogs, it's best to avoid this; it'll make your system very slow and may cause programs to crash.

USER GROUP OF THE MONTH

Channel Islands PC Users Group

The Channel Islands PC Users Group meets the first Saturday of the month in the Camarillo Airport Freedom Center in Camarillo, California. Visitors may attend at no charge, and novice users are welcome. CIPCUG has special interest groups in such areas as Windows, OS/2, modem use, and what's inside your PC. It also offers free two-to-six-week training sessions for various programs and participates in the computer shows held in Ventura and Oxnard. Members receive *The Outer Edge*, a monthly 12-page newsletter that features software and book reviews, tips, a help section, and classified ads. A no-fee 14.4-kbps BBS, called Y-Not, is available to members and the general public.

For more information contact Bob de Violini, P.O. Box 5025, Oxnard, CA 93031, or call 805/983-4741. You can access the BBS at 805/484-9625. Individual membership is \$30 per year and renewals are \$20.

Reader service no. 601

A SHIELD FOR MY AUTOEXEC.BAT: I prevent programs from changing my `AUTOEXEC.BAT` file without permission by renaming the file to `AUTO.BAT` and adding `/K` to the end of the `SHELL` command in `CONFIG.SYS`. For example, the line `SHELL=C:\DOS\COMMAND.COM /K=C:\AUTO.BAT` tells DOS to read `AUTO.BAT` instead of `AUTOEXEC.BAT`. If you want to let a program change your `AUTOEXEC.BAT`, you'll have to change `AUTO.BAT`'s name back to `AUTOEXEC.BAT` and then back again afterward.

Bob de Violini

Channel Islands PC Users Group



Irretrievably Stacked?

Q I am using Stacker 3.1 with MS-DOS 6.2. Now that I have added another hard drive, I want to unstack my disk. However, there are lost clusters on my C: drive (a Stacker drive), and Stacker says I must run CHKDSK before unstacking. CHKDSK doesn't solve the problem, and prints a message telling me to run ScanDisk, which in turn says it will not correct errors while Stacker is running. What do I do?

Christopher J. McCarthy, San Antonio

A Lost clusters—clusters allocated for use but not linked to a specific file—are a common occurrence, especially if you run Windows and your system locks up or crashes before you exit. Stacker is correct: To remove the lost clusters you must run CHKDSK. But you must invoke CHKDSK with the /F command line parameter. If you don't, CHKDSK examines the disk but does not fix any problems it finds.

CHKDSK's message advises you to run ScanDisk instead, because ScanDisk can find and fix more kinds of disk problems. However, CHKDSK is still the simplest and the best way to get rid of lost clusters.

Talking Modem

Q I often access the computers in our home office from our satellite office using Close-Up, a remote control program. While I'm doing that, I'd like to be able to speak to someone at the other machine over the same phone line so I can describe what I am doing. Is there a software package that will

allow a person to transmit data and voice at the same time via modem?

IMJFK, America Online

A There's no software package that does what you ask, but a hardware product may fit the bill. MultiTech Systems makes a modem called the MultiModemPCS, which has a handset attached to the side. After two of these modems establish a data connection, you can initiate a voice conversation over the same line by simply picking up the handset at one end. The other modem rings, and a voice connection is established when the second handset is picked up. Because the bandwidth for the voice transmission is "stolen" from the data connection, data transmission does slow down a bit, but it's still reasonably fast.

You must have these special modems at both ends of the connection to use the voice-over-data feature. However, you can use a MultiModem PCS for a data-only connection to any standard modem at up to 14.4 kbps.

- **MultiModem PCS;** MultiTech Systems; 800/328-9717
Reader service no. 676

Have Another SIP

Q I have heard of an adapter that enables SIP memory modules [the ones with the pins that stick out of the bottom] to sit in SIMM sockets. I have contacted a few mail-order companies, which say they've been asked before about these adapters but have not seen them. Do you know where I can purchase one?

Leo Osborn, Evanston, Wyoming

A JDR Microdevices carries a SIP-to-SIMM adapter. Many older SIPs are, however, too slow for today's PCs, so make sure the access times on the SIPs are fast enough for your machine. SIP-to-SIMM adapters work best on PCs designed to take three-chip SIMMs. These systems refresh DRAM more frequently, so are more likely to work with SIPs (or any other DRAMs) that are picky about refresh times.

- **JDR Microdevices;** 800/538-5000.
Reader service no. 677

MOVing Right Along

Q In the March *Tip of the Month*, you stated that a metal-oxide varistor (MOV) would protect a phone line from power surges. Please explain whether I should install the MOV in parallel (between two of the wires) or in series (by cutting a wire and inserting the MOV).
Walt H. Wolf, La Quinta, California

A Several readers have asked for more information about installing MOVs on phone lines.

In electronic parlance, installing a device *across* a line means connecting it in parallel with the other devices on that line—that is, between the two wires that make up the phone line. Many phone cables have more than two wires, but it only takes a pair to make a phone line; by convention, the first line on a cable uses the red and green wires, while the second uses yellow and black. If your cable uses other colors, or you're not sure which two wires make up your phone line, ask someone who understands phone wiring to help you.

A few readers also pointed out that putting a single MOV across the two wires of a phone line doesn't protect against every possible kind of surge. While it protects against transverse mode surges, which occur across the two wires, it won't protect against common mode surges, which occur between the two wires and ground. To protect the line from both kinds of surges, you need to connect three MOVs in a triangle that includes the two wires of the line and a ground wire, as shown in **FIGURE 1**. Your telephone junction box should already contain a ground wire for its lightning arresters.

A few astute readers noted that the MOVs' varactor voltage—the voltage at which they begin to conduct—should be 170 volts or more. The Radio Shack MOVs listed in March's column meet this specification; if you use others, be sure to check the voltage ratings.

By Brett Glass

Brett Glass is a contributing editor for PC World. Help Line welcomes your questions (see page 10 for contact information).

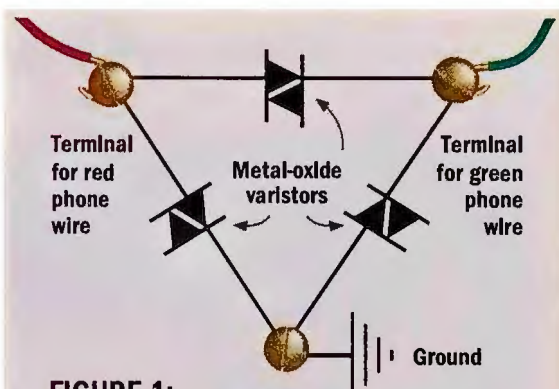


FIGURE 1:
CONNECT THREE MOVs in a triangle across your phone line and its ground line to protect against transverse and common mode surges.

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SPREADSHEETS Q & A

Skip to the Right Page in Excel 5.0

Q I've started using Excel 5.0's notebook page tabs to organize my worksheets. But I hate scrolling through dozens of tabs to find one sheet. Isn't there a quicker way?

Milford Questbach, Filbert, West Virginia

A If you right-click a tab scrolling button in the lower left corner of the worksheet window, Excel pops up a menu listing all the sheets in your file. To select a sheet, you just click its name.



Customize Your Excel 5.0 ToolTips

Q Excel 5.0's tool bars are easy to use: Put the mouse pointer on a tool and a little ToolTip box tells you what the tool does. But create custom tools and they always display the same uninformative ToolTip: 'Custom'. I've written a macro (see **FIGURE 1**) that lets you change the ToolTip on any tool bar.

To set it up, select **Tools • Record Macro • Record New Macro**, enter **Change-ToolTips** as the Macro Name, click **Options**, make sure **Personal Macro Workbook** is checked, and click **OK**. Click the Stop Macro button, then select **Window • Unhide** and **PERSONAL.XLS**. Click the last Module tab and edit the skeleton macro there until it looks like the

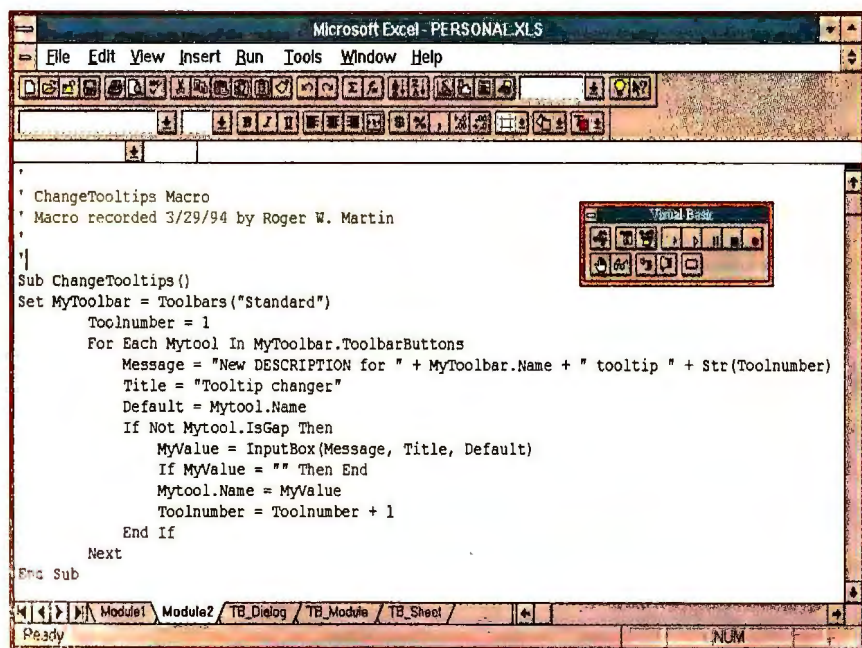


FIGURE 1: CREATE YOUR OWN CUSTOM TOOLTIPS descriptions with the assistance of this handy Excel 5.0 macro.

one in Figure 1. Select **Run • Start** to test it, and choose **ChangeToolTips**. When done, select **Window • Hide**.

To edit the ToolTips (using Excel or custom tools), select **Tools • Macro • PERSONAL.XLS!ChangeToolTips**. A dialog box asks for a new description of each tool on the indicated tool bar. To edit the Tooltips for another tool bar, unhide **PERSONAL.XLS** and change the name in the 'Set MyToolbar' statement in the seventh line of the macro. To see a list of tool bar names, use **View • Toolbars**. Here's how it works:

Set MyToolbar = Toolbars("Standard") sets MyToolbar as the Standard tool bar.

Toolnumber = 1 denotes the tool currently being changed.

For Each Mytool In MyToolbar.ToolbarButtons begins a loop that repeats for every tool in the current tool bar. In each iteration, the current tool is called Mytool.

Message = "New DESCRIPTION for " + MyToolbar.Name + " tooltip " + Str(Toolnumber) defines text for the next dialog box.

Title = "Tooltip changer" defines the title for the dialog box.

Default = Mytool.Name defines the text that will appear in the dialog box as that of the current ToolTip.

If Not Mytool.IsGap Then skips the little gaps between some tools.

MyValue = InputBox (Message, Title, Default) shows the predefined dialog box and stores the result in MyValue.

If MyValue = "" Then End halts the macro if the user clicks Cancel. Otherwise **Mytool.Name = MyValue** changes the tool's name.

Toolnumber = Toolnumber + 1 bumps the counter for the next tool.

Have fun, y'all!
Roger W. Martin,
Goodlettsville, Tennessee

A Thank you, Roger—but, er, exactly what was your question?

USER GROUP TIP

Simplify Test Data

Test formulas in your spreadsheet by entering simplified test data—nothing but ones, for example—in the cells the formulas reference. That way, any errors you may have in your formulas will stand out more because you'll be able to predict their results easily.

Jerry McCloud

Channel Islands PC Users Group

Formatting Graph Axes In 1-2-3

Q I'm using 1-2-3 to create *x-y* graphs that display dates on the *x*-axis and quantities on the *y*-axis. But things aren't turning out quite like I planned. The problem is, the graph's *x*-axis displays the date code numbers (for example, 33703) instead of the formatted dates that appear in the cell (4/9/92). How do I make the proper dates show up on my graph?

John Knobloch,
Orangeburg, South Carolina

A Happily, a simple solution exists. Let's assume your graph is an *x-y* plot. In releases 2.x and 3.x, select **/Graph • Options • Scale • X-Scale • Format • Date**, and choose the format you need. In release 4.x for Windows, right-click one of the *x*-axis labels, choose **Number Format** from the pop-up menu, and select a date format from the list.

Averaging in Windows Spreadsheets

Q My 1-2-3 spreadsheet contains five columns of class grades, and I want to eliminate the lowest two values for each column, then determine the average of the remaining grades. How would I accomplish this?

Ernest Wetherby, Joliet, Illinois

A You didn't indicate which version of 1-2-3 you're using. I hope that it's release 4.0 for Windows, because unfor-

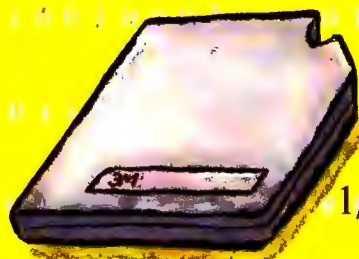
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Master Class: Building Spreadsheets Other People Can Understand

New job, new city, new life! After all the negotiations, the expressions of confidence, and the exhilaration of the move, it's finally time to work. Luckily, your predecessor, Sheetmeister, has promised to spend a full week showing you the ropes. But just when you're ready to start, it's Sheetmeister on the phone: "Sorry for the change of plans, but my schedule has accelerated. We'll have to skip the training. But hey, the job practically does itself! It's all in the worksheets on your PC. They're pretty self-explanatory. Bye."

They'd better be. Well, no big deal—you're no slouch with a cell pointer yourself. You fire up the spreadsheet and open the first file. Let's see, what are those labels: INADV, LTD? How about those columns of unidentified numbers and cryptic formulas like `@SUM(B:D11..B:D14)*(1/C43)-101.4`? Four hours later, your palms are sweating. This stuff is spaghetti! Why don't people build spreadsheets other people can understand?

Why, indeed? The problem of cryptic spreadsheets is as old as the PC itself, but here are six rules of thumb to help spare your successors (and yourself) this kind of torment.

1 Provide documentation. In 3-D worksheets, reserve the first sheet to list all the other sheets. In 2-D worksheets, such as 1-2-3 release 2.x, Quattro Pro for DOS, and Excel 4.0, use the diamond-back system (where each functionally separate area is below and to the right of the preceding one), reserving one area for documentation. Provide directions on using the worksheet—where to enter data and how to print the reports. List macros and how to use them. You might also include an list of ongoing revisions, so later you (or your successor) can match up reports with a specific version of the worksheet. If you write macros, provide a line-by-line explanation of how they work. In Quattro Pro for Windows and DOS, 1-2-3 for Windows and DOS, and Excel 4.0, use a column next to the macro code for comments; in Excel 5.0, use an apostrophe at the beginning of a comment to intersperse the comment with macro statements.

2 Separate data entry areas from reports. Printed reports are often brief and stylized, without room for you to provide the labeling others need to enter data intelligently. So it's helpful to put the data entry area onto one page of your worksheet file and use a separate page to design a report that's easy to understand. Your data entry page can include instructions, definitions, the phone number to call when there are questions, and so forth. Organize things in

the order most convenient for entering data, and label each section clearly; avoid peculiar acronyms and abbreviations. Then use formulas to link the report page back to the data entry page.

3 Name everything—systematically. Make your formulas easier to interpret by assigning names to ranges and cells that contain key values. When future generations peruse your work, they'll see `@IF(HOURS_USED>FREE_HOURS,FEE*(HOURS_USED-FREE_HOURS),0)` instead of `@IF(B2>B9,C3*(B2-B9),0)`. To keep range names organized, assign names to the pages of your multi-page worksheets—for example, DATA_ENTRY and EASTERN_SALES. (If you're using 1-2-3 release 3.x, assign a special range name in the top left corner of each page as a substitute for the sheet name provided in Windows spreadsheets.) Then give each range name a two-character prefix to identify the page it's on, such as ES_COMMISSIONS and ES_PROJECTIONS for those ranges in the Eastern Sales sheet. While you're at it, use a similar scheme to name charts, graphic objects, 1-2-3 Query objects, and other items.

4 Make data cells distinctive. In every spreadsheet, some cells contain formulas, while others hold data values—numbers you type directly into the cells. Make it easy to see the difference: Change the text color of the cells, the cell shading, whatever. But do it consistently so it's easy for your successor to see quickly which numbers are calculations.

5 Never put a constant into a formula (unless the constant has been immutably determined by the laws of physics). If you've buried next year's assumed rate of inflation as a constant in 12 different formulas in your worksheet, you've ensured that no one but you will understand the projected results. If a number has any meaning at all, put it in a cell with a label that explains what it is.

6 Adopt a standard report footer and use it on every spreadsheet report. Make the footer include the name of the file that generated the report, the date and time, and the page number (preferably in "Page x of y" format). That way, when your protégé finds page 13 of the strategic plan squirreled away behind the filing cabinet, she'll know exactly where it came from.

So why go to all this trouble? Well, it's not merely the right thing to do. If you ever get hit by a bus, your successor will thank you in a silent prayer. But most of all, the more self-explanatory your worksheets are, the less time you'll spend explaining them in person.

Unfortunately DOS versions 2.x and 3.x lack the SMALL functions that are necessary to make this solution work. (It won't work in Quattro Pro for DOS, either). Let's postulate that your grades are located in a range named GRADES. Then try out the appropriate spreadsheet formula indicated below:

1-2-3/W: `(@SUM(GRADES)-@SMALL(GRADES,2)-@MIN(GRADES))/(@COUNT(GRADES)-2)`

Quattro Pro for Windows 5.0: `(@SUM(GRADES)-@SMALLEST(GRADES,2)-@MIN(GRADES))/(@COUNT(GRADES)-2)`

Excel 4.0 and 5.0: `=(SUM(GRADES)-SMALL(GRADES,2)-MIN(GRADES))/(COUNT(GRADES)-2)`

The logic of the formula is uncomplicated. In all three programs, you simply take the sum of the numbers, subtract the smallest value in the range, which is `@MIN(GRADES)`, and the second

smallest value, `@SMALL(GRADES,2)`, then divide by the number of values in the range, less 2.

By Richard Scoville

Richard Scoville is a contributing editor for PC World and a software consultant based in Chapel Hill, North Carolina. Spreadsheets welcomes your questions (see page 10 for contact information).

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WORD PROCESSING Q & A

Lining Up ASCII Columns in Windows Word Processors

Q I often have to download long ASCII text files from various sources on the Internet. Most of these files contain tables that use spaces to line up the columns. To make printing easier, I usually load these text files into Word 2.0 for Windows. But when I do this, the columns don't line up anymore. Is there any way I can load these files into Word without messing up the tables?

Alvin Mappala, Shawnee, Kansas

A You're having trouble lining up those pesky ASCII columns because the DOS-based files you're getting online are based on *fixed-width* characters. Most Windows fonts, by contrast, are *proportional*, meaning the characters have different widths. As a result, columns that lined up just fine in an ASCII file are all out of whack when you look at them in Windows.

The solution is to use a fixed-width font in your Windows word processor. Unfortunately, there aren't a lot to choose from. I'd suggest Courier New. This fixed-width font comes with Windows 3.1 and can be scaled to any size. To apply it in Word, select the text you want to change, then select *Format Font*, then pick *Courier New* from the program's font list.

Switching Print Order in WinWord 6.0

Q I use Microsoft Word 6.0 for Windows and have both a Hewlett-Packard DeskJet 550C ink jet printer and an HP LaserJet 4P. I'd like to print pages in reverse order on the DeskJet and in the normal order on the LaserJet. Is there an easy way I can do this in WinWord?

Collin Evans, Racine, Wisconsin

A There sure is. Give the *File•Print* command, then select the DeskJet (assuming it isn't already selected) by clicking *Printer* in the Print dialog box, choosing *DeskJet* from the Printers list, and clicking *Close*. When you return to the Print dialog box, select *Options*, then check the *Reverse Print Order* box under Printing Options. Click *OK* to leave Options, then click *OK* again to print your document. When you want to print with the LaserJet, follow the same procedure to select it as the printer, then make sure the Reverse Print Order box is *not* selected.

Had It With WordPerfect 6.0 for Windows

Q I installed WordPerfect 6.0 for Windows the week it came out, and I've had nothing but trouble ever since. I've been plagued with nearly constant General Protection Faults, terribly slow printing, and other problems. One time,

the program wouldn't even run, and I had to install it again from scratch. There must be some solution to this. I've tried calling WordPerfect's technical support, but all I get are busy signals. I don't want to switch to another program, but I'm at my wit's end.

Barbara Martin, Boston

A You are not alone. Virtually as soon as WordPerfect 6.0 for Windows shipped, it

was clear to everyone (including WordPerfect Corporation) that the program had some serious shortcomings. Since then, the company has been working hard on an interim release to fix these problems, but there have been delays in shipping that version as well.

In April, the company finally shipped version 6.0a. This revision gets rid of almost all the bugs in the initial release and offers some actual improvements as well, including QuickCorrect, which automatically corrects common spelling errors as you type; better file conversion tools; improved speed; and lower hard disk requirements.

Registered users of WordPerfect 6.0 can call 800/321-4566 to request their free copy of this update. If you forgot to send in your registration card, don't worry: You'll be able to register when you call. One note: Don't delete your current copy of WordPerfect 6.0 from your hard disk. The interim release won't install without it.

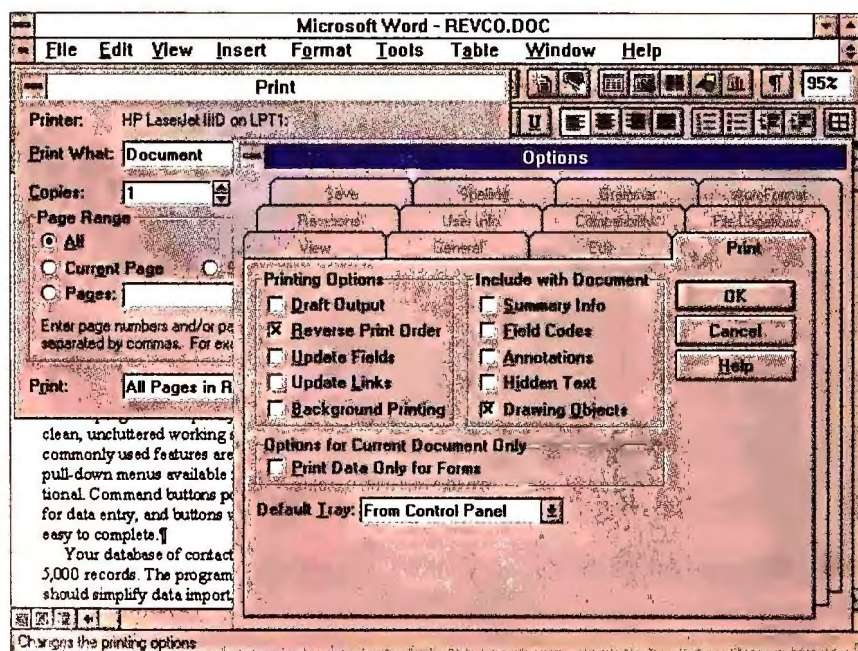
Indenting Text in WordPerfect 5.2 for Windows

Q Why doesn't WordPerfect 5.2 let me set temporary indentations for text? I often have to incorporate quotes from poems in my papers for school. Normally, when I turn on text formatting in WordPerfect, it stays in effect until I turn it off. But if I press <F7> to activate the Indent command, type a line of the poem, and press <Enter> to start a new line, WordPerfect returns to the normal margins. Isn't there some way to tell the program I want indentation to stay on until I turn it off?

John Ziv, Oyster Bay, New York

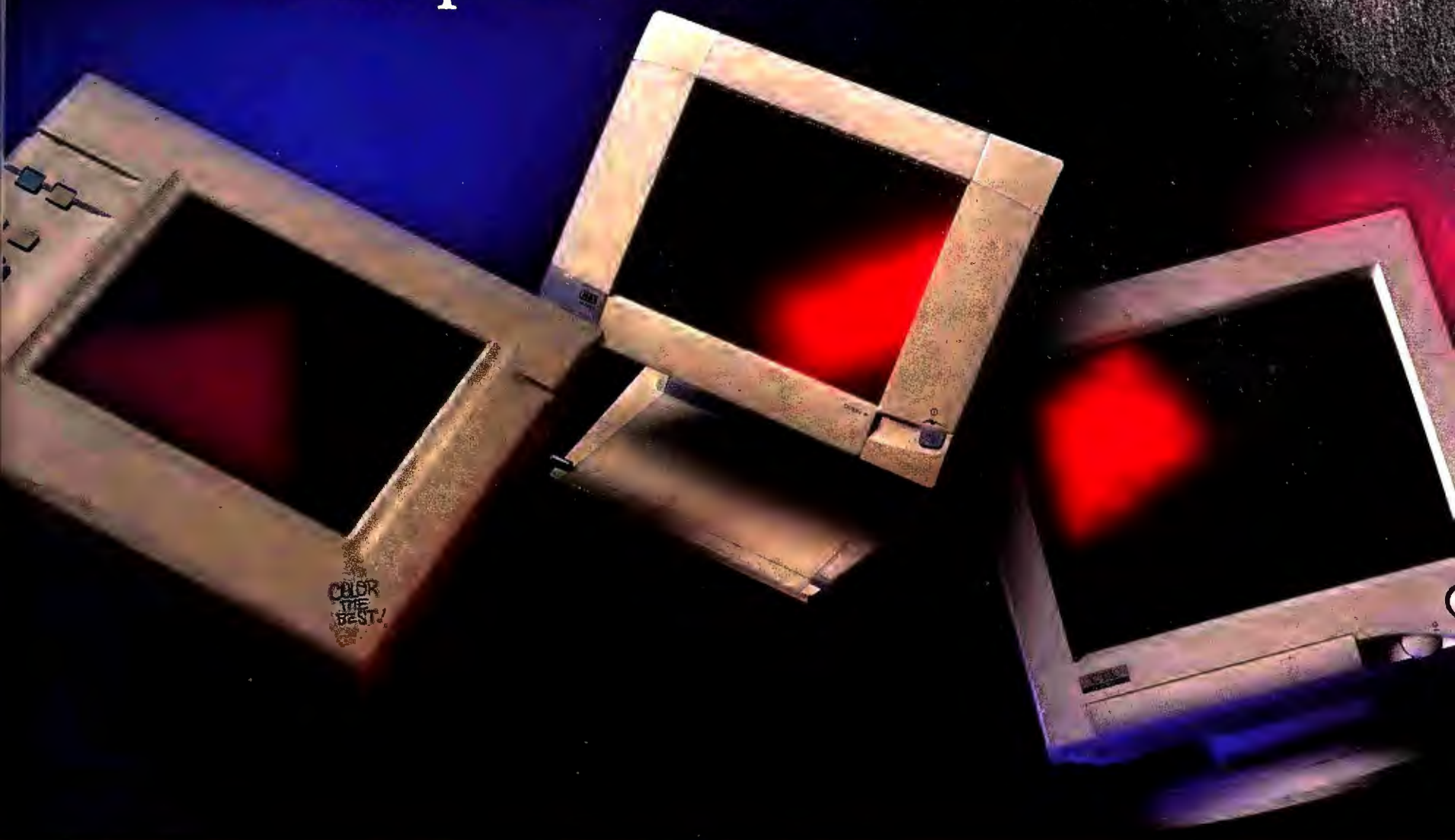
A I was surprised to discover this seeming lapse in the program. I expected I'd be able to select a block of text and then press <F7> to indent the whole thing. But since the Indent command doesn't work on blocks of text, here's a work-around:

Instead of indenting each line with the <F7> key, type your poem in just as



PRINTING PAGES IN REVERSE ORDER in Word 6.0 for Windows is just one of your choices when you select *Print•Options*.

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Hor. Freq. (KHz)	30-38	30-50	30-62	30-62	30-65	30-65	30-85
1600 x 1280 NI	—	—	—	—	—	—	Yes(60Hz)
1280 x 1024 NI	—	—	—	—	Yes(60Hz)	Yes(60Hz)	Yes(75Hz)
1024 x 768 NI	87Hz/1	60Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI	75Hz/NI
Mac Compatibility	—	—	Yes	Yes	Yes	Yes	Yes
Flat Square	—	—	—	Yes	Yes	Yes	Yes
Color Match	—	—	—	—	—	Yes	Yes
Digital Controls	—	—	—	—	Yes	Yes	Yes
MPR-II & ISO9241-3	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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you would normal text. After you've typed in all the lines, press **<Enter>** once more to add an extra line at the end of the section to be indented. Next, select all the lines of the poem with the mouse or keyboard. Select **Layout•Margins**, and enter a new value for the left margin in the subsequent dialog box. Finally, click **OK**. That's all there is to it. Your selected text should all conform to the new margin.

If you need to indent sections of text frequently, use the WordPerfect macro recorder to create a margin-resetting macro, and assign a shortcut key combination to it.

File Bloat in WinWord 6.0

Q I recently switched from version 2.0 of Word for Windows to the new 6.0 release. I was surprised to find that the file size for a simple three-paragraph letter jumped from 3K in version 2.0 to 11K in version 6.0. This has the potential for eating up a lot of extra hard disk space. Is there anything I can do to reduce the size of these files?

David A. Yount, Onarga, Illinois

A Many users have encountered this file-bloating problem in the new version of Word for Windows. The culprit: WinWord's new multilevel undo feature. To make 100 levels of undo possible, the program stores all of your editing and formatting changes in the document file.

That arrangement would be fine except for one thing: By default, WinWord's Fast Save feature is enabled. With Fast Save turned on, the program doesn't dump your additions and deletions when you save your document. And so your files grow in size.

The solution is to turn off Fast Save. To do this, select **Tools•Options** and click the **Save** tab in the Options dialog box. Then uncheck the **Allow Fast Saves** box and click **OK**. From now on, WinWord will dump that excess material when you save a document, and your files should shed some of those unwanted bytes.

The only drawback to turning off Fast Save is that it may take a few seconds longer to save your documents.

These delays could slow you down a little if you use WinWord's Automatic Save feature to save your work. The choice is yours.

Importing WordPerfect Macintosh Files

Q My office has a mixture of Macs and PCs. Everybody uses one version or another of WordPerfect, but I'm the lone holdout who's still using WordPerfect 5.1 for DOS. Is there any way for me to import files generated in WordPerfect 3.0 for the Macintosh?

Denise Whittle, Oakland

A While WordPerfect 5.1 for DOS doesn't include an import filter for the Macintosh version, WordPerfect recently released WordPerfect 5.1+ for DOS, which handles Macintosh files just fine. What's more, the new version of this classic program can also import and save files in WordPerfect 6.0 format, which should help you keep peace with those users in your office who have already upgraded.

Other additions in WordPerfect 5.1+ include support for fax cards and E-mail; special editions of Screen-Extender, a utility that keeps your text from running off the right edge of the screen; and Bitstream's FaceLift, which gives DOS users access to scalable fonts. WordPerfect has also improved mouse support and drop-down menu access with this release of the program. The upgrade costs \$49.95 for licensed users of version 5.1. Contact WordPerfect Orders and Information at 800/321-4566.

Getting Back to Normal in Ami Pro

Q I've run into a formatting problem in Ami Pro 3.01 that I just don't understand. Suppose I select a paragraph and then use **Text•Font** to change its font. So far, so good. But then let's say I mistakenly change part of the paragraph to italics. I thought I could get the text back to normal by pressing **<Ctrl>-N**, but when I do this, Ami Pro changes the whole paragraph back to the font I replaced. I just want to get rid of the extra font formatting. How do I get things back to normal?

Alexandria Wilson, Los Angeles

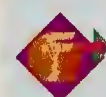
A The problem is that Ami Pro's **<Ctrl>-N** command switches your text back to the normal *style* for that paragraph. That means you get the normal style's default font too, and that's not what you want.

You can remove the unwanted font formatting with the same **<Ctrl>-key** shortcuts you're using to apply it. For example, if you've boldfaced a block of text, you can remove the boldfacing by reselecting the text and pressing **<Ctrl>-B**. To remove the unwanted italics, all you have to do is select the text you want de-italicized and then press **<Ctrl>-I**.

You should know that this same toggling technique works no matter how you applied the formatting. For example, if you used one of the SmartIcons to format selected text, you can click the same icon to remove the formatting. If you formatted text with commands in the **Text** menu, select the same commands to reverse the effect.

By George Campbell

George Campbell is a contributing editor for PC World. Word Processing welcomes your questions (see page 10 for contact information).



POWER TIP no. 311

Turn Off 386MAX Messages

Qualitas's 386MAX memory manager has the annoying feature of displaying a memory map and registration information every time that one of its commands is run in **AUTO-EXEC.BAT** and its drivers are loaded by **CONFIG.SYS**.

You can prevent these annoyances from occurring by entering a space and then typing the word **terse** after each occurrence of **386MAX.SYS**, **386LOAD.SYS**, and **386MAX.PRO** in your configuration files. For example, you might have the lines:

```
DEVICE=C:\386MAX\386MAX.SYS terse
pro=c:\386MAX\386MAX.PRO terse
```

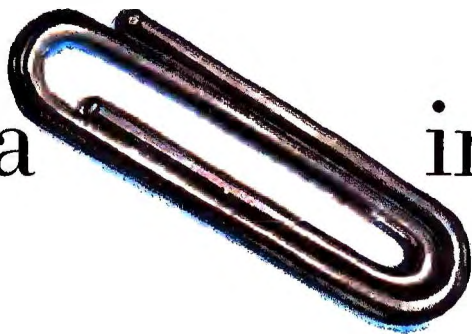
Graham Langford
Pickering, Ontario, Canada

There's



on the keyboard,

there's a



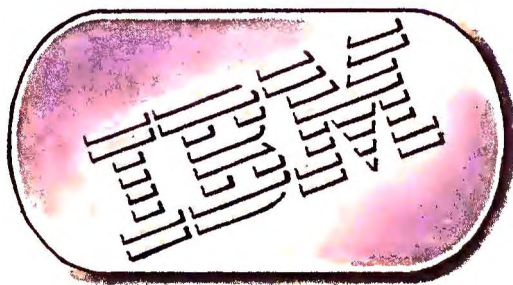
in the printer,

there's



in the A: drive,

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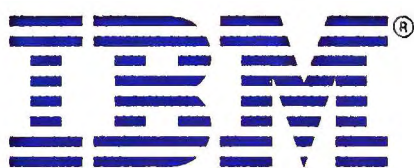
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WINDOWS Q & A

The Case of the Invisible Program

Q When Windows starts, I get this strange error message: 'Cannot find file specified in WIN.INI (or one of its components)'. I have searched every INI file on my hard disk for the source of this problem, with no results. Any solutions for this?

M. Murphy, PC World Online

A This error message pops up when you—or, more likely, a clumsy installation program—add an extra space or comma to the load= line of WIN.INI. This line can start any number of apps, as long as it doesn't exceed 127 characters, and the executable file names are separated by a single comma or space, but not both. If an unnecessary comma or space is inserted after a file name, you will get this perplexing message.

To banish the message forever, simply select **File•Run** in either Program

Manager or File Manager, type **WIN.INI**, and press **<Enter>**. This sequence displays WIN.INI in Notepad. Locate the load= line near the top of the file, delete any extra commas or spaces, and save the file. You won't see the error message the next time Windows loads.

Maximize Screen Real Estate

Q I run a lot of programs on screen at the same time, and my desktop is running out of room. Since my video setup can't jump to a higher resolution, can I cram more stuff on screen by getting rid of title bars?

Gina Moensch, Sioux City, Iowa

A You can't eliminate title bars, but you can hide them by nudging them off screen. The trick is using Windows' keyboard shortcuts (rather than the mouse) to move and size an app's window. A possible bonus: If programs

remember their last positions—as Program Manager, File Manager, Word 6.0 for Windows, and others do—you won't have to arrange them every time you load Windows.

Shoving a title bar out of view is easy: Select the application window that normally sits at the top of the screen and press **<Alt>-<Space>** to open its control menu.

To stretch the window so that its title is moved off screen select *Size*, press the **<Up>** key until the title bar slips out of view, then press **<Enter>**. To move the window lock, stock, and title, select *Move* and follow the same steps. (Should the Move and Size commands be dimmed on the control menu, just select *Restore* first.)

If your application has a save settings feature, turn it on; then exit the program, reload it, and turn off the feature. Your new space-saving arrangement is now the default. If you're using Program Manager or File Manager, uncheck *Save Settings on Exit* in the Options menu, and hold down **<Shift>** while selecting **File•Exit**. This preserves the new settings without closing either program.

Printing Help

Q Is there a way to print more than one Windows help file topic at once?

Gus Roessler, Grand Island, Nebraska

A Considering how frequently this question is asked, you would think that Microsoft would include a "print all topics" feature in Windows Help. But so far it hasn't. Your only recourse is to copy each topic to a word processor and then print it from there. The good news: It's easy.

In File Manager, first double-click the HLP file that runs WINHELPEXE and opens the file. Click to display the desired topic, and press **<Ctrl>-<Insert>** to copy the entire topic to the Windows Clipboard. Then load your word processor and press **<Shift>-<Insert>** to paste the topic in. Make sure that you leave the cursor at the bottom of the page so that you can easily paste in the next topic. Press **<Alt>-<Tab>** to return to Windows Help and navigate to the next topic.

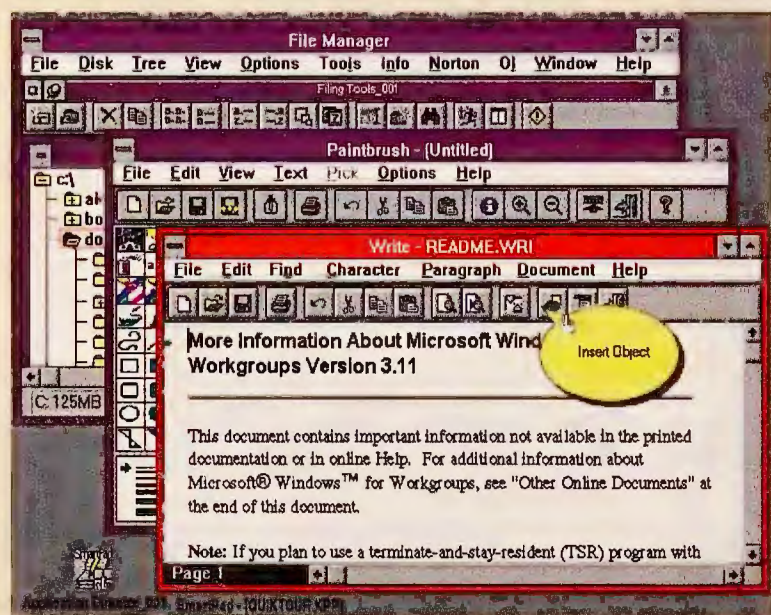
Repeat the steps until you have all the topics you want to print in a single document. Format it and print away.

Sizing Up Directories: A Better Way

Q In your April column, you describe a DOS batch file that calculates how much disk space the files in a subdirectory and its subdirectories take up ["Size Up Directories With File Manager—and DOS"]. The idea was to determine whether the files in the selected subdirectories could fit on a floppy.

While your approach works, it has

Windows Toolbox



SmartPad 3.0 may be the tool bar utility to end all tool bar utilities. You can use it to attach tool bars to any application (including DOS programs running in a window) and even create a custom tool bar to replace Program Manager. Tool bar buttons can launch programs, documents, and editable SmartPad macros that can make DDE calls. The interface is somewhat cluttered, but the program makes up for this tiny gaffe by giving you a ton of customization options. Softblox, Inc., \$95; 404/892-0202, 404/892-0981 (fax). Reader service no. 718



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PC/Computing, BEST, May 1994

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Windows Sources, Experts' Pick, June 1994

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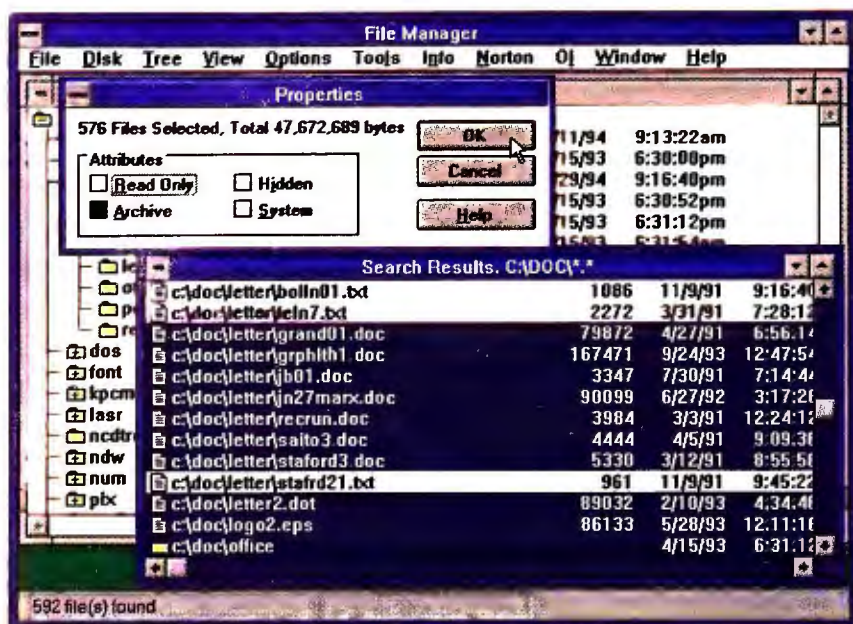
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SIZE UP DIRECTORIES AND ALL THEIR FILES with some seldom-used commands in File Manager.

annoying limitations; for example, you can't tell whether a directory would fit if you left out certain files. I have a much simpler solution: Use the hidden power of File Manager's Search function.

To check the size of a directory and its subdirectories, select its folder icon in File Manager, then select *File•Search*. Make

press **<Alt>-<Enter>** for file properties. The resulting dialog box displays the total number of files and total disk space consumed.

To exclude certain files from the total—for example, TXT files—press **<Esc>** to close the Properties box, then choose *File•Select Files*. Type ***.TXT**, click *Deselect* and *Close*, then select *File•Properties*. This

sure that the Search For text box contains **.*** and that the Start From text box shows the directory name (both should be in place by default); then check the *Search All Subdirectories* option. Click *OK*, and File Manager will display all of the files in the Search Results window. Press **<Ctrl>** and the slash key to select all the files, then

time you'll see the size of the directory, minus the TXT files. You can automate this sequence with a Recorder macro.

Brian Palmer, Las Cruces, New Mexico

A An excellent tip, Brian! We stand corrected—and informed.

Repairing Icon Labels

Q Recently I deleted some fonts that I wasn't using, via the Fonts feature in the Control Panel of Windows. Now my Program Manager icon labels have shrunk and look like they're in Courier. What did I do?

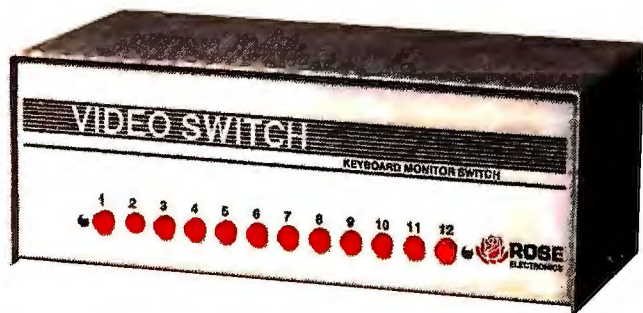
Robert Martin, PC World Online

A You apparently deleted the MS Sans Serif font, the Windows default for icon labels. You can either restore it from your original Windows disks or specify a different font in WIN.INI.

To restore the original font, get out your Windows installation floppies and look for the SSERIFE.FO_ file (if you run Windows in VGA mode) or SSERIFF.FO_ (for super-VGA mode). The underscore ►

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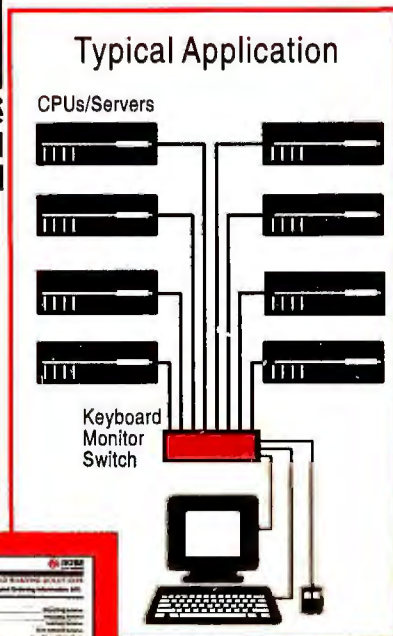
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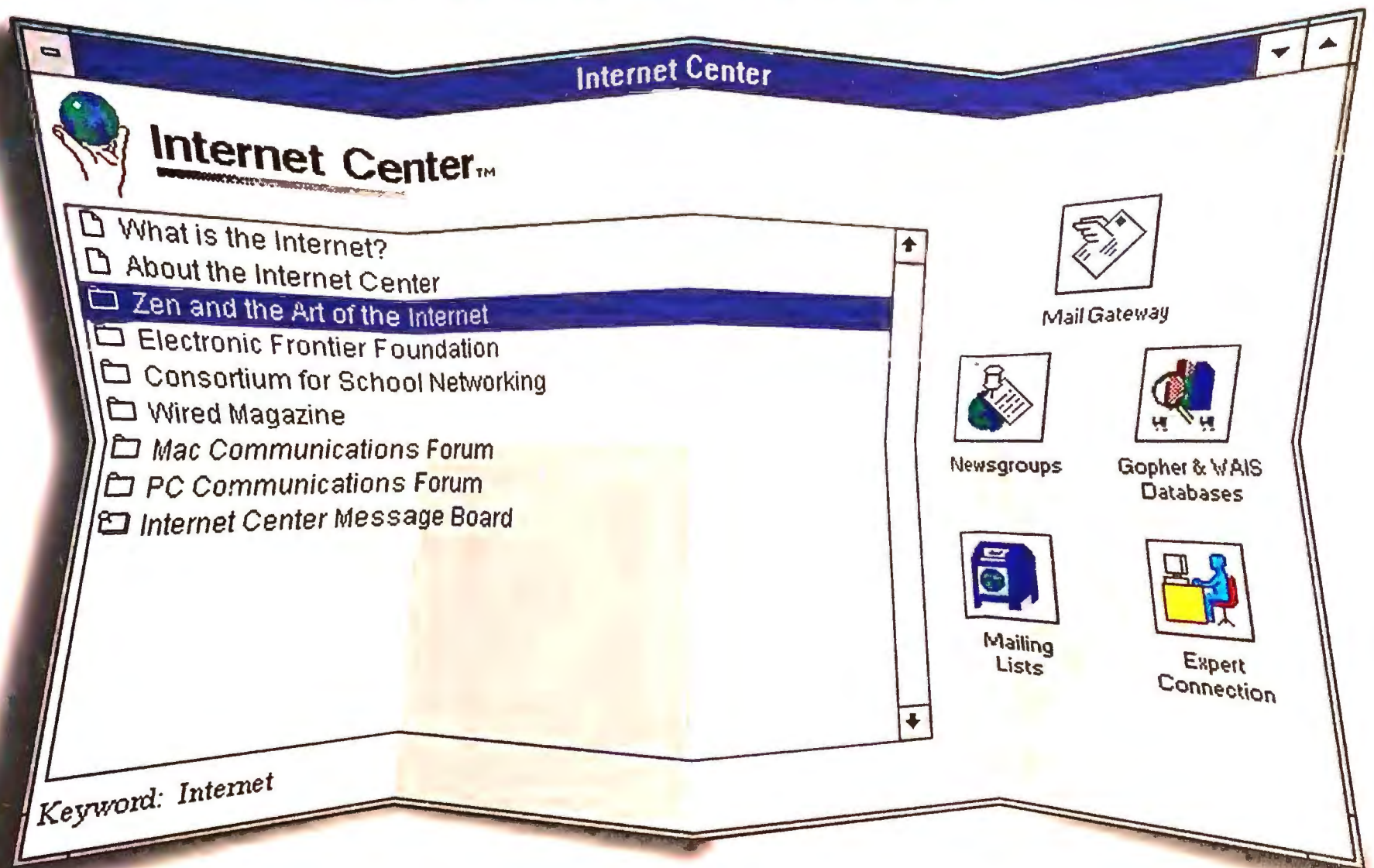
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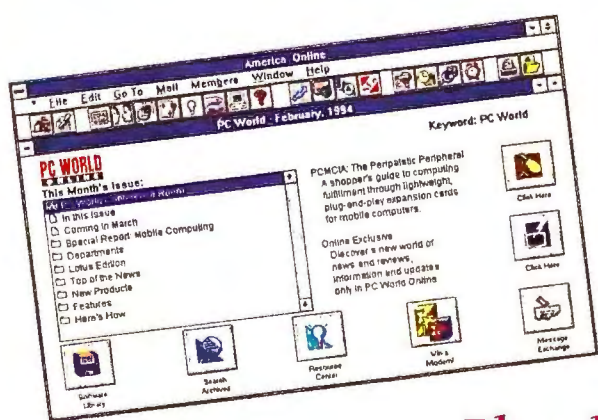
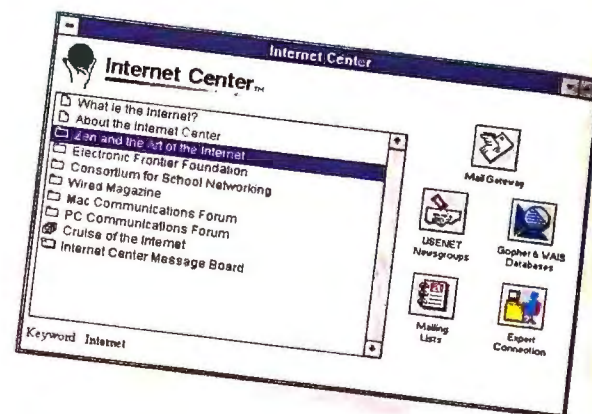
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character indicates that the file is compressed. To decompress it, you must use the EXPAND utility that comes with Windows. Exit to DOS and type a command like `C:\WINDOWS\EXPAND A:\SSERIFE.FO_ C:\WINDOWS\SYSTEM\SSERIFE.FON` (substituting your drive and path information).

Reload Windows, start Control Panel, open the Fonts option, select *Add*, and specify Windows' SYSTEM subdirectory if necessary. Then select *MS Sans Serif*

8,10,12,14,18,24 (VGA res), or a similar entry ending with '(8514 res)' for the super-VGA version. Click *OK*, close Control Panel, and restart Windows.

For a snazzier desktop, replace the default font with a TrueType or PostScript font. Here's how: Select *File•Run* in either Program Manager or File Manager, type `WIN.INI`, and press **<Enter>**. Then, under the [Desktop] heading in your WIN.INI file, type `IconTitleFaceName=Arial`. If you don't want

Arial, substitute a different TrueType or PostScript font, spelling the name as it appears in the Font dialog box of Windows Write (select *Character•Fonts*). But you can't choose WingDings or use a plotter font such as Modern, Roman, or Script.

Cleaning Up Control Panel

Q I recently removed a Windows program I didn't like from my system, but I can't delete the icon it placed in Control Panel. How can I drive out this unwanted icon?

Michael Ferry, PC World Online

A To delete a Control Panel icon, you must identify and remove the related CPL file from Windows' SYSTEM directory.

First, check the deleted application's manual—it may list the CPL file it installs. If it doesn't, ask the program's vendor. If the company isn't helpful, pop the program's installation disks into a floppy drive and look for files ending in CPL or CP_. If this doesn't help, slip on your deerstalker, run File Manager, and start snooping for CPL files in Windows' SYSTEM subdirectory. The CPL file you want to eliminate probably has a file name similar to that of the program you deleted. (*Don't* delete MAIN.CPL, CPWIN386.CPL, DRIVERS.CPL, or SND.CPL; they come with Windows.)

If the names baffle you, compare the dates and times of the files on the installation disks with those of the CPL files on your hard drive. If there's a match, you've probably found the culprit. While you're at it, look in the WINDOWS and SYSTEM subdirectories for DLL, HLP, INI, and other files that have names similar to that of the suspect CPL file. Then move these files to a temporary directory not listed in the PATH statement of your AUTO-EXEC.BAT file. Start Control Panel; if the icon is gone and its name has been removed from the Settings menu, you've succeeded and can now delete the relocated CPL file. Before you delete the other moved files, wait a few days to make sure that they're not used by other programs.

By Scott Dunn

Scott Dunn is a contributing editor for PC World and coauthor of 101 Windows Tips (Peachpit Press, Berkeley, California, 1992). Windows Q&A welcomes your questions (see page 10 for contact information).

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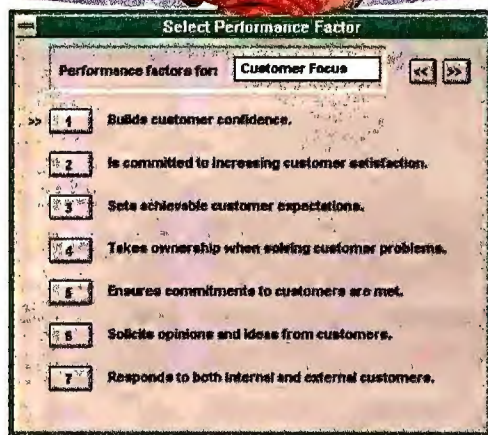
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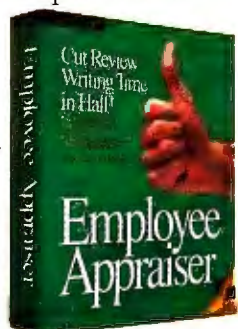
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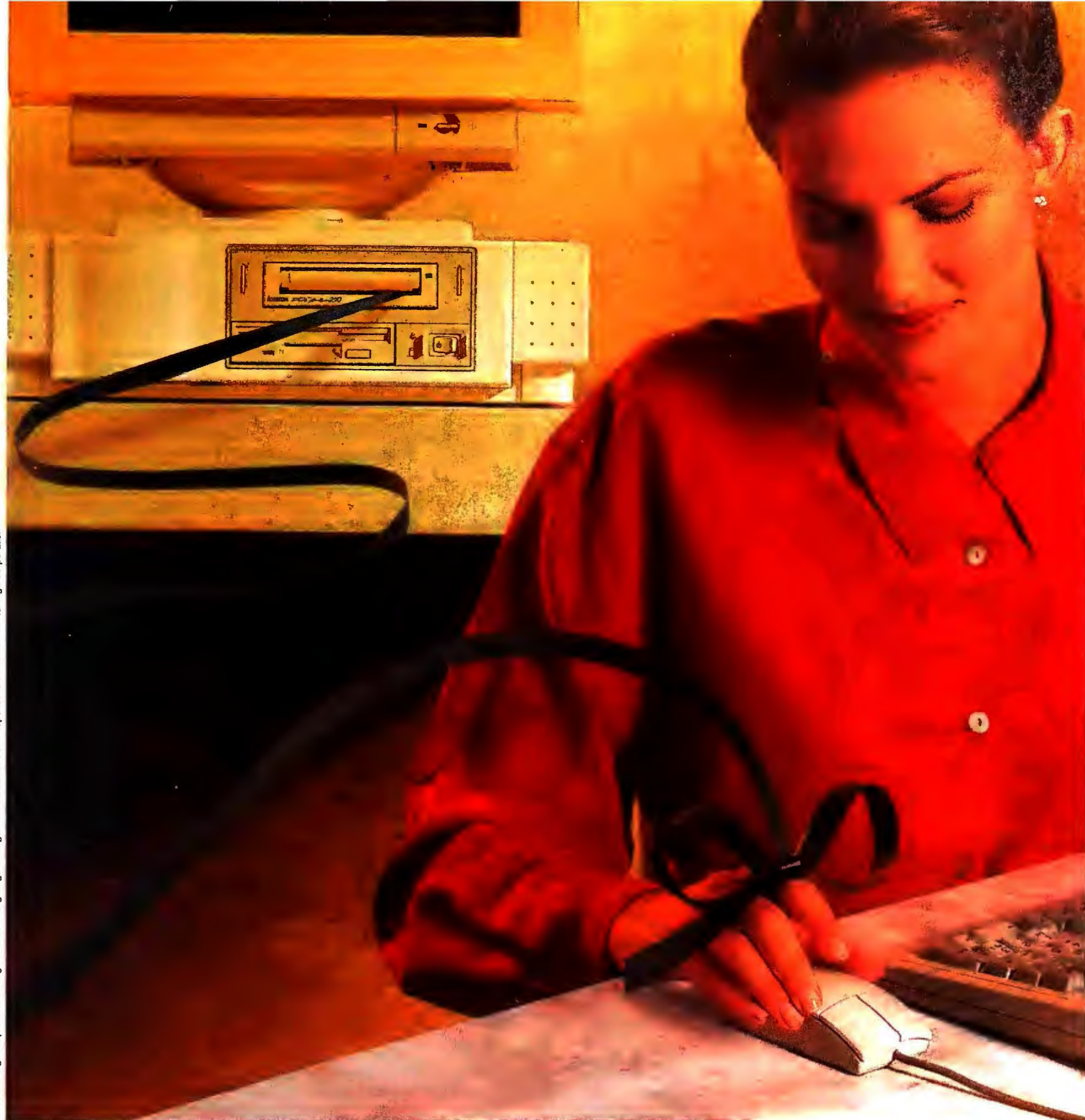


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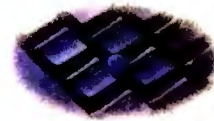


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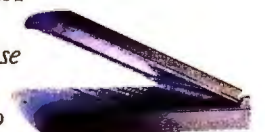
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DATA MANAGEMENT Q & A

Time-Stamping Paradox Records

Q We use Paradox 4.5 for Windows to track customer service calls. I'd like Paradox to time-stamp each call automatically, entering the date into a date field and the time into an alphanumeric field. How can I have the program do this? Right now, we have to enter this information manually.

Sam Kline, Chicago

A You can add a *method* to your data entry form that will fill in the date and time whenever a new record is inserted, and then move the cursor to the next field waiting to be filled in.

The first thing you'll need is a data entry form. If you don't have one, you can create one quickly by bringing up your table and pressing <F7>. With your form open, press <F8> or click the *Design*



icon to enter Design mode. Right-click the form's title bar, and select *Methods* from the resulting pop-up menu. Then double-click *action* under Built-in Methods.

A window will appear for entering your method's code. Some code will be in the window already—all you have to

do is add a few lines to make it look like **FIGURE 1**. I'm assuming that your date and time fields are called Date and Time, and that the field you want the cursor to jump to is called First Name. Of course, you'll change these field names to match the names that appear in your own table.

After you add the lines, select *Language • Check Syntax* or click the *Check*



Syntax icon to make sure your code is correct. When you are satisfied, close the window and press <F8> or click the *View Data* icon to leave Design mode.



To test your new method, press <F9> or click the *Edit Data* icon while in the form, then press <Insert> to add a new record (<Page Down> will not work in this case). Paradox will automatically fill in the time and date and put the cursor in the First Name field. Be sure to save the form when you close it. Remember to use this form when you enter data so that Paradox will stamp your time and date fields automatically.

One caveat: For your form to work right, the time field must be long enough to hold the time text as it's formatted by Windows—by default, that's 10 characters. To change the time format, open Control Panel and double-click the *International* option.

Cream-of-the-Crop Queries in Access 2.0

Q I recently upgraded to Access 2.0 and discovered I could query for the top records in a single table. But what about more complicated queries? I want to see who my top 10 customers are in terms of sales volume, but the information is scattered across three tables: Customers, Orders, and Order Details. The Customers table is linked to

Orders via the Customer ID field, and Orders is linked to Order Details by way of Order ID. To make things even more complicated, we also need to calculate sales amounts from fields called Unit Price and Quantity, both of which are in Order Details. Can you tell me how to set up this query?

John Bailey, New York

A First, open a new query (bypassing the Query Wizard) and add the three tables you mentioned to the design. Drag the customer name field into the first column of the query grid. Then click the Field row in the second column and enter [Unit Price] * [Quantity] (other readers can use their own equivalent field names). These steps tell Access to show two columns in the query result: your customer names and the extended price of each line item.

Next, you must tell Access to show only the total sales for each customer. Click the *Totals* icon; the expression 'Group By' will appear in the Total row of each query column. Click the Total line for the '[Unit Price] * [Quantity]' column, and select *Sum* from the drop-down menu. Then click the Sort line in the same column and set it to *Descending*.



The last step limits the query result to the top 10 records: Right-click some empty space on the query design window, select *Properties* from the resulting pop-up menu, enter **10** for Top Values, and close the Query Properties window. When you run the query, you should see just the names and total sales for your top 10 customers. (If you do get more than 10 records, it's only because there's a tie for 10th place.)

Putting Names in Proper Case With Paradox for DOS

Q We use Paradox for DOS to keep a list of people who respond to our ads. How can I make sure all the names are entered in the proper case, with the first letter of each name capitalized?

Donna Green, Milwaukee

```
method action(var eventInfo ActionEvent)
if eventInfo.isPreFilter()
then
; This code executes for each object on the form.

else
; This code executes only for the form.
if eventInfo.id() = DataInsertRecord then
doDefault
date = today()
time = time()
moveTo("First Name")

endif

endif

endmethod
```

FIGURE 1: TIME-STAMP PARADOX FOR WINDOWS records using this method.

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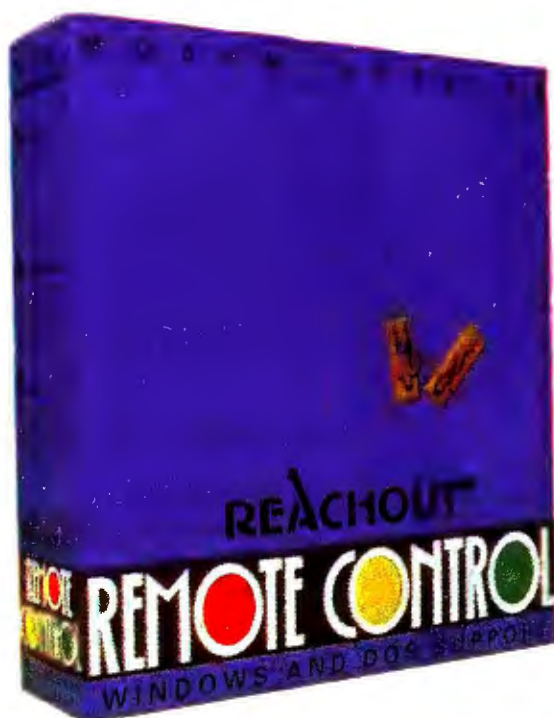


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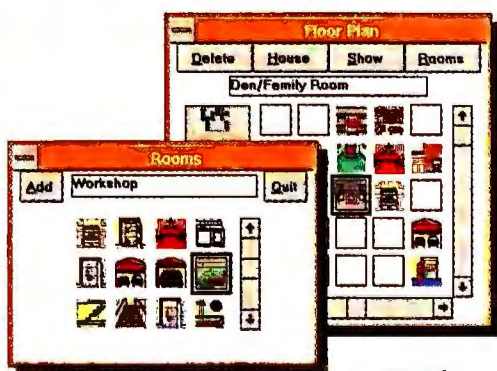
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A one-page flier is an excellent way to advertise your wares to potential customers, but its average life span is shorter than a mosquito's. You have to grab the reader's attention immediately before your document is flicked into the circular file. But you can convey a lot of information quickly—if you make it easy to find.

This month's makeover candidate comes from Michael Stearns, a tax attorney in Houston. Stearns used WordPerfect 5.2 to create a flier to attract lawyers and CPAs to his tax seminars. Unfortunately, the flier never really gets off the ground, in part because the essential information (What's the seminar about? Who should attend? When and where is it?) is buried.

To show you how Stearns can make his flier more effective, we imported the document into PageMaker 5.0 and set

about redesigning it. Our goal: to make the information more accessible by reorganizing the page.

A Change of Face

The first thing we did was change type-faces. The original layout contains mostly 10-point Courier, with one odd detour into Times Roman. We switched to Helvetica (TrueType fans could use Arial instead) for a cleaner, more professional look. We also cranked up the body text size to 12 points for greater readability.

Next, we turned to the headline, your first and last opportunity to snag readers and thus the most important piece of text. The original head is small and high on the page, making it too easy for readers to miss. We opted for a larger, newspaper-style head on two lines, leaving no doubt what the seminar is about and who should be there.

Multiply and Divide

Our next step was to break up the page by splitting it into two columns. The reason is simple: It's easier to skim down a narrow column than across a wide one, especially when you're dealing with short blocks of information.

In the left column we collected information about what's going to happen at the seminar—the topics, speaker, and so on—in four sections. Each section has its own subhead, set in Helvetica Bold. And we set off Stearns's bio by surrounding it with a box.

We then put all the logistical details in the right-hand column. We split this information into two sections, each set off by a subhead in reverse type (white type on a black background).

Happy Landings

To liven up the document without detracting from its professional tone, we added 4-point rules at the top and bottom to frame the text and balance the page. We also added a thin vertical rule between the two columns to define where they begin and end. Finally, we replaced the asterisks in the bulleted list with checkmarks from the Zapf Dingbats collection (you could also use TrueType Wingdings).

Granted, a flier advertising a seminar on tax procedures is never going to set readers' hearts aflutter with excitement. But you can apply the techniques outlined here to virtually any short, data-intensive document, using design elements to organize the page and make the information more accessible. And if you do your job well, your flier may skip the circular file entirely—and land safely on your customer's bulletin board.

By Art Weller and Daniel Tynan

Art Weller, a designer based in Oakland, California, performed the document redesign. Daniel Tynan is a contributing editor for PC World. Publishing & Presentations welcomes your questions and makeover candidates (see page 10 for contact information).

Before

TAX PROCEDURE - For the Practitioner

RENT WORK FOR THE PRACTITIONER

This seminar covers selected practical and procedural rules and techniques for assisting taxpayers from the time a deficiency is proposed through settlement and/or collection. This seminar is intermediate level with no advance preparation. Attorneys will qualify for MCLE for the College of the State Bar of Texas and Texas Board of Legal Specialization in Tax Law.

*Avoiding and Abating Penalties

*Bankruptcy & Tax Collections

*Collection from non-liable spouse in community property states

*Tax Deficiencies
-Statutory notices
-Recision of deficiency notices
-Assessments
-Settlement forms & consequences
-Statute of limitations for assessments and collections

*Offers in Compromise

REGISTRATION INFORMATION

LOCATIONS AND DATES

GALVESTON	COLLEGE STATION	HOUSTON
Oct. 22, 1992	Oct. 9, 1993	Oct. 29, 1993
College Station Hilton J.W. Marriott 5002 Seawall Blvd. #01 University Dr. E.	5150 Westheimer	Holiday Inn

TIME 8:30 a.m. - 12:10 p.m.
Registration begins at 8:00 a.m.

REGISTRATION DEADLINE 5 days prior to each seminar. Remit a \$10 late fee after that date. Registration will be accepted at the door subject to space availability and a \$10 additional registration fee.

COURSE FEE \$55.00

SEMINAR BOOK 60 page seminar book included

CANCELLATION Must receive written notice postmarked no later than the day prior to the seminar, \$10 cancellation fee

REFRESHMENT Complimentary coffee, tea, and soft drinks

NO CONFIRMATIONS MAILED

THE SPONSOR RESERVES THE RIGHT TO LIMIT ATTENDANCE OR CANCEL WITH REFUND

SEMINAR SCHEDULE

Michael Stearns, J.D., C.P.A., Board Certified in Tax Law, Texas Board of Legal Specialization, 12 years tax law practice, 4 years prior tax practice with national C.P.A. firms, Adjunct Professor, University of Houston - Clear Lake

After

1 The big headline leaves no doubt what this flier's about. With larger type sizes (like this 36-point Helvetica Black), reduce the amount of space between letters slightly so they don't look too spread out (use your program's kerning utility).

4 Hours CPE for C.P.A.s & Enrolled Agents; 3.25 for Attorneys

Tax Procedure For The Practitioner

This seminar covers selected practical and procedural rules and techniques for assisting from the time a deficiency is proposed through settlement and/or collection. This intermediate level with no advance preparation. Attorneys will qualify for MCLE for of the State Bar of Texas and Texas Board of Legal Specialization in Tax Law.

2 Splitting the information into two columns makes it easier to skim. A thin vertical rule separates the columns and guides the eye down the page.

Topics

- ✓ Collection from non-liable spouse in community property states
- ✓ Tax Deficiencies
 - Statutory notices
 - Recision of deficiency notices
 - Assessments
 - Settlement forms & consequences
 - Statute of limitations for assessments and collections
- ✓ Offers in Compromise

Seminar Book

Each attendee will receive a 60 page companion volume.

Refreshments

Complimentary coffee, tea and soft drinks will be available during the seminar.

Seminar Speaker

Michael Stearns, J.D., C.P.A., is Board Certified in Tax Law, Texas Board of Legal Specialization. His background includes twelve years in tax law practice and four years prior tax practice with national C.P.A. firms. He is an Adjunct Professor at the University of Houston-Clear Lake.

Where & When

College Station

Oct. 9, 1993
College Station Hilton
801 University Drive E.

Galveston

Oct. 22, 1993
Holiday Inn
5002 Seawall Blvd.

Houston

Oct. 29, 1993
J.W. Marriott
5150 Westheimer

4 Judicious use of boldface and reverse type draws the reader's eye to the important information—like the location, time, and cost of each seminar.

Important Information

Time

8:30 a.m. — 12:10 p.m.
Registration begins at 8:00 a.m.

Fee

\$55.00

Deadline

Payment must be received 5 days prior to each seminar. Remit a \$10 late fee after that date. Registration will be accepted at the door subject to space availability and a \$10 additional registration fee.

Cancellation

Must receive written notice postmarked no later than the day prior to the seminar. There will be a \$10 cancellation fee.

3 Putting the speaker's bio inside a box makes it stand out, while using full sentences gives the information a friendlier, more informal tone.

5 Thick rules at the top and bottom help balance other visual elements on the page. Using a smaller, bold italic font makes this text at the bottom noticeable but not obtrusive.

No confirmations mailed • The sponsor reserves the right to limit attendance or cancel with refund

COMMUNICATIONS Q & A

Researching Prospective Employers Online

Q A headhunter set up a job interview for me with an out-of-town employer. I don't know much about the company except that it's medium-size and has been in business less than ten years. Do you know of any online service or database where I can find more information about the company?

Andrew McGee, Fort Worth, Texas

A The best place to search is CompuServe's collection of company information databases. At any CompuServe prompt, type **GO COMPANY**, then press **<Enter>**. Where you go from the resulting menu depends on whether the company you're researching is publicly traded or privately held.

If it's a private concern, I'd start with Business Database Plus. It contains full-text articles from more than 500 business magazines, trade journals, regional business newspapers, and industry newsletters. You can find revealing bits of information, but take them with a grain of salt: Companies are rarely discussed here in anything but glowing terms. (I once found upbeat articles about a small firm, though I knew for a fact that its payroll checks had been bouncing for months.) Access to the database costs \$15 per hour, plus a \$1.50 charge for each article you read.

D&B Dun's Market Identifiers database has information on private and public enterprises. Enter the company name and you'll get the sales figures, net worth, number of employees, and corporate family tree of subsidiaries. Each Market Identifiers search costs \$7.50 for up to five names, plus \$7.50 for each full company record you read.

If the company is traded on a public exchange, you have four options on the CompuServe company menu. First, Standard & Poor Online's company reports include a one-paragraph company backgrounder plus details on revenues, long-term debt, and stock market activity; reports cost \$1 per company. Second, you can check the Dis-

closure II database, which contains company reports and other Securities and Exchange Commission filings; the cost is \$5 to \$17, depending on the information you request. Third, the Company Analyzer provides company profiles, stock price histories, financial statements, projected earnings, and analysts' outlooks. Costs vary depending on the information you access. Finally, Citibank's Global Reports give you company news and history, SEC filings, earnings, products, and subsidiaries. But access is pricey: \$60 an hour on weekdays, \$30 at night and on weekends.

If you're concerned about your prospective employer's financial status, check the firm's credit history in the TRW Business Credit Profiles database in the same CompuServe company menu.

This database contains credit histories; financial information; company profiles; details of any tax liens, judgments, and bankruptcies; plus payment histories to creditors. The search costs \$9, plus \$34 for each credit report.

A note of warning: All the charges listed here are in addition to CompuServe's connect fees (\$4.80 per hour for 2400-bps access, \$9.60 for 9600 and 14,400 bps). Before you tap into any database, be sure you're clear on the search charges. We hear from too many readers who unwittingly rack up big online bills searching for information.

Distributing Software as Shareware

Q I've written a simple phone log utility. How do I go about distributing it as shareware? Do I need to register it with an agency? How much should I charge for the program? Do I need to offer support to people who send me money for it?

Matt Whitney, Ayr, Ontario, Canada

A According to Richard Harper, president of the Association of Shareware Professionals, the first thing you should

do is get your product copyrighted. Call the Library of Congress's Registry of Copyrights (202/707-3000) and ask for Form TX and Circular 61. Registration costs \$20, but it should deter anyone from stealing your code.

As for pricing, you should check similar shareware products and set your price accordingly. Then just upload your program to the appropriate forums on the major online services—such as CompuServe, America Online, and GENie—plus a few bulletin board systems, and wait for the checks to roll in. (The rules and procedures for uploading files vary. Check with the forum's or

You can find revealing bits of information on CompuServe's Business Database Plus, but take them with a grain of salt.

BBS's sysop for specific guidelines.)

Should you provide support? It's a darn good idea, says Harper. "It will be hard for someone to justify sending you money if they can't expect something besides the software in return." He suggests creating a support forum on a local BBS, or providing E-mail support via CompuServe or the Internet.

Now that you're a bona fide software mogul, you might consider joining the Association of Shareware Professionals (ASP). It's kind of like the Better Business Bureau of shareware: If your product comes with a statement of ASP membership, potential buyers will be less apt to regard you as some fly-by-night hacker. To find out more about joining, contact the ASP on CompuServe by typing **GO ASPFORUM** or by calling 616/788-5131.

By Judy Heim

Judy Heim is a PC World contributing editor and author of The Best Guide to Business Shareware (Osborne/McGraw-Hill, Berkeley, California, 1994). Communications welcomes your questions (see page 10 for contact information).

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Circle 154 on reader service card

HARDWARE Q & A

How Fast Is Fast Memory?

Q My PC's manual says to use memory rated at 80 nanoseconds or faster. Would I see better performance with 70ns, 60ns, 53ns, or even 40ns memory?
Aaron Loo, Pleasanton, California

A In a word, no. Memory speed ratings don't describe how *fast* memory is: They specify the top speed at which the memory can be accessed safely by a system. Memory rated at, say, 60ns can tolerate access faster than your system can handle, so you'd be wasting that excess capability—and paying for it, since 60ns memory costs more than 80ns memory. If you installed 100ns memory, though, you'd be in trouble: Your system would start getting memory errors or slow down significantly.

No-Name Video

Q I bought a super-VGA card at a garage sale and installed it in my PC. It seems to work, but it didn't come with any software, and it's literally a no-name card—I can't figure out who manufactured it. Since it's super VGA, I'd like to run Windows on it at a higher resolution than 640 by 480. Any ideas?
Kyle Ventura, Aberdeen, Maryland

A For higher resolution, you need a Windows driver—a program that lets your card talk to Windows. To identify the card's manufacturer, first take a look at the largest square chip on the card and see if you can make out a name (Tseng, Trident, S3, ATI, or whatever) and the chip's ID number. The name will be that of the controller's manufacturer, which usually writes the drivers as well. If you call and ask nicely, the company will probably send you a high-resolution driver to match your chip.

If you don't see anything coherent on the controller chip, open Windows' Main group and double-click on *Setup*. Select *Options • Change System Settings*, click on the down arrow across from Display to reveal a list of drivers, and choose *Super VGA (800x600, 16 colors)*.

This driver probably isn't as fast as one you could get from the manufacturer, but at least it's better than 640 by 480. To install a driver from the manufacturer, follow the same procedure, only choose *Other display (requires disk from OEM)* from the driver list.

A couple of points: First, remember that you need a super-VGA-capable monitor to run at 800 by 600 resolution. The key monitor spec to look for is horizontal scan frequency, which should be 38 kHz or better. Second, if Windows won't load when you install a new driver, run Windows' *Setup* from DOS and change the display to VGA.

A PC Reaches Retirement Age

Q I own an Epson Equity I+ system with a 20MB hard drive. Sometimes I get the message 'Seek error reading drive C:'; other times it just takes a long time to access something on the drive. I've tried repartitioning and reformatting the hard disk, but that didn't help. How can I fix it?

*Douglas Esanbock,
Spring Valley, Wisconsin*

A You're talking about an 8-year-old 8088 system. The hard disk is old, it's tired, and it's having trouble finding hard disk sectors. When your drive was configured, the read/write heads laid down the basic data marking the sectors where the data should go. Now, several centuries later, those heads have drifted out of alignment, and they're having trouble finding the sector information.

You could do a *low-level format*, which rewrites the sector information to align with the heads. Steve Gibson's SpinRite will do this, as will The Norton Utilities and PC Tools Pro. But in your case, this is a temporary measure at best. Hard disks manufactured in the mid-eighties simply weren't meant to last as long as yours has. Count yourself lucky the thing is still spinning.

You could also replace the hard disk and controller, but you'd probably have trouble finding one that's compatible

with your old system. In the back pages of my local computer tabloid, the cheapest brand-new system I can find is a 386SX with a 120MB hard disk, a monitor, 4MB of RAM, a keyboard, and two floppy drives. It costs around \$500, probably less than your 20MB hard disk cost originally. See what I'm getting at?

A Hard Disk That's Missing Something

Q I recently replaced my original IDE hard disk with a 342MB model. When I installed it, my PC's setup utility gave me only 12 drive types to choose from, none of which matched my new drive. So I picked the type with the largest capacity, 308MB. Unfortunately, I now have 34MB less than I paid for. How can I let the system know I have a 342MB hard disk?

Larry Jasorka, Stirling, New Jersey

A Before you do anything, back up your hard disk, because you'll have to reformat it to reclaim those 34MB.

Most system setup utilities include a user-definable drive type, which is usually called Type 0, Type 47, or Type 99. Pick it from the list of drive types and fill in the blanks. Be prepared to enter a few disk parameters: number of cylinders, number of heads, the preformatted capacity, number of sectors per track, the landing zone, and the starting cylinder for write precompensation.

Your system setup may not require all these specs; if you can't find them in your documentation, get them through your drive maker's fax-back service.

If your system lacks a user-definable drive type, I suggest you shell out \$30 for Micro House's EZ-Drive, an IDE hard disk utility available from Insight Direct (800/998-8093). Just insert the program disk in a floppy drive, type **EZ/CUSTOM**, and follow the instructions.

To get the missing 34MB back, you'll need to run FDISK from a floppy and enter the proper capacity for drive C: and any other logical partitions (drives D:, E:, and so on) you may want. (This destroys all data on the disk, so I hope

you remembered to perform the backup.) At this point, enter **FORMAT C: /S** to create a bootable, ready-to-roll, 342MB drive; then restore your data onto it.

The Battle Between Mouse and Modem

Q I just got a new internal modem and a communications program. My modem is configured for COM4, but my communications software tells me COM4 is unavailable. When I changed my modem to COM3, the program worked, but my mouse no longer did. What's happening?
Hyung Jun Kim, Edmonds, Washington

A Let's start with the reason your mouse wouldn't work: PCs have four serial ports, but you can use only two at a time because COM1 and COM3 share one *hardware interrupt*, as do COM2 and COM4. (Two devices can't use the same hardware interrupt—a kind of hot line to the CPU—at the same time.) When you changed your modem to COM3, the mouse was probably on COM1; the two fought for the same interrupt, and your mouse lost.

It's best to start installing serial devices from the lowest COM number. Your mouse is on COM1, so reconfigure your modem for COM2, probably by moving a jumper (your modem's manual or the manufacturer's tech support can tell you how). Then plug the modem back in, turn on your PC, run your system setup utility, and *disable* COM2. Run your communications software setup again, tell the program your modem is on COM2, and everything should run fine.

X-Ray Specs

Q I often travel by air and have been counseled by associates not to subject my notebook to airport security X-ray equipment. According to security personnel, my PC is perfectly safe. What's the real story?
Geoffrey Freda, St. Albert, Alberta, Canada

A Let's put this one to rest once and for all: Airport X-ray machines won't harm your hardware or your data. If you put a camera with high-speed film through one of those things, *then* you might have a problem.

By Eric Knorr

Eric Knorr is a contributing editor for PC World. Hardware welcomes your questions (see page 10 for contact information).



Jessye Zane, Architect
PC World Online user



Marc Taylor, Account Executive
PC World Online user



Brad Meyers, New Father
PC World Online user

This morning Jessye Zane, who is very particular about aesthetics, took a moment to admire our windows.

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Circle 35 on reader service card

STAR-DOT-STAR TIPS

Mail Magic

If you use cc:Mail Remote—the DOS program that lets you pick up your cc:Mail messages from home, a remote office, or on the road—you may wish you could set up a batch file that automatically calls your cc:Mail post office and retrieves your messages. It turns out you can. Write your batch file so it first changes to your cc:Mail Remote directory, then uses the command **REMOTE password COMM/CALL** (where *password* is your cc:Mail Remote password) to poll the post office.

Avi Markson, New York

Editor's note: The REMOTE parameter COMM/CALL is great, especially if used in AUTOEXEC.BAT to download mail each day when you turn the computer on. The command instructs the program to dial your default cc:Mail post office, send and receive messages, then hang up and return to

the DOS prompt without ever loading the cc:Mail user interface. To read new mail, you still have to run the program in the normal way.

This trick doesn't work with versions of cc:Mail Remote earlier than 3.2, and suffers from one additional drawback: Each invocation of REMOTE using COMM/CALL tries the call only once, so if you get a busy signal or encounter other difficulties connecting you'll have to try again manually. To make cc:Mail Remote try the call several times before giving up, use the REDIAL.BAT technique, shown in **FIGURE 1**, which interprets REMOTE's exit codes and borrows a looping trick from our April column. For best results, use the CALL command in AUTOEXEC.BAT to launch REDIAL.BAT.

Saving CMOS on Paper

If your computer loses the contents of its CMOS configuration memory, it will probably fail to boot and remain disabled until you reenter the correct settings in the CMOS setup program. Luckily, there's an easy way to document the settings.

Start the computer and enter the CMOS setup program (as the computer is booting, most BIOSes display the correct keystrokes for activating the program). Make sure your printer is on and connected, then press **<Print Screen>** for the contents of each setup screen. (Remember to print all the screens—including the sometimes-hidden one that selects a disk drive type.) This tip won't keep buggy programs from wiping out your CMOS configuration, but if disaster strikes you'll be able to pull out the setup screen printouts and get things working again quickly.

Allan Karden, CompuServe

Editor's note: Buggy programs aren't the only thing that can scramble your CMOS. A worn-out CMOS battery can cause data loss; so can a lot of jostling, which sometimes interrupts the battery circuit. Printing the screens and saving the output in a safe place is an easy way

to get your PC up and running again.

One reminder: If you have an EISA machine, you have more to save than if you have an ordinary ISA computer. The EISA configuration is also kept in CMOS, but it's only accessible through a special EISA configuration utility that you should have received on a floppy along with your computer or motherboard. Print out the configuration using **<Print Screen>** or with the configuration program's printing option, if there is one. You may also want to tell the program to save the EISA configuration to a floppy disk, since it can be complicated and tedious to restore by hand. Finally, keep a bootable floppy disk around so you can boot DOS and run the EISA configuration utility. My EISA machine won't recognize the hard disk controller until after the configuration program has run—so there's no way to boot from the hard disk if the EISA CMOS has been trashed.

A Slash in Time

If you ever type AT commands into your modem, you'll be pleased to hear of a shortcut that lets you repeat the last command instantly. Type the characters **A/** while the modem is in the command state, and the modem repeats the previous command. You don't even need to type **<Return>** after the slash.

Burt Gross, Los Angeles

Editor's note: A/ is the only command in the standard AT set that doesn't require **<Return>** to work. This is the fastest way to redial a number if the previous call did not go through, and it reduces the chance of typos when you need to repeat a long, complex command. It's particularly useful if you want to repeat a call after changing modem speed; the modem will recognize A/ despite a speed change.

By Brett Glass

Brett Glass is a PC World contributing editor. Star-Dot-Star welcomes your tips, macros, batch files, and short programs (see page 10 for contact information).

```
@ECHO OFF
C:
CD\CCMAIL
SET COUNTER=1

:START
REMOTE PASSWORD COMM/CALL
SET COUNTER=%COUNTER%1
IF "%COUNTER%"=="11111" GOTO END
IF ERRORLEVEL 3 GOTO MODEM
IF ERRORLEVEL 2 GOTO ESCAPE
IF ERRORLEVEL 1 GOTO START
IF ERRORLEVEL 0 GOTO END

:MODEM
ECHO Modem not responding
GOTO END

:ESCAPE
ECHO Call canceled by pressing ESC

:END
SET COUNTER=
```

FIGURE 1: AUTO-DIAL YOUR CC:MAIL POST OFFICE using REDIAL.BAT. CALL the batch file from AUTOEXEC.BAT to download mail when you boot up.

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Maximum Refresh Rate at Maximum Res. (Hz)	76	76	60	60
MPR-II (Low Radiation)	•	•	•	•
Power Management	•	•	•	•
Flat Square Screen		•	•	•
On-Screen Programming			•	•
Real Color Control				•
Warranty	2 Years	2 Years	2 Years	2 Years

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Circle 198 on reader service card

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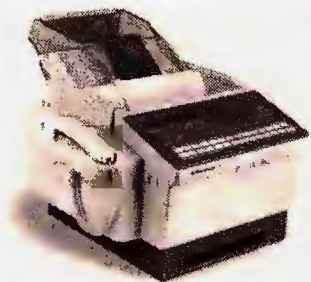
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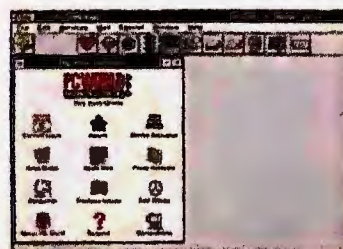
CIRCLE 457 ON READER SERVICE CARD

ONLINE SHOPPING

PC WORLD EXEC/DIRECT Online Shopping

Advertisers can sell computer products directly to users of CompuServe through PC World's exciting new *Exec/Direct* Service, on the PC World Online area. Forming a "virtual shopping mall", *Exec/Direct* enables 1.5 million online subscribers to shop for, preview and purchase PC hardware, software and accessory products using their credit cards.

The new service lets buyers browse and place orders 24 hours a day, at any location where they have their PC's. They can preview products as VGA graphics or text-based descriptions, or download a software demo for a test drive.



To advertise on the PC World Online *Exec/Direct* Service: please contact your PC World advertising sales representative or call 1-800-PC WORLD.

To join PC World Online, please consult ordering information located elsewhere in this Issue

CIRCLE 494 ON READER SERVICE CARD

ACTION CARDS

PC WORLD Action Cards

Advertisers use PC World Action Cards to get direct access to 150,000 managers who buy and use PC's for business. Mailed six times a year, PC World Action Cards is a uniquely effective card deck advertising program delivering PC-proficient managers who buy direct, and have bought a PC-related product within the last 90 days via Direct Response. 60% of them receive no other card deck! Frequency discounts are available to advertisers in PC World's Classified Advertising section.

For more information on selling products by advertising in PC World Action Cards, please call:



PC World
Action Card Sales Department

501 Second Street
San Francisco, CA 94107

Eastern U.S.: 508-820-8113
Western U.S.: 415-978-3353

CIRCLE 471 ON READER SERVICE CARD

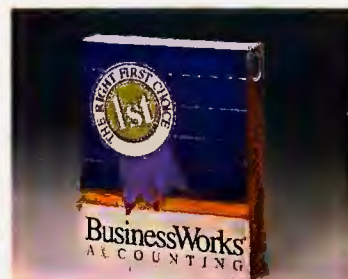
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AT&T and INTEL APPROVED

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PENTIUM Fan - Add \$ 20

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★ AMI Bios ★ ZIF Socket ★

★ All Green Features ★

★ Up to 128MB RAM (72 Pin) ★

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★ Available in 30 or 72 Pin ★

★ Green Features ★ 3.3 or 5 Volt ★

INTEL

486DX4-100 VLB (256K Cache) \$799

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486DX33 VLB (256K Cache) \$369

Motherbd w/o CPU (256K Cache) \$119

AMD

486DX2-66 VLB (256K Cache) \$429

486DX40 VLB (256K Cache) \$309

CYRIX

486DX50 VLB (256K Cache) \$449

486DX40 VLB (256K Cache) \$299

486DX33 VLB (256K Cache) \$279

SIMM/SIPP MODULES

Desc	80NS	70NS	60NS
256x9	\$ 12	\$ 15	\$ 17
1MBx3	\$ 38	\$ 39	\$ 48
1MBx8	\$ 38	\$ 42	\$ 48
1MBx9	\$ 42	\$ 45	\$ 55
4MBx8	\$135	\$138	\$145
4MBx9	\$138	\$145	\$159
16MBx8		\$599	\$649
16MBx9		\$669	\$719

72 PIN SIMMS

Desc	80NS	70NS	60NS
1x32 (4MB)	\$139	\$ 149	\$ 169
1x36 (4MB)	\$159	\$ 169	\$ 189
2x32 (8MB)	\$329	\$ 339	\$ 389
2x36 (8MB)	\$339	\$ 349	\$ 389
4x32 (16MB)		\$ 619	\$ 659
4x36 (16MB)		\$ 639	\$ 699
8x32 (32MB)		\$1099	\$1199
8x36 (32MB)		\$1189	\$1269
16x36 (64MB)		\$2799	

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CONNOR

3 Year Warranty

210MB .. 13MS ... \$199

250MB .. 12MS ... \$229

340MB .. 13MS ... \$265

420MB .. 12MS ... \$289

540MB .. 10MS ... \$389

SEAGATE

3 Year Warranty

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340MB .. 12MS ... \$269

452MB .. 12MS ... \$305

545MB .. 12MS ... \$399

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1.7GB 10MS ... \$1069

1GB 8.5MS ... \$ 889

1.7GB 8.5MS ... \$1269

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3 Year Warranty

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340MB .. 12MS ... \$269

425MB .. 12MS ... \$299

540MB .. 12MS ... \$399

CONTROLLERS

PCI - ADAPTEC - 2940K w/Drivers \$339

PCI - BUS LOGIC - KT946C w/Drivers ... \$309

EISA - ADAPTEC - 2742K w/Drivers \$379

VLBS - PROMISE IDE Caching \$139

(Up to 16MB)

16 BIT - IDE w/2FD/2HD/2S/1P/1GP \$ 19

VIDEO BOARDS

PCI - ATI Graphic Turbo PCI 64 (4MB) \$589

PCI - GENOA Phantom (2 MB) \$209

VESA LOCAL BUS

DIAMOND - STEALTH 64 (2 MB) \$359

GENOA - 8500VL (1 MB) \$119

TRIDENT - 9400VL (1 MB) \$ 99

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CIRCLE 505 ON READER SERVICE CARD

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"Network Central™ and NetWare® provide a powerful and easy-to-use file and information sharing solution."

-Toby Corey, Senior Director of Marketing for NetWare Products Division, Novell, Inc.

Network Central for Windows is simply the fastest, easiest way to find, organize and share documents, spreadsheets and files, on your network. All without moving a single file or fighting your way through network complexity.

It's designed to be installed by you and used on your PC without interfering with the network. It's a powerful single user tool and a real productivity enhancer for any team.



Find. Once you find a file you never have to look for it again, because with Network Central you get back to it with a single click. You can also preview file contents without opening the file itself.

Organize. Simplifies project organization by creating a

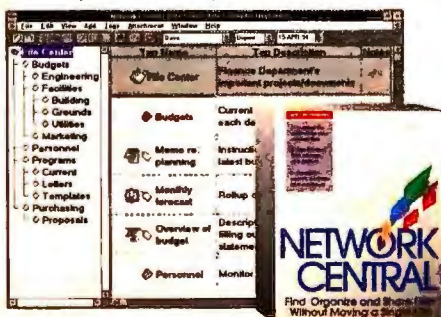
virtual file cabinet for your network. A single location where you or your team can organize project files into folders without moving them from their original locations.

Share. File sharing is easy because Network Central gives you one place to find all the files you need. Even new team members have instant access to project files. Plus it automatically navigates the network for you, even if you're not connected to the drives or servers where the files are located.

Flags changes. Lets you know the moment a file has been added or changed so you can see what requires immediate attention.

Add users. As your need to share files grows, Snap+Together™ design lets you easily add new users one at a time.

For more information or to order, call First Floor today. We'll make your network work for you.



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AND GET A BONUS LICENSE TO USE WITH A FRIEND FREE.

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EXTENSION 101

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FIRST FLOOR

CIRCLE 434 ON READER SERVICE CARD

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Plug the BuffPort™ into your PC and print to any parallel printer or device. Transfer data from your PC as fast as the printer can accept it, up to 150,000 cps. (A standard PC parallel port is typically limited to about 10,000 cps.) Use the BuffPort with the HWP for a 150,000 cps printer sharing system!

If you have an older printer that does not have an high-speed interface, then connect a CPR buffer to the end of your printer cable and send from the BuffPort at 100,000 cps. The CPR also works as a printer buffer with a standard PC parallel port, but would be limited to the PC port's speed.



BUFFALO is a registered trademark of Melco, Inc. BuffPort is a trademark of Buffalo, Inc.

SIMMs:

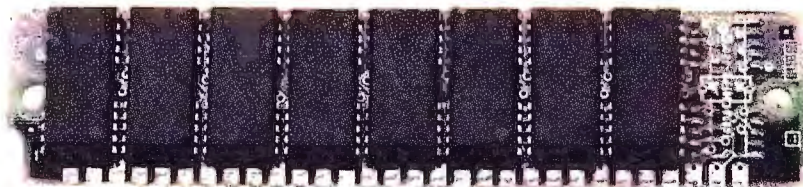
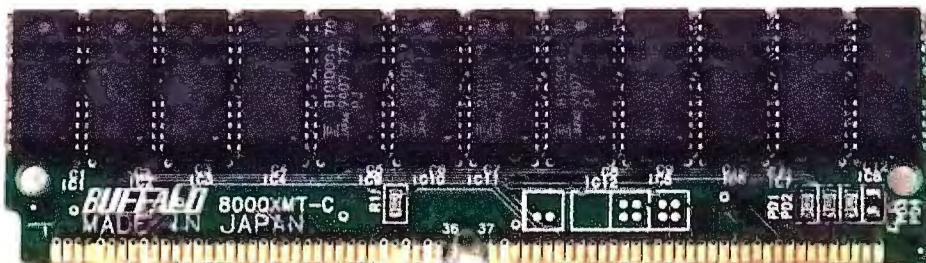
1 x 36 & 32

2 x 36 & 32

4 x 36

4 x 8, 1 x 3

PCMCIA



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Printer Sharing:

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SLP 2 ser. & 8 par.

HWP 5 parallel ports

HXM 2 ser. & 2 par.

HXS 4 serial ports

ASB 5 parallel ports

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CIRCLE 420 ON READER SERVICE CARD

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"The MiniSCSI Plus is even more elegant than its predecessor and almost twice as fast." - Jim Seymour PC Magazine 12/92



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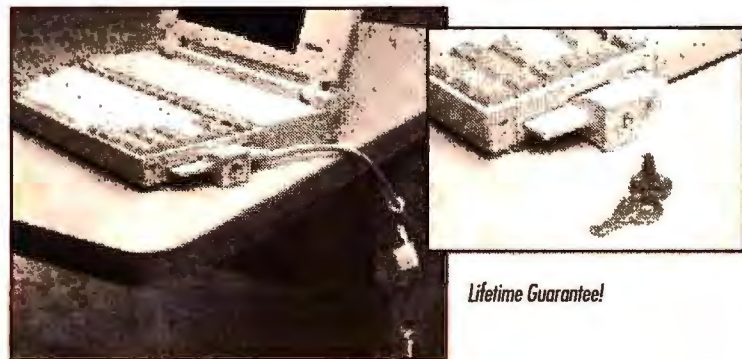
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CIRCLE 511 DN READER SERVICE CARD



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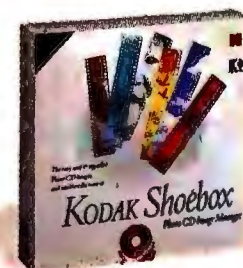
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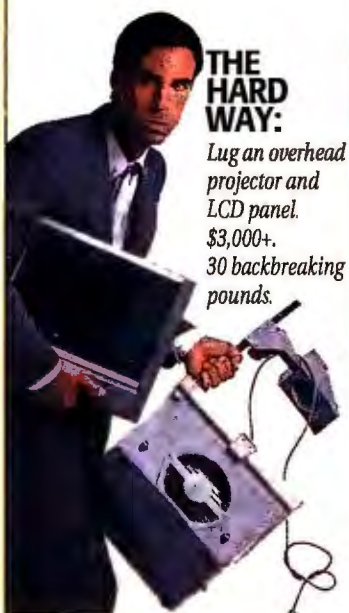
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For more information about TV Elite, contact Advanced Digital Systems (ADS) at (800) 888-5244. From outside U.S., call (310) 926-1928

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- CD-ROM drive
- Sound board recommended



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SOUND
Add music and voice-over

ANIMATION
Makes your work fly



Developed and Produced by



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All Memory Has Value!



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Call or fax what you have available

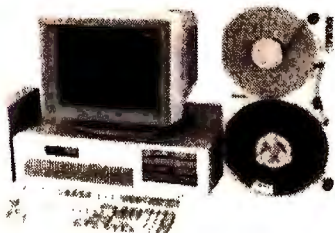
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CIRCLE 417 ON READER SERVICE CARD

FACT: 82% of
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on PC purchases.

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CIRCLE 508 ON READER SERVICE CARD

Miscellaneous

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- For Epson, OKI, IBM, Oot Matrix and HP LaserJet Printers.
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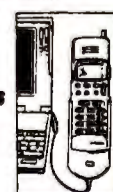
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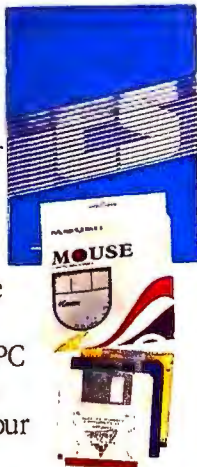
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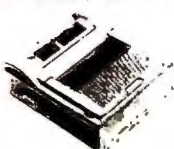
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OL410e LED
600 DPI Class



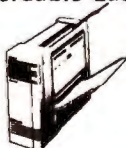
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- ▶ 4PPM W/32-bit RISC processor
- ▶ 2MB with EMM
- ▶ 600 DPI Class
- ▶ 5-yr printhead warranty

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Panasonic

KX-P4400
Affordable Laser



Key Features

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- ▶ 300 X 300 dpi
- ▶ 512K memory
- ▶ 1-yr warranty

\$410⁹⁵*

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KX-P4410
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Key Features

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- ▶ 300 X 300 dpi
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Key Features

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- ▶ IDE/AT
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- ▶ Priced at 65¢ a meg

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Key Features

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- ▶ 3 1/2" 1 inch high
- ▶ 546MB
- ▶ IDE/AT
- ▶ 12 msec seek time
- ▶ Priced at 58¢ a meg

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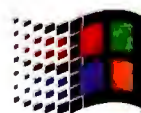
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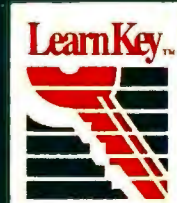
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Prem. 386SX/32, Prem. 386SX/16				
Prem. II 386SX/20, 25			500780-004	189.00
Premium 386/25, 33, 386/33Tf, 386SX/16,			500780-003	59.00
Prem. II 386SX/20, 25			500780-001	59.00
Premia 4/33S, 4/33, 4/50D, 4/66D		8Meg	501159-002	379.00
Premia		16Meg	501159-003	789.00
Premia		32Meg	501159-004	1469.00
Premia		64Meg	501159-005	3111.00
AST Cloud III		0-32Meg	500R18-001	179.00

ZENITH MEMORY MODULES

MODEL	AMT. UPGRADED	AST PART #	PRICE
Z386/33, 25, 20, 33E	1Meg	ZA3800ME	59.00
Z386/33, 25, 20, 33E, 486/25E	4Meg	ZA3800MK	180.00
Z386SX	2Meg	7-605-1 modules	119.00

MAGNAVOX

286/386SX-16, 386SX-20, 486SX-20 & 386-33 all are 72PIN SIMM:
1MEG - 59.00 4MEG - 180.00 8MEG - 349.00 16MEG - 659.00

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IBM P/S2 32BIT EXPANSION BD.

0-16Meg, Ext.-Expnd. Memory Bd for P/S2 70, 80, 90, Lim 4.0

1Meg	2Meg	4Meg	8Meg
\$99.00	\$238.00	\$319.00	\$499.00

PS/2 MCA 0-8MEG EXPANSION R...

Meg Extended and/or Expanded Memory for all IBM

IBM PART NO.	WORKS WITH MODEL NO.	PRICE
30F5348 (512K)	30-286	37.00
30F5360 (2Meg)	30-286 25-286 50 MTHR 80	104.00

32G372 (16Meg ecc)	9595 DP1	
6450375 (1Meg)	90-041	79.00
6450379 (2Meg)	90-111, 311-121, 321, 081, 161	84.00
6451060 (4Meg)	80-A21, A-61, 80-120, 80-111, 80-311	189.00
6450604 (2Meg)	70-061, E61, 121, 50Z, 55SX, 65SX, P-70, 55LS, 56LS, X-Station 120 & 130, 35SX, 35LS, 40SX 70-A21, A-61, 8-21, E-61, 35SX, 35LS, 40SX, Val. Pt. 321	89.00
6450608 (2Meg)	35	90.00
78X8955 (128K)	35SX, 40SX, 55SX, 65SX, 55LS, 69LS	175.00
3472933 (4Meg)	35SX, 55LS, 65SX, 40SX, 35SX, 35LS	175.00
8778977 (2Meg)	P/S1-286	49.00
1057035 (512K)	P/S1 & P/S1/386SX-2121	109.00
92F9395 (2Meg)	P/S1 & P/S1/386SX, Model-2121	189.00
92F9694 (4Meg)	PSII Expert, Consultant, Wiidow	184.00
92F7200 (4Meg)	Value Point Performance, PC Server 4/66	184.00
92G7201, 73G5131 (4Meg)	Value Point Performance, PC Server 666	359.00
92G7203 (4Meg)	Value Point Performance, PC Server 4/66	159.00
92G7205 (32Meg)	Value Point Performance, PC Server 4/66	1539.00
96F9290 (4Meg)	Standard 1x3-70 Simms	172.00
96F9291 (1Meg)	Standard 4x9-70 Simms	672.00
6450902 (2Meg)	56, 57, 57SX, 90, 95, P-75, 57SLC Value Point 77 486SX2, 486SX, SVR 85 P/S1, Value Point Perf	90.00
60G1622 (16Meg)	57SX, 90, 95, P-75, 57SLC, 56, 56SLC, P/S1, 386SX, Mod-2123, 2133, 2155, Val Pt 77, 486CS2, 486SX, SVR85	699.00
6450128 (4Meg)	Value Point 77 486SX2, 486SX, SVR 85 35SX, 40SX	175.00
6450129 (8Meg)	56, 57, 57SX, 90, 95, P-75, 57SLC	339.00
6450130 (8Meg)	56, 57, 57SX, 90, 95, P-75, 57SLC	339.00

IBM NOTEBOOK & LAPTOP MEMORY

8189098 (4Meg)	Thinkpad 500, 510CS	199.00
8189099 (8Meg)	Thinkpad 500, 510CS	389.00
8189113 (16Meg)	Thinkpad 510CS	869.00
79F0999 (2Meg)	LX40, N33SX, PS Note, Thinkpad 7101	103.00
79F1000 (4Meg)	LX40, N33SX, PS Note, 1Kpd 350, 350C, 710T, PS Note 425	369.00
79F1001 (4Meg)	LX40, N33SX, PS Note, Thinkpad 750	189.00
79F1415 (4Meg)	Thinkpad 750, 750C, 755 360	209.00
79F1416 (8Meg)	Thinkpad 750, 750C, 755 360	339.00
66G0094 (16Meg)	Thinkpad 750, 750C, 755 360	849.00
07G1420 (4Meg)	CL57LX, LpTp, Thinkpad 700, 720, 720C	209.00
07G1421 (8Meg)	CL57LX, LpTp, Thinkpad 700, 720, 720C	389.00
66G0378 (8Meg)	Thinkpad 350, 350C, PS Note 425	339.00
66G0379 (16Meg)	Thinkpad 350, 350C, PS Note 425	649.00
92R8094 (2Meg)	445S	109.00

COMPAQ MEMORY MODULES

MODEL	AMT. UPGRADED	CMPO PART #	PRICE
DeskPro 386/33, 386/33L	2Meg Module	115144-001	139.00
486/25, 486/33L	8Meg Module	116551-001	429.00
486/50L System Pro	32Meg Module	116568-001	1459.00
DeskPro 386/33L, 486/33L	[Exp 8d]	116569-001	279.00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	199.00
DeskPro 386S-16MHz	1Meg Exp 8d	113633-001	149.00
	4Meg Exp 8d	113634-001	279.00
	1Meg Module	113646-001	79.00
	4Meg Module	112534-001	199.00
DeskPro 386/20E	1Meg Exp 8d	113644-001	149.00
DeskPro 386/25E	4Meg Exp 8d	113645-001	279.00
	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	219.00
DeskPro 286N, 386N,	1Meg Module	116688-001	59.00
386SX/20, 386/23M, 486/33M,	2Meg Module	118659-001	89.00
486S/25M, 486S/16M	4Meg Module	118659-001	169.00
Port. I Series 486C	8Meg Module	128677-001	389.00
M Series Exp 8d	0-64Meg	128160-001	189.00
DeskPro 386/15	1Meg Kit	100701-001	99.00
	4Meg Kit	108072-001	299.00
	1-2Meg Exp 8d	108069-001	239.00
	4-8Meg Exp 8d	108070-001	437.00
DeskPro 286	512K Kit	113012-001	49.00
DeskPro 5/60, 5/68M, 5/68M	8Meg Kit	149911-001	389.00
Prosignia 5/60	16Meg Kit	149949-001	707.00
Proliant 100 5/60	32Meg Kit	149912-001	1399.00
Proliant 2000 4/30, 5/66	64Meg Kit	149913-001	2700.00
Proliant 4000 4/50, 5/66	128Meg Kit	149914-001	5900.00
Prolinea 386 3/25S, 3/25ZS	2Meg	141738-001	109.00
	8Meg	141742-001	338.00
Prolinea 486 4/25S, 4/33, 4/50, 4/66, CDS	2Meg	141743-001	95.00
Enhanced Prolinea, Prosigno series	4Meg	141684-001	175.00
	8Meg	141685-001	339.00
Prosignia PC Server, 486/33,	8Meg	141685-001	339.00
486 OSX/66	16Meg	149320-001	699.00
	32Meg	149147-001	1525.00

COMPAQ LAPTOPS & NOTEBOOKS

LTE/286	2Meg 8d	117081-002	99.00
LTE/286	4Meg 8d	117081-003	179.00
LTE/386S/20	4Meg Module	121125-002	209.00
LTE/LITE/20, 25, 25C	4Meg Module	129769-002	209.00
LTE/LITE/20, 25, 25C	8Meg Module	129769-003	409.00
LTE/LITE/20, 25, 25C	16Meg Module	129769-004	809.00
LTE/LITE/425C/33C/25E/25SL	4Meg Module	142337-002	189.00
LTE/LITE/425C/33C/25E/25SL	8Meg Module	142337-003	349.00
LTE/LITE/425C/33C/25E/25SL	16Meg Module	142337-004	718.00
SLT/286	1Meg Module	110235-001	75.00
SLT/286	4Meg Module	110237-001	219.00
SLT/386	1Meg Module	118303-001	79.00
SLT/386	2Meg Module	118304-001	109.00
SLT/386	4Meg Module	118305-001	219.00
Concerto, LTE Elite	4Meg	144790-001	189.00
	8Meg	144790-002	389.00
	16Meg	144790-003	719.00
Contura 320, 325	2Meg	139497-001	99.00
	4Meg	139498-001	189.00
	8Meg	139499-001	349.00
Contura 4/25, 4/25C, 4/25CX	4Meg	146520-001	189.00
	8Meg	146521-001	339.00
	16Meg	146531-001	739.00
Aero 4/25, 4/33L	4Meg	190532-001	184.00
	8Meg	190597-001	374.00
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T1000SE/VE/E	2Meg	BC14-PA8212U	79.00

T2000/T2000SX	2Meg	PC18-PA8317U	79.00
T2000SX/T1000LE	4Meg	PC18-PA8314U	189.00
T2000SX/T1000LE	8Meg	PC14-PA8315U	359.00
T2000SX/X/T1800, 1850, C	2Meg	PC-PA2000U	79.00
T2000SX/X/T2000SX/T1800, 1850, C	4Meg	PC-PA2001U	189.00
T2000SX/X/T2000SX/T1800, 1850, C	8Meg	PC-PA2002U	359.00
T4400SX, SXC T6400, T6500	4Meg	PC-PA2004U	199.00
T4400SX, SXC T6400, T6600	8Meg	PC-PA2005U	369.00
T4400SX, SXC T6400, T6600	16Meg	PC-PA2006U	639.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	4Meg	PC-PA2012U	199.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	8Meg	PC-PA2013U	389.00
T4500, C, T4600, T4700, T1900, C, T1910, T1950 (3.3 v)	16Meg	PC-PA2014U	769.00
T3300SL	6Meg	PC-PA2008U	699.00
T3400CT, T2400, T3600	16Meg	PC-PA2009U	269.00
T3400CT, T2400, T3600	4Meg	PC-PA2019V	194.00
T3400CT, T2400, T3600	8Meg	PC-PA2020V	369.00
T3400CT, T2400, T3600	16Meg	PC-PA2021V	763.00
T3400CT	32Meg		1549.00
T1000XE	2Meg	PC18-PA8306	
T1600	2Meg	PC8-PA8302U	99.00
T3100	2Meg	PC3-PA7135E	139.00
T3100e	2Meg	PC9-PA8340U	109.00
T3100SX	2Meg	PC15-PA8308U	189.00
T3100SX	4Meg	PC15-PA8310U	109.00
T3100SX	3Meg	PC7-PA7137U	135.00
T3200SX	2Meg	PC12-PA8307U	119.00
T3200SX	4Meg	PC12-PA8909	199.00
T3200SX/XC	2Meg	PC19-PA8318U	119.00
T3200SX/XC	4Meg	PC19-PA8319U	199.00
T3200SX/XC	5Meg	PC7-PA8301U	119.00
T5200/T8500	2Meg	PC10-PA8304U	114.00
T5200/T8500	8Meg	PC10-PA8313U	419.00

NOTEBOOK, LAPTOP MEMORY

MODEL	AMT. UPGRADE	MANU PART #	PRICE
ACER 730	2Meg/8Meg/8Meg		109/209/399
ACER 750	4Meg/8Meg/16Meg		199/459/869
ALR Venture		12407980	249.00
AST Ascenta 900N	4Meg/8Meg/16Meg		229/469/899
AST Bravo & Explore	4Meg/16Meg		189.99
AST Notebook Prem Exec 386SX/20/25/SL	4Meg/16Meg	501255-001, -002	189.99
AST Power Exec 3/25C, 425SL	4Meg	500814-003	199.00
AST Power Exec 3/25C, 425SL	16Meg		819.00
AST Power Exec 425SL	16Meg	501166-001	199.00
AST Power Exec 425SL	16Meg	501166-003	819.00
AST Power Exec 4/233SL	4Meg/16Meg	501819-001, -002	194/799
AT&T Safari NSX/20	4Meg	PEC 37651	259.00
80ndwell 8310, Plus	1Meg	23050-0910	109.00
80ndwell 8310V, SX	1Meg		109.00
80ndwell 8310V, SX	1Meg		109.00
Canon Innova 486	2Meg/4Meg/8Meg		109/209/499
Canon NoteJet 486	4Meg/8 Meg		199/399
Chicony, Ultra, Hyundai 386	4Meg		199.00
Epson N83	4Meg	A080511	199.00
Everex Tempo LX, LX20, Carri	2Meg	PCA 00053-0001	109.00
Gateway 2000 Color 4233	4Meg/16Meg		199/799
Gateway 2000 Nomad 425 OX/SXL	4Meg/16Meg		199/1199
Gateway 2000 486 Hardbook	4Meg/16Meg		199/799
Golstar G5520 386SX/16	4Meg	S386-4M	49.00
Grd 1720, 1750, 1755	1Meg		129.00
HP Omnibook	2Meg/4Meg		129/279
Magnavox Metals	4Meg/4 Meg	286, 386SX	109/199
NCR Safari 3180	4Meg/5 Meg		229/499
NEC Prospeed 286, 386SX-16	1Meg	PC21-21	79.00
NEC Prospeed 286, 386SX-16	4Meg	PC21-22	199.00
NEC Prospeed 386	2Meg	PC31-21	119.00
NEC Prospeed 386	4Meg	PC31-22	199.00
NEC Prospeed 386SX-20	1Meg	PC43-21	79.00
NEC Prospeed 386SX-20	4Meg	PC43-22	199.00
NEC Ultralite Versa	4 Meg/8Meg/16Meg/20Meg	OP4104	183/359/799/988
Packard Bell 386SX, 286	1Meg, 4Meg	286, 386SX	109/199
Packard Bell Stationary	2Meg/8Meg		119/419
Panasonic CF170, CF270, CF370	1Meg	CF-8A165	49.00
Panasonic CF380, CF480	2Meg/4Meg/6Meg		119/199/309
Panasonic CF-V21P, CF-580	4Meg/16Meg		219/819
Sanyo 1718 N8	2Meg	M8C-N8MEM2	79.00
Sharp 6781, 6981, 6785	2Meg/4Meg		109/199
Sharp PC-6220	1Meg	CE 6218	109.00
Tandon, PC Brand, Dataworld	2Meg/8Meg	N8386SX-20	119/429
Ti Travelmate 2000	1Meg	2568034-0001	79.99
Ti Travelmate 3000	4Meg	2566995-1	84.00
Ti 4000, Ti 4000E	2Meg/16Meg		199/999
Tandy 1510, 2610, 3810	1Meg		49.00
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Twinedd, Alima, Compunex, 486SX, OX, Tandy 4860	4Meg/16Meg		199/859
Ultra 486	2Meg, 4Meg, 6Meg		119/199/309
Zeus 386SX Notebook (not the + version)	2Meg		109.00
Zenith Master Sport 386SX	2Meg	ZA-300-1	114.00
Zenith Master Sport SL, SLE, 600, 620, 625NL	2Meg	ZA-4	119.00
Zenith Super Sport 286, 286E	2Meg	ZA-180-66	99.00
286C, SX	2Meg	ZA-180-64	149.00
SX Alpha	2Meg	ZA-180-86	149.00
SX Beta	2Meg	ZA-180-87	149.00
Zenith 2-Note 325L, LC	2Meg/6Meg	ZA3250-4/5	129/419
Zenith 2-Note 425NL, LNC, LNP	4/8/16Meg		269/519/839

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S-RAM Cards 2MEG	179.00	Lan Ethernet (Coax)	159.00
14,000/14,400 Data/Fax Modems	189.00	Visual Media (CD Rom, Tape Dr)	279.00
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Canon LBP 860	-	-	-	-	99	-	-	179	-	-	-	-	-
Canon LBP4, 4L, 4Lx, 4Plus	-	-	-	159	218	-	-	-	-	-	349	669	1249
Epson 6000, Action Laser	-	-	-	-	139	-	-	229	-	-	-	-	-
Epson Action Laser II	-	-	-	89	-	208	-	-	327	-	-	-	-
Epson 8000	-	-	-	89	-	208	-	-	327	-	-	-	-
Epson 1000, 1500	-	-	-	-	119*	-	-	-238*	-	Call	-	-	-
HP 2, 2D-	-	-	-	-	109	-	-	189	-	-	-	-	-
HP 3, 30, 3P, 2P, 2P,	-	-	-	-	99	-	-	189	-	-	-	-	-
HP 4, 4M, 4SI, 4SIMX, 4P, 4MP	-	-	-	-	89	-	-	169	-	-	349	-	-
HP 4i	-	-	-	59	-	-	-	-	-	-	-	-	-
HP 3Si	-	-	-	69	-	-	-	169	-	-	349	-	-
HP 4Si	-	-	-	-	89	-	-	175	-	-	349	-	-
HP Design Jet 600, 650	-	-	-	-	-	-	-	175	-	-	349	-	-
HP Deskjet 500, 500C, 510, 550, 560	-	-	55	-	-	-	-	-	-	-	-	-	-
HP Deskjet 1200C, 1200C/P	-	-	-	-	89	-	-	175	-	-	349	-	-
HP Paintjet XL2, 303	-	-	109	-	-	-	-	289	-	-	469	837	-
IBM Laser 4039, 4019E	-	-	-	-	-	-	169	-	-	-	-	-	-
IBM Laser 4039, 4037	-	-	-	-	-	-	-	-	-	-	-	-	-
IBM Laser 4039, 4079	-	-	-	-	99	-	-	169	-	-	350	-	-
NEC 90, 290	-	-	-	139	-	-	-	-	-	-	-	-	-
NEC 95, 97	-	-	-	99	-	-	-	-	-	-	-	-	-
Ok! 400	-	-	-	89	-	-	-	-	-	-	-	-	-
Ok! 400E, 400EX, 410E, 410EX	-	-	-	135	189	-	-	-	-	-	-	-	-
Ok! 630, 940	-	-	-	-	109	-	-	-	-	-	-	-	-
Packard Bell PB 9500	-	-	-	-	139	-	-	227	-	-	-	-	-
Packard Bell 9815	-	-	-	-	180	-	-	299	-	-	-	-	-
Panasonic 4420/4450i	-	-	-	129	209	-	-	-	-	-	-	-	-
Panasonic 4410/4430	-	-	-	126	-	-	-	195	-	-	-	-	-
Panasonic 4450	-	-	-	99	-	-	-	-	-	-	-	-	-
Panasonic 4400/5400	-	-	-	Call	Call	-	-	Call	-	-	-	-	-
Panasonic 4440, 5410	-	-	-	1091	1791	-	-	Call	-	-	-	-	-
Sharp 9400, 9460, 9600, 9700E	-	-	-	89	149	-	-	249	-	-	-	-	-
TXLPW17/P/535	-	-	-	55	-	-	-	-	-	-	-	-	-
TI Microwriter	-	-	-	79	159	-	-	-	-	-	-	-	-

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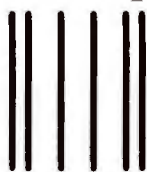
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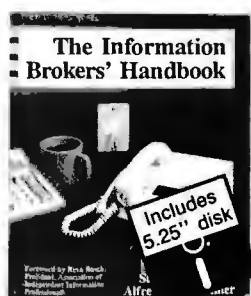
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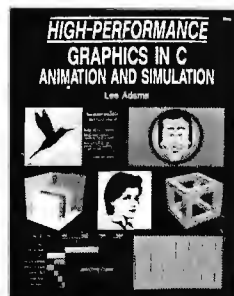




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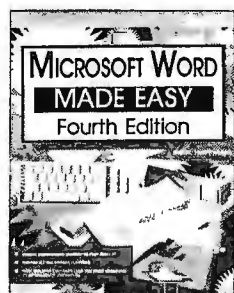
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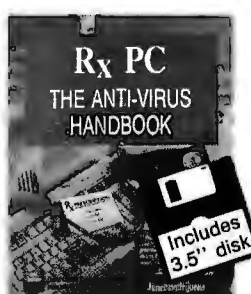
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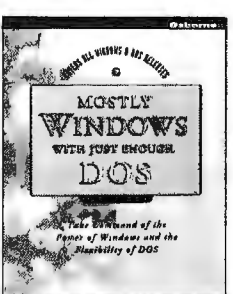
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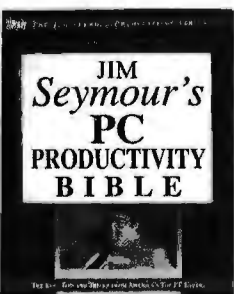
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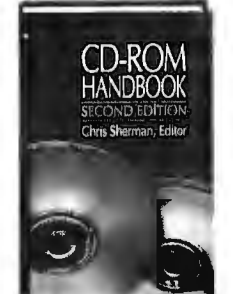
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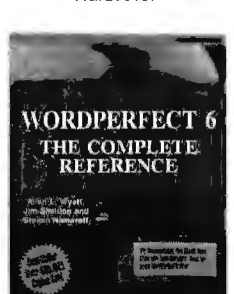
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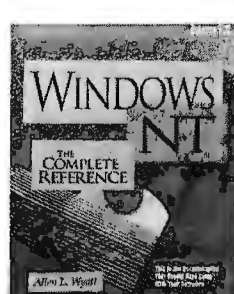
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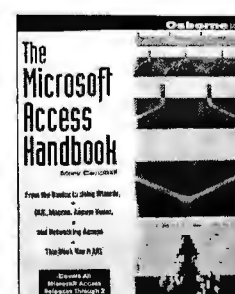
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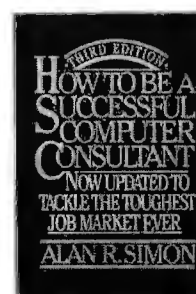
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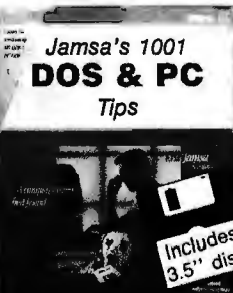
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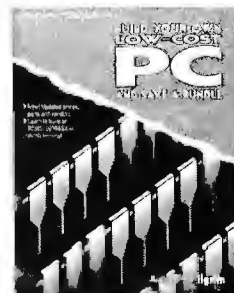
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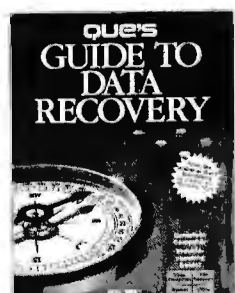
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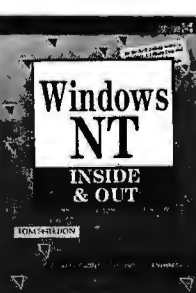
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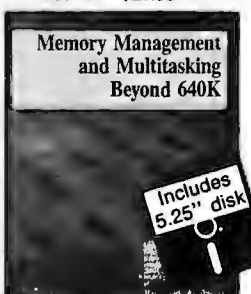
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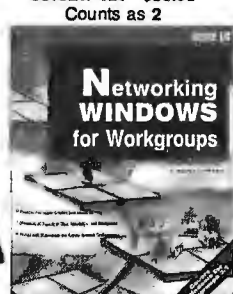
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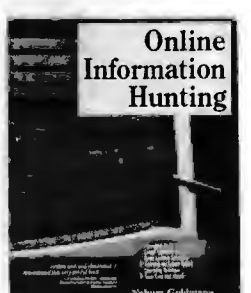
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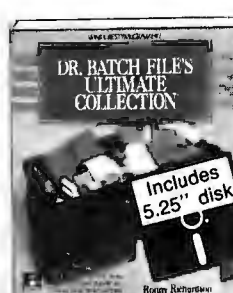
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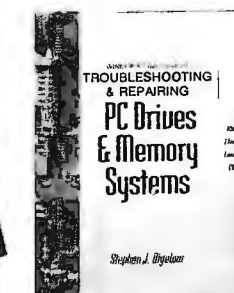
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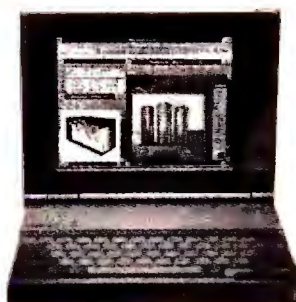
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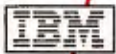
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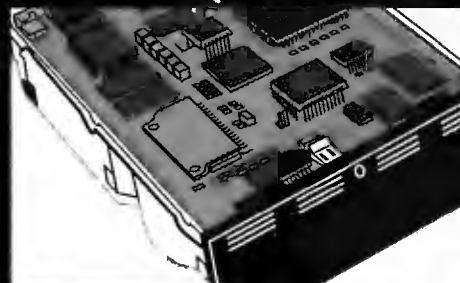
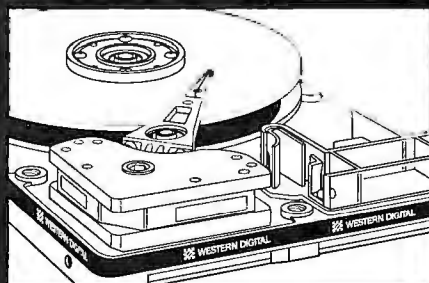
COURIER MODEMS

V.34 Ready w/fax internal	397.06
V.34 Ready w/fax external	432.62
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V.34 Ready Dual Std. external	562.44

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Nobody knows drives like MegaHaus. We have specialized in storage solutions for over 8 years. Repeat business from satisfied customers is the backbone of our business. We satisfy our customers.

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During the first year of your warranty, we replace, not repair, any defective items. All items receive lifetime technical support from our factory trained techs.

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INCLUDES 1 FREE DISK!

The industry standard in removable media. 3 1/2" form factor. IDE interface, SCSI also available.

105MB	14.5ms	SQ3105A	\$229
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1740MB	10ms	MC2217	\$899



#1 SCSI disk controllers. Includes EZ-SCSI.

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16Bit	ISA	A1542CFBASIC	\$225
32Bit	EISA	A2742ABASIC	\$319



Baracuda drives, 7200rpm, 1MB buffer. FAST! MegaHaus unbeatable price! WIDE SCSI in stock.

1690MB	8ms	ST11950N	\$1329
2139MB	8ms	ST12550N	\$1499
4290MB	8ms	ST15150N	\$2699



Quality IDE hard drives, 3yr wty, 4500rpm.

364MB	12ms	70G8488	\$235
527MB	12ms	70G8486	\$329
728MB	12ms	70G8511	\$399

HARD DRIVES



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420MB	14ms	CFS420A	\$245
541MB	12ms	CFA540A	\$339
811MB	10ms	CFA810A	\$499
1080MB	9ms	CFP1080A	\$599



IDE			
170MB	15ms	7170A	\$195
540MB	12ms	7546A	\$299



IDE			
1050MB	10ms	MC4110A	\$649
1740MB	10ms	MC2217A	\$899
SCSI			
1052MB	8.5ms	MC4110	\$649
1740MB	10ms	MC2217	\$899
3020MB	11ms	MC1936	\$1899
SCSI-AV Audio / Visual tuned drives			
1000MB	10ms	MC2210AV	\$749
1700MB	10ms	MC2217AV	\$999
3000MB	11ms	MC1936AV	\$2119



IDE			
213MB	16ms	ST3243A	\$185
260MB	16ms	ST3290A	\$216
341MB	13ms	ST3391A	\$238
420MB	14ms	ST3491A	\$253
545MB	12ms	ST5660A	\$349
SCSI (WIDE SCSI also available)			
1690MB	8ms	ST11950N	\$1325
1700MB	9ms	ST11900N	\$1089
2145MB	8ms	ST12550N	\$1499
2148MB	9ms	ST12400N	\$1199
4290MB	9ms	ST15230N	\$2299
4290MB	8ms	ST15150N	\$2699



IDE			
341MB	12ms	AC2340	\$219
425MB	12ms	AC2420	\$225
540MB	11ms	AC2540	\$315
730MB	10ms	AC2700	\$425
1083MB	10ms	AC31000	\$599

HARD DRIVES



IDE			
270MB	12ms	LPS270A	\$219
342MB	12ms	LPS340A	\$249
541MB	12ms	LPS540A	\$329
SCSI			
170MB	14ms	ELS170S	\$199
270MB	12ms	LPS270S	\$239
342MB	12ms	LPS340S	\$265
541MB	12ms	LPS540S	\$355
1080MB	10ms	IMP1080	\$675
1440MB	9.5ms	IMP1440S	\$885
2160MB	9.5ms	IMP2160S	\$1199



SCSI (WIDE SCSI also available)			
1052MB	8.6ms	0662S12	\$689
2040MB	9.2ms	0664N1H	\$1199
4250MB	11ms	0664CSH	\$2239

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Complete solutions for your IBM. Larger sizes in stock!	210MB	420MB	540MB
PS/1 386 & 486	\$299	\$399	\$499
PS/2			
25, 30, 30-286	\$299	\$399	\$499
35 & 40	\$269	\$369	\$469
50 thru 95	\$399	\$499	\$599

CONTROLLER CARDS

ADAPTEC	Alone	w/Drive
A1522BASIC 16Bit SCSI	\$119	\$109
A1542CBASIC 16Bit SCSI	\$225	\$215
A2742 EISA SCSI	\$319	\$309
A2842 VESA SCSI	\$279	\$269
FUTURE DOMAIN		
1680SVP 16Bit SCSI	\$155	\$139
QLOGIC		
PCI SCSI & WIDE	\$325	\$309
ALPHA RESEARCH CACHING CARDS		
S425I 16Bit IDE	\$99	\$89
S475I 32Bit Local Bus IDE	\$139	\$129
S485I 32Bit PCI IDE	\$229	\$219
S425S 16Bit SCSI	\$229	\$219
S475S 32Bit Local Bus SCSI	\$369	\$359

Many other types of controllers in stock.

CD ROM DRIVES

NEC	CDR900	4X	180ms	\$939
NEC	CDR510	3X	195ms	\$369
Plextor	PX43CH	4X	150ms	\$475
Toshiba	XM3401	2X	200ms	\$269
Toshiba	XM4101	2X	320ms	\$219
Teac	CD50	2X	265ms	\$209
Pioneer External CD Changers (300ms)				
DRM602X	6 disc	307KB/sec		\$869
DRM604X	6 disc	612KB/sec		\$1149
DRM1804X	18 disc	612KB/sec		\$2099

MULTIMEDIA KITS

SCSI Drive, sound card (in retail pkg)				
MV=Media Vision Pro Audio 16. MS=Media Vision Pro Studio 16				
SB= Sound Blaster 16 SCSI. SA= Sound Blaster SCSI ASP.				
	MV	MS	SB	SA
XM4101	\$330	\$349	\$359	\$425
CD50	\$330	\$349	\$359	\$425
XM3401	\$399	\$419	\$425	\$479
CDR510	\$489	\$525	\$529	\$589
PX43CH	\$629	\$649	\$659	\$699
CDR900	\$1099	\$1119	\$1129	\$1189

CD ROM TOWERS

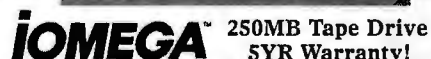
CD ROM Drive Towers - Multiple CD ROM drives in a single external enclosure. Great for networks, BBS, or business.

	2 Drive	4 Drive	7 Drive
XM4101	\$569	\$1199	\$1999
CD50	\$569	\$1199	\$1999
XM3401	\$669	\$1499	\$2499
CDR510	\$859	\$1899	\$3299
PX43CH	\$1089	\$2529	\$4299
CDR900	\$2119	\$4339	\$7489

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Caddies \$5 Macintosh CD Driver \$29
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SCSI Tape Drives - Kits include 16bit card, software & 1 tape	Bare	Kit
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2Gig HP 35470	\$889	\$999
4-8Gig Conner 4324	\$999	\$1109
4-8Gig HP 35480	\$989	\$1099
4-16Gig Sony SDT5000	\$1029	\$1169
4-16Gig HP C1533A	\$1379	\$1579

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- Prints mailing labels, 1 to 4 across.
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- Customer file shows: credit limit, collections 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.

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- Provides aged reports by payment date.
- Prints 1099s miscellaneous.
- Checks for duplicate transactions.
- User can design up to 9 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).

Can It Do This?

- 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.

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- Calculates taxes.
- Allows user to update federal, state, and local tax tables.
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- Allows recurring transactions.
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- Provides bill of materials processing (kits and manufacturing).
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41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
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721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760
761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780
781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800
801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820
821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840
841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860
861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880
881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900

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901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920
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Advertised Products

951	Desktop computers	955	Accounting software	959	Multimedia products
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953	DTP/Presentation software	957	Network/sharing products	961	Mail order companies
954	Monitors and video boards	958	Printers	962	Storage devices

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N1

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520

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PRODUCTS FEATURED IN EDITORIAL

601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620
621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640
641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680
681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700
701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720
721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740
741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760
761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220
221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260
401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420
421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440
441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460
461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480
481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500
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Advertiser Index A-Z

Get more information—circle the appropriate number on the reader service card.

Reader Service Number	Page Number
102 Acer America Corporation	128-129
66 Acma Computers Inc.	171
23 Adobe Systems	236
9 Advanced Logic Research Inc.	11
31 All Micro	314B
— Ambra Computer Corporation	109-116
— Ambra Computer Corporation	2, 3
45 American Power Conversion	48-49
8 Arlington Computer Products	310
— AST Research	22-23
— AST Research	52-53
4 AT&T	261
5 ATI Technologies	169
22 Austin Computer Systems	45, 46
41 Austin Hayne	272
63 Borland	28-29
— Canon	228
103 Charles Schwab	223
47 Compaq	225-227
88 Compaq	118-119
35 Compaq	284-285
83 Compaq Direct Plus	195
61 Compaq Direct Plus	54-55
73 CompuAdd Corporation	50
33 CompuServe	94
68 Computer Discount Warehouse	311-313
67 Corel Systems	34
48 Corel Systems	275
56 Cougar Mountain Software	314A
74 CIX International	263
— Curtis	125
94 Datastorm Technologies Inc.	215
— Dell Computer Corporation	C5-C8
— Dell Computer Corporation	65-79
49 Delphi	205
99 Delrina Technology Inc.	31
146 Delrina Technology Inc.	33
37 Delrina Technology Inc.	35
— EcoLogical	314D
101 ElseWare Corporation	21
— Epson America	26-27
82 Executrain Corporation	253
107 First International Computer/Everex	271
153 Fujitsu	252
111 Fusion Software	277B
— Gateway 2000	81-93
— Hewlett-Packard	130-131
— Hewlett-Packard	38-39
— IBM Corporation	265
142 IBM PC Co.	8
— IDG Books Worldwide, Inc.	320
132 In Focus Systems Inc.	201

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Index

Reader Service Number	Page Number	Reader Service Number	Page Number	Reader Service Number	Page Number	Reader Service Number	Page Number
— Intel Corporation	100-101	260 Zeos International	267	255 Sampo	199	Management	
— International Correspondence Schools	299	237 Zeos International	6, 7	198 Samsung Electronics	287	41 Austin Hayne	272
152 Iomega	273			213 Samtron Displays, Inc.	103	— Symantec Corporation	14
138 KAO	10			224 Viewsonic	18	Other	
90 Keystone Learning Systems	309			218 Viewsonic	277	99 Delrina Technology Inc.	31
118 Kinesis Corporation	20			Multimedia		146 Delrina Technology Inc.	33
— LA Trade	306			132 In Focus Systems Inc.	201	37 Delrina Technology Inc.	35
206 LearnKey	304-305			Other		Presentation Graphics	
241 Logitech	249			— Curtis	125	— Software Publishing	147
— Lotus	151-156			144 Sharp Electronics Corporation	245	Project Management	
— Lotus	16-17			Peripheral/Sharing Devices		233 Patton & Patton Software Corporation	276
— Lotus	56-57			209 Rose Electronics	268	236 Scitor Corporation	42
246 Lotus Publishing	250-251			Power/Protection		Spreadsheets/Templates/Forms	
126 Lyco Computer	301			45 American Power Conversion	48-49	— Lotus	56-57
169 MAG InnoVision	185			81 Tripp Lite	80	— Microsoft	234
150 Mail Boxes Etc.	241			Printers/Plotters		Software Suites	
147 MegaHaus	314			205 NEC	161	— Lotus	151-156
157 Microcom	123			— Okidata	36	— Microsoft	C2-1
183 MicroGrafx	97			140 Okidata	37	Statistics	
161 MicroHelp	217			— QMS Inc.	32	253 SPSS, Inc.	99
217 Micron Computer, Inc.	12, 13			— QMS Inc.	257	Utilities	
— Microsoft	234			230 Sharp Electronics Corporation	139	31 All Micro	314B
— Microsoft	40-41			124 Tektronix Inc.	167	161 MicroHelp	217
— Microsoft	C2-1			154 Texas Instruments	179-181	194 Nanao USA Corporation	218
200 Microsolutions Computer Products	24			Scanners/Digitizers		212 PKWARE Inc.	44
172 MIS Corporation	302			— Canon	228	189 Quarterdeck	197
— Mobalink	238			73 CompuAdd Corporation	50	— Symantec Corporation	164
194 Nanao USA Corporation	218			— Epson America	26-27	Video	
205 NEC	161			153 Fujitsu	252	90 Keystone Learning Systems	309
203 NEC	140-141			Storage/Backup Devices		Windows	
187 NEC	273A-B			208 3M Data Storage	259	94 Datastorm Technologies Inc.	215
— NRI Schools	303			152 Iomega	273	111 Fusion Software	277B
164 Ocean Isle Software	277A			147 MegaHaus	314		
— Okidata	36			200 Microsolutions Computer Products	24		
140 Okidata	37			Systems			
233 Patton & Patton Software Corporation	276			47 Compaq	225-227		
— PC Connection	188			217 Micron Computer, Inc.	12, 13		
— PC Connection	187-189						
181 PC World - Online Access Magazine	323						
— PC World Online/America Online	269-270						
207 PC World Online/CompuServe	283						
212 PKWARE Inc.	44						
227 Polywell Computers	314C						
— QMS Inc.	32						
— QMS Inc.	257						
211 Quantex	25						
189 Quarterdeck	197						
209 Rose Electronics	268						
255 Sampo	199						
198 Samsung Electronics	287						
213 Samtron Displays, Inc.	103						
236 Scitor Corporation	42						
210 Shapeware Corporation	126-127						
230 Sharp Electronics Corporation	139						
144 Sharp Electronics Corporation	245						
— Software Publishing	147						
253 SPSS, Inc.	99						
— Symantec Corporation	14						
— Symantec Corporation	164						
124 Tektronix Inc.	167						
154 Texas Instruments	179-181						
244 Texas Instruments	212-213						
— The Computer Book Club	307						
208 3M Data Storage	259						
228 Toshiba America Inc.	247						
81 Tripp Lite	80						
154 U.S. Robotics	281						
148 USA Flex	308						
224 Viewsonic	18						
218 Viewsonic	277						
197 Win Book	143						
238 Worldwide Technologies	300						
192 Zenith Data Systems	104-105						
193 Zeos International	9						
216 Zeos International	242						

Advertiser Index by Product Category

Get more information—circle the appropriate number on the reader service card.

HARDWARE

Boards/Chips/Cards

5 ATT Technologies 169
— Intel Corporation 100-101

Communications

— Mobalink 238
154 U.S. Robotics 281

Computers

66 Acma Computers Inc. 171
9 Advanced Logic Research Inc. 11
— Ambra Computer Corporation 109-116
22 Austin Computer Systems 45, 46
88 Compaq 118-119
61 Compaq Direct Plus 54-55
— Dell Computer Corporation C5-C8
— Gateway 2000 81-93
Hewlett-Packard 130-131
— Hewlett-Packard 38-39
— Intel Corporation 100-101
217 Micron Computer, Inc. 12, 13
172 MIS Corporation 302
227 Polywell Computers 314C
211 Quantex 25
216 Zeos International 242
260 Zeos International 267
237 Zeos International 6, 7

Input Devices

118 Kinesis Corporation 20
241 Logitech 249

Laptops/Notebooks

— Ambra Computer Corporation 2, 3
— AST Research 22-23
— AST Research 52-53
22 Austin Computer Systems 45
22 Austin Computer Systems 46
35 Compaq 284-285
83 Compaq Direct Plus 195
— Dell Computer Corporation C5-C8
— Dell Computer Corporation 65-79
107 First International Computer/Everex 271
— Gateway 2000 81-93
187 NEC 273A-B
244 Texas Instruments 212-213
228 Toshiba America Inc. 247
197 Win Book 143
192 Zenith Data Systems 104-105
193 Zeos International 9

Local Area Networks

47 Compaq 225-227
209 Rose Electronics 268

Monitors/Displays

102 Acer America Corporation 128-129
74 CTX International 263
132 In Focus Systems Inc. 201
169 MAG InnoVision 185
194 Nanao USA Corporation 218
203 NEC 140-141

SOFTWARE

Accounting/Financial

103 Charles Schwab 223
56 Cougar Mountain Software 314A

Communications

94 Datastorm Technologies Inc. 215
157 Microcom 123
164 Ocean Isle Software 277A

Database Management

63 Borland 28-29
— Lotus 16-17

Entertainment

111 Fusion Software 277B

Fontware

23 Adobe Systems 236
101 ElseWare Corporation 21

Graphics

4 AT&T 261
67 Corel Systems 34
48 Corel Systems 275
183 MicroGrafx 97
210 Shapeware Corporation 126-127

Integrated Software

— Microsoft 40-41

MISCELLANEOUS

Books/Periodicals/Subscriptions

— IDG Books Worldwide, Inc. 320
— The Computer Book Club 307

Mail Order

31 All Micro 314B
8 Arlington Computer Products 310
68 Computer Discount Warehouse 311-313
— LA Trade 306
126 Lyco Computer 301
— PC Connection 188
— PC Connection 187-189
148 USA Flex 308
238 Worldwide Technologies 300

Online Services

33 CompuServe 94
49 Delphi 205
— PC World Online/America Online 269-270
207 PC World Online/CompuServe 283

Other

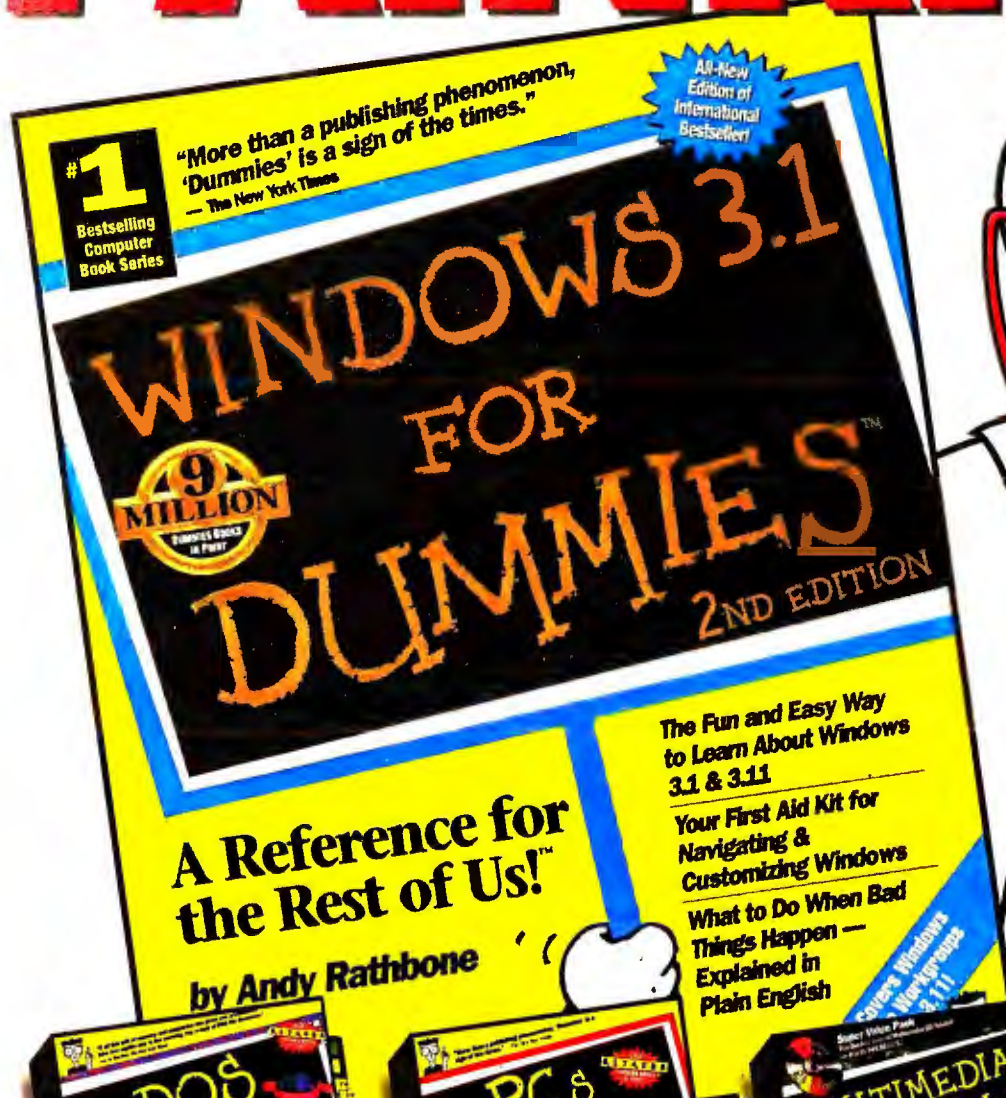
— EcoLogical 314D
246 Lotus Publishing 250-251
150 Mail Boxes Etc. 241

Service/Support

— IBM Corporation 265
142 IBM PC Co. 8

Reader Service Number	Page Number	Reader Service Number	Page Number	Reader Service Number	Page Number	Reader Service Number	Page Number
Supplies							
138	KA0.....	10					
Trade Shows							
181	PC World - Online Access Magazine.....	323					
Training							
82	Executrain Corporation.....	253					
—	International Correspondence Schools.....	299					
90	Keystone Learning Systems.....	309					
206	LearnKey.....	304-305					
—	NRI Schools.....	303					
Products Featured in Editorial							
Get more information—circle the appropriate number on the reader service card.							
Accounting							
761	DacEasy Executive Information System in DOS, DacEasy.....	122					
714	Peachtree Accounting 3.0 for Windows, Peachtree Software.....	107					
—	QuickBooks 2.0 for Windows, Intuit.....	239					
Add-On Board							
683	Actix GraphicsEngine 64, Actix.....	182					
694	ATI Graphics Pro Turbo, ATI.....	183					
695	ATI Graphics Ultra Pro, ATI.....	183					
684	ATI Graphics Xpression, ATI.....	182					
678	Boca Voyager, Boca Research.....	182					
685	Diamond Stealth 32, Diamond Computer.....	182					
696	Diamond Stealth 64, Diamond Computer.....	184					
697	Diamond Viper Pro, Diamond Computer.....	184					
679	Elsa Winner 100VL, Elsa.....	182					
686	Genoa Phantom 32i, Genoa.....	183					
687	Hercules Dynamite Power VL, Hercules.....	183					
688	Hercules Dynamite Pro ISA, Hercules.....	183					
698	Hercules Graphite Power VL, Hercules.....	184					
699	Matrox MGA Ultima, Matrox.....	184					
680	miroCrystal 10SD, miro.....	182					
689	miroCrystal 20SD, miro.....	183					
690	Number Nine #9GXE64, Number Nine Computer.....	183					
700	Number Nine #9GXE64 Pro, Number Nine Computer.....	184					
691	Orchid Kelvin 64, Orchid Technologies.....	183					
681	Paradise VL Plus, Western Digital.....	182					
682	STB Express PCI, STB.....	182					
692	STB LightSpeed, STB.....	183					
693	STB Nitro, STB.....	183					
701	VideoLogic 928Movie, VideoLogic.....	184					
702	VidTech GraphMax L12, VidTech.....	184					
CD ROM Software							
767	SelectPhone, Pro CD.....	117					
Communications							
810	Close-Up 6.0, Norton-Lambert.....	61					
811	Kurzweil Voice for Windows 1.0, Kurzweil Applied Intelligence.....	62					
Computer System							
719	Acom Patriot 4000, Acom.....	135					
720	Ambra D4661/VL, Ambra Computer.....	135					
721	Ambra D41001/VL, Ambra Computer.....	135					
738	Ares DX4-100, Ares Microdevelopment.....	162					
787	Ares PCI-VESA System, Ares Microdevelopment.....	68					
775	AST Ascentia 800N, Ascentia 900N, Bravo MS, Premmia GX, Premmia MX; AST Research.....	95					
722	AT&T Globalyst 200 (486DX2-50), AT&T Global Information Solutions.....	138					
723	AT&T Globalyst 200 (486SX-33), AT&T Global Information Solutions.....	138					
724	Austin P5-66, Austin Computer Systems.....	138					
739	Compaq Deskpro XE 450, Compaq Computer.....	162					
725	Compaq ProLinea 4/100 Model 525, Compaq Computer.....	142					
726	CompuAdd C4100D, CompuAdd.....	142					
727	CompuAdd CP60p, CompuAdd.....	142					
740	DECpc XL560, Digital Equipment.....	162					
728	DECpc XL590, Digital Equipment.....	146					
778	Dell Dimension XPS MT, Dell Computer.....	98					
729	Diamond DT 486-66, Diamond Technologies.....	146					
730	Duracom TravelPro5110, Duracom Computer Systems.....	146					
731	Empac Magnum, Empac Int'l.....	150					
612	HP OmniBook 530 PC, Hewlett-Packard.....	240					
741	Hyundai Neuron Lite 425SX, Hyundai.....	162					
—	IBM ThinkPad 500, IBM.....	150					
732	Identity Systems Select Series, Identity Systems Technology.....	150					
733	Insight PCI P66 SCSI, Insight.....	150					
734	MicroTech Ultima XVC/100, MicroTech Computer.....	157					
735	MIS M5P/60, MIS Computer.....	157					
736	MPC 380, MPC Technologies.....	157					
737	NEC Image 4100es, NEC Technologies.....	159					
777	Portégé T1960CS, T1960CT, T2400CS, T2400CT, T3600CT; Toshiba America.....	98					
788	QMS 2001 Knowledge System PC, QMS.....	70					
742	Wyse Forté GSV, Wyse Technology.....	162					
Database Management							
755	Office Accelerator, Baseline Data Systems.....	324					
Educational							
756	American Heritage Talking Dictionary, SoftKey International.....	122					
760	TriipMaker for Windows, Rand McNally.....	122					
Entertainment/Game							
616	Funny, Warner New Media.....	321					
617	Sam & Max Hit the Road, LucasArts Entertainment.....	321					
618	Star Trek 25th Anniversary CD ROM, Interplay.....	321					
Fax-Modem							
641	ATI 19200 ETC-I, ATI.....	202					
642	AT&T DataPort 14.4/Datafax, AT&T.....	202					
643	Best Data Products The Smart One 1442F, Best Data Products.....	202					
644	Boca Research BocaModem V.Fast Class Internal, Boca Research.....	202					
645	Cardinal Technologies MVP 1921, Cardinal Technologies.....	202					
646	CMS Enhancements FM-144HVbis, CMS Enhancements.....	202					
647	Computer Peripherals Viva 14.4i Internal Modem, Computer Peripherals.....	202					
648	Data Race RediCard, Data Race.....	202					
649	Digicom Systems Connection 14.4 DF, Digicom Systems.....	202					
650	GVC 14.4 kbps Fax Modem, GVC.....	202					
651	Hayes Accura 144B + Fax 144, Hayes Accura 28.8 VFC + Fax; Hayes.....	203					
652	Intel Faxmodem, Intel SatisFaxtion Modem/400; Intel.....	203					
606	KX-F390, Panasonic.....	239					
653	Microcom Deskporte Fast ES 28.8, Microcom.....	203					
654	Motorola UDS FasTalk II 14.4, Motorola.....	203					
676	MultiModem PCS, MultiTech Systems.....	256					
796	PCMCIA fax-modem card, Megahertz.....	200					
655	Practical Peripherals PM288HC II, Practical Peripherals PC144HC; Practical Peripherals.....	203					
656	Supra FaxModem 288i, Supra.....	203					
657	U.S. Robotics Sportster 14,400, U.S. Robotics.....	203					
797	V.34 PCMCIA card, Smart Modular Technologies.....	200					
658	Ven-Tel PCM144Fax, Ven-Tel.....	203					
659	Zoltrix Platinum Internal 14.4, Zoltrix.....	203					
660	Zoom Fax VFP 28.8, Zoom.....	203					
Fax Software							
706	Eclipse Fax 6.0, Phoenix Technologies.....	120					
Financial							
752	Fidelity's On-line Xpress, Fidelity.....	216					
744	Managing Your Money 1.0 for Windows, Meca Software.....	210					
749	Morningstar Mutual Funds OnFloppy & OnDisc, Morningstar.....	214					
—	Quicken 3.0 for Windows, Quicken Companion 2.0; Intuit.....	210					
746	Retirement Planner, The Vanguard Group.....	211					
745	Retirement Planning Thinkware, Fidelity Investments.....	211					
747	Reuters MoneyNetwork for Quicken Users, Reality Technologies.....	214					
751	StreetSmart, Charles Schwab and Company.....	214					
748	The Telescan System, Telescan.....	214					
750	Value Line Value/Screen III, Value Line Software.....	214					
Form Generation							
717	Lotus Forms 1.0 for Windows, Lotus Development.....	108					
Groupware							
707	CaLANdar 3.0, Microsystems Software.....	121					
705	GroupWise 4.1, WordPerfect.....	120					
Image Editing							
712	Photoshop 3.0, Adobe Systems.....	106					
713	Picture Publisher 5.0, Micrografx.....	106					
Input Device							
780	ArtPad, Wacom.....	102					
781	PenMouse, Kurta.....	102					
779	Select-Ease Keyboard, Lexmark.....	102					
LAN Application							
782	Coactive Connector 2.0, Coactive Computing.....	68, 121					
LAN Operating System							
783	LANtastic 6.0, Simply LANtastic 5.1; Artisoft.....	68					
784	Personal NetWare 1.0, Novell.....	68					
785	PowerLAN 3.0, Performance Technology.....	68					
763	PowerLAN 3.1, Performance Technology.....	124					
786	Windows for Workgroups 3.11, Windows NT 3.5; Microsoft.....	68					
Mail Order							
719	Acom Patriot 4000, Acom.....	135					
720	Ambra D4661/VL, Ambra Computer.....	135					
721	Ambra D41001/VL, Ambra Computer.....	135					
738	Ares DX4-100, Ares Microdevelopment.....	162					
722	AT&T Globalyst 200 (486DX2-50), AT&T Global Information Solutions.....	138					
723	AT&T Globalyst 200 (486SX-33), AT&T Global Information Solutions.....	138					
724	Austin P5-66, Austin Computer Systems.....	138					
739	Compaq Deskpro XE 450, Compaq Computer.....	162					
725	Compaq ProLinea 4/100 Model 525, Compaq Computer.....	142					
726	CompuAdd C4100D, CompuAdd.....	142					
727	CompuAdd CP60p, CompuAdd.....	142					
740	DECpc XL560, Digital Equipment.....	162					
728	DECpc XL590, Digital Equipment.....	146					
729	Diamond DT 486-66, Diamond Technologies.....	146					
730	Duracom TravelPro5110, Duracom Computer Systems.....	146					
731	Empac Magnum, Empac Int'l.....	150					
741	Hyundai Neuron Lite 425SX, Hyundai.....	162					
—	IBM ThinkPad 500, IBM.....	150					
732	Identity Systems Select Series, Identity Systems Technology.....	150					
733	Insight PCI P66 SCSI, Insight.....	150					
734	MicroTech Ultima XVC/100, MicroTech Computer.....	157					
735	MIS M5P/60, MIS Computer.....	157					
736	MPC 380, MPC Technologies.....	157					
737	NEC Image 4100es, NEC Technologies.....	159					
742	Wyse Forté GSV, Wyse Technology.....	162					
Miscellaneous							
608	CompuSet, Plantronics.....	239					
611	Telescoping Arm, Tandem; Multiform Products.....	240					
Online Service							
801	America Online.....	51, 198, 216					
802	CompuServe.....	51, 198, 216					
768	CompuServeCD, CompuServe.....	117					
792	Delphi Internet Services.....	51, 198					
803	Dow Jones News/Retrieval.....	216					
793	GENie.....	198					
794	MCI Mail.....	198					
804	Prodigy.....	51, 198, 216					
Personal Information Manager							
716	Sidekick 1.0 for Windows, Borland.....	108					
757	AnyTime 2.1 for Windows, Individual Software.....	122					
765	Sharkware Professional 2.0 for Windows, CogniTech.....	124					
Printer							
776	DECcolorwriter 520ic, Digital Equipment.....	96					
—	Epson Stylus Color, Epson America.....	96					
Scanner							
609	PaperMax with MaxMate						

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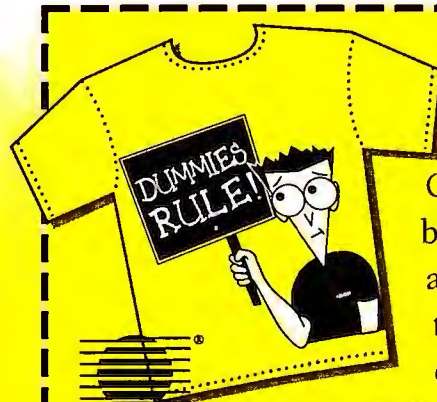
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The Final Frontier, Sam & Max, and That's Not Funny

Most PC game companies are rushing into interactive movies by trying to splash a bit of Hollywood magic over their products with actors and special effects. LucasArts Entertainment, the computer gaming arm of George (*Star Wars*) Lucas, has had its movie thing together for a long time. *Sam & Max Hit the Road*, the latest CD ROM "talkie" from the California wunderkind, is a charmer.

This postmodern Saturday matinee stars two of the daffiest cartoon characters since *That Duck*. Sam is an introspective hound dog whose goofy, self-referential dialogue reminds me of *Rocky and Bullwinkle*. His partner Max is really Wambo Wabbit, a buzz saw disguised as a fuzzy bunny. These bozos first appeared in Steve Purcell's underground comic book *Sam & Max: Freelance Police*.

Trixie the Giraffe-Necked Girl

Their big PC adventure has something to do with Bruno the Bigfoot and Trixie the Giraffe-Necked Girl, who have disappeared from Kushman's Carnival, but I didn't pay much attention to the plot. I bet you won't, either. Exploring the landscape with Lucas's new text-free interface is far more fun.

The display is free of an interface bar, so the action unfolds in full-screen graphics. To change your cursor from Use mode to Pick up mode, simply click on a small box in the lower left corner. Then it's back into the action.

You use your mouse to select the *kind* of things Sam and Max say as well—questions, statements, farewells, or goofy non sequiturs—so there's no more typing. If you get the CD ROM edition, you don't even have to bother with reading: Actors speak all the dialogue, including yours. (The CD ROM comes with a free hint book, too.) A

By Michael Goodwin

floppy-based version uses on-screen text and costs \$10 less.

Once you get past the interface and into the game itself, you'll find that it's surprisingly hip: The highway signs for Sartre's Angst Villa flash by so fast you can't quite read them; the boys have their office upstairs from a store that sells "Guns, Liquor, Baby Needs," right across the street from the Really Bad Food hash house. Dancing hamburgers festoon the main game map. Surrealism is alive and well!

The little touches are perfectly done, too: Unlike many games that blast your speakers off the desk, or play so softly you have to exit and reset sound levels manually, *Sam & Max* provides a three-slider control panel that lets you set the volume for music, voice, and effects independently within the game. Text display speed is also fully adjustable.

If that isn't enough, any time you get bored solving puzzles you can drop out of the plot and play three different mini-games, including the legendary Car Bomb and the ever-popular Wak-A-Rat. You can't get killed—however, you *can* get fatally frustrated.

Beam Me Up, Scotty?

Gene Roddenberry's *Star Trek* series has boldly gone through several generations, but the original version starring Captain Kirk and Mr. Spock still has a host of fans. If you're one of them, you can indulge in a new CD ROM by Interplay, which reinvents the venerable series using full-color animation and dialogue spoken by the original actors. Ask the on-screen Spock for information and not only will he tell you more than you want to know, he'll do it in the emotionless voice of Leonard Nimoy.



The game is painstakingly true to the series. You play Captain Kirk, of course, and your adventures start on the bridge of the USS Enterprise—where you have access to all the familiar communications, weaponry, and personnel. If a Klingon battle cruiser appears, Lieutenant Uhura opens hailing frequencies (assuming it doesn't start shooting first) and relays incoming orders from Starfleet Command. Scotty will wring the last erg of warp power from the engines, and so on. Naturally, you have access to phasers, shields, and photon torpedoes. It's all quite convincing—and in some ways it's a lot more fun than the creaky old TV series.

There are several adventures on this CD ROM, with multiple conclusions depending on how you play your role. The plots run in two modes—on the bridge, and on the surface of the various planets where you attempt to complete your missions. In both locations the interface is a bit unwieldy, requiring more clicking and mousing than I'd like. But once you get the hang of the controls, you can move around, talk to people, fight, defend yourself, use Spock's tricorder, or have McCoy employ his medical kit when needed.

I had a couple frustrating problems

What do these dancing hamburgers say about subtextual surrealism in *Sam & Max Hit the Road*?



"THE SHIELDS ARE FAILIN', CAPTAIN!" The fate of the Enterprise hinges on your decisions in **Star Trek 25th Anniversary CD ROM**.

with the game. For one thing, during space battles with those pesky Klingons, it's almost impossible to figure out where the enemy ships are. The space battles would be more amusing if there were a 360-degree targeting radar. Also, while it was easy to beam down to the surface of planets, I never figured out how to get back. "Beam me up, Scotty! Scotty? Come in, Scotty?"

material, save us from their leftovers!

The CD ROM boasts a complicated interface that theoretically permits you to navigate this ocean of humor, coming to land on just those jokes and joke-tellers you want. But someone seems to have played a funny trick on these guys and switched the index marks around. Ha ha ha! So when you click on the button that's supposed to

Stop Me If You've Heard This One

It sounds like a side-splitter: Put 84 people in front of a camera and get them to tell the funniest joke they've ever heard. Unfortunately, too many of the people in filmmaker Brian Ferren's *Funny* are clueless about what constitutes humor. If this sampling represents their best

take you to Frank Zappa telling the joke about New Zealanders who have more than two girlfriends (hard to believe this is the funniest joke Frank Zappa knew), you end up with a female bartender's tasteless joke about ladies of the night.

Aside from jokes that aren't very funny and an interface that doesn't really work, you get a "movie" screen that measures exactly 1.5 by 2 inches. In Texas, the postage stamps are bigger than that.

• **Funny** \$24.99; Time Warner Interactive Group; 800/593-6334

Reader service no. 616

• **Sam & Max Hit the Road** CD ROM version \$55.95, floppy disk version \$47.95; LucasArts Entertainment Co.; 800/782-7927, 415/721-3300

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• **Star Trek 25th Anniversary CD ROM** \$49.95; Interplay; 800/969-4263

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Michael Goodwin is a PC World contributing editor. He can be reached on PC World Online (see page 10 for contact information). ■

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WinWord Bass-o-Matic

I recently underwent a major transition in life—like birth or unemployment: I changed word processors. I gave up my trusty old copy of DOS WordStar and plunged into Microsoft Word 6.0 for Windows. I've made it through the purgatory of learning the basics and even found some neat features. I love AutoCorrect, which handles my errors with aplomb (*not aplmob*), and Revisions keeps me from duking it out with my editor. I'm getting to like WinWord so much, I want to make it perfect.

What's missing? For one thing, WinWord offers no easy way to save a file to a directory other than the one you're already in. Sure, I could scroll through the dialog box one level at a time, but I said "easy." And how about a quick way to open a list of my favorite templates—minus all Microsoft's packaged wizards—when I open a new document?

To get closer to nirvana, I tried out dozens of add-in tools: some commercial, some shareware, and some free. Each is cleverer than the last, and all slice more than a few minutes from my computing time. I even found one gem that also works with Ami Pro and WordPerfect for Windows.

Whopper of a Program

For sheer comprehensiveness, nothing beats PineCliffe's WOPR (pronounced "whopper"). For starters, this \$49.95 shareware package gives me a real file manager right inside WinWord. Not only can I copy, rename, and delete files, I can jump quickly into my most frequently used directories. WOPR also lets me create and choose from a set of custom file types, making it easy for me to find my old WordStar files. WOPR adds its own commands to the File menu, including a Save As with all the trimmings, and a New File with a customizable list of favorite templates.

By Steve Bass

WOPR also helps WinWord catch my mistakes. With a click of the right mouse button, WOPR checks the current word's spelling. That's good, but what's great is that I can hold down <Ctrl> to add the misspelling—and its correction—to Word's AutoCorrect list. Stellar Speller is also smarter than Word's spell checker. For example, Word objects to 'misspelling-', while Stellar Speller knows enough to ignore the '-'. I can also get to the thesaurus while I'm editing with the mouse.

What else is there to say? I was enamored of Word's Envelope feature until I loaded WOPR's Envelopr. Now I get to choose from multiple return addresses, add graphics, change fonts, and place messages on the envelope's lower left corner. Another nice feature: When I bring up WinWord's Edit•Replace dialog box, WOPR pops the currently selected text into the Find What text box. Curiously, WOPR doesn't do this for a simple Edit•Find, but it does let me skip quickly forward or backward in my search. And if you don't like a specific feature, WOPR uninstalls it, something I wish more products would do.

Download a copy—WOPR60.ZIP—from PC World Online (see page 10 for more information), or just call PineCliffe directly. • *WOPR \$49.95; PineCliffe Int'l; 800/659-4696, 314/965-5630. Reader service no. 753*

I also found other worthwhile WinWord add-ins, three of which I've uploaded to PC World Online. At the low end of the price range (free) are Directory Changer (WRDR06.EXE), for jumping quickly between your eight favorite directories, and FileDelete (WDDEL.ZIP), which does just what the name implies. (George Campbell discussed FileDelete in June's *Word Processing*.) For a bit more money, File-



ware manages your files and lets you substitute one font for another globally (FW3W6.ZIP). • *Fileware \$39.95; Total System Solutions; 800/814-2300, 718/375-6261 (fax). Reader service no. 754*

Ultimate Mail Merge

I send out a lot of mailings, and having a database program like Office Accelerator tied to my word processor is a big convenience. This add-in goes way beyond WinWord's mail merge, letting me store 32,000 names, each with ten phone numbers and addresses, various search keys, and 16 pages of notes. Besides handling mass mailings and faxes, it can also drop an address into a single letter and dial phone numbers.

Office Accelerator also works with WordPerfect for Windows and Ami Pro. It's a commercial program, so I can't put it on PC World Online without getting arrested. But, I've seen it discounted to \$50. • *Office Accelerator \$99.95; Baseline Data Systems; 800/429-5325, 310/214-8529 (fax). Reader service no. 755*

Now if only an add-in could give WinWord the WordStar key commands.

Contributing Editor Steve Bass is president of the Pasadena IBM Users Group. He can be reached on PC World Online (see page 10 for contact information).

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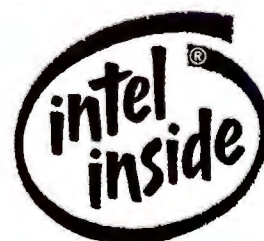
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